

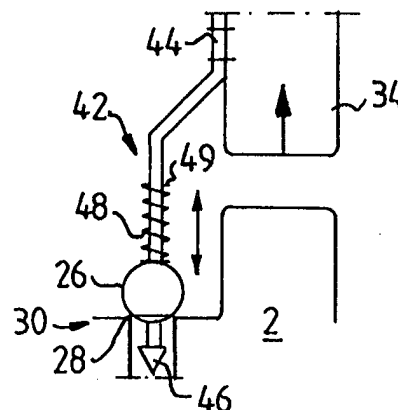


INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : A47L 15/42	A1	(11) International Publication Number: WO 98/22015 (43) International Publication Date: 28 May 1998 (28.05.98)
(21) International Application Number: PCT/SE97/01959 (22) International Filing Date: 21 November 1997 (21.11.97) (30) Priority Data: 9604298-1 22 November 1996 (22.11.96) SE (71) Applicant (for all designated States except US): VIPTOP AB [SE/SE]; Avtalsvägen 15, S-227 61 Lund (SE). (72) Inventor; and (75) Inventor/Applicant (for US only): ROGMARK, Bertil [SE/SE]; Avtalsvägen 15, S-227 61 Lund (SE). (74) Agents: HELLBOM, Lars et al.; H Albihns Patentbyrå AB, P.O. Box 3137, S-103 62 Stockholm (SE).		(81) Designated States: JP, US, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i> <i>In English translation (filed in Swedish).</i>

(54) Title: DISHWASHER**(57) Abstract**

The invention relates to a dishwasher (2) using abrasive granules and having an overflow spillway (18) provided with a valve (30) which has a valve ball (26), which by means of an operating arm (42) is positively controlled, for example, depending on the movement of the dishwasher lid (34).



FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MN	Mongolia	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakstan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

Dishwasher

The invention relates to a dishwasher using abrasive granules and comprising a tub having an arrangement for spraying washing liquid against dishwares in the tub, means for supplying rinse water and an overflow spillway arranged for regulating the water level in the tub

A dishwasher of conventional type has a pump which draws dishwater from the tank of the dishwasher and sprays it out through a washing pipe. The dishwater circulates in this manner until the washing is completed, and the pump then stops. During the so-called rinse cycle clean hot water is supplied from outside and is sprayed in through a rinse pipe. The amount of water which is sprayed in during the rinse cycle will raise a level so that water begins to run out through an overflow spillway connected to the dishwasher drain. The overflow spillway is provided with a filter to prevent abrasive material from exiting through the drain. The filter will, of course, not only prevent the abrasive material from entering the drain but also dirt which floats on the surface of the dishwater, and this is not a desirable function.

Furthermore, the surplus water will flow towards the drain as soon as the level has been raised so that the surface tension of the water towards the drain has been broken. This situation tends to cause dirt particles to remain in the water surface around the overflow spillway instead of running out with the water.

Dishwashers with overflow spillways are previously known, e.g. by WO 88/08270, which shows a dishwasher with an overflow spillway. In this type of machine, only a small volume of rinse water is used, between 2 and 5 liters, which, since it is collected in the tank 1, causes the level in the tank 1 to be raised temporarily, somewhat over the overflow level. This enables the surface layer of the liquid in the tank 1 to be diverted through the overflow spillway together with grease, food and other

contaminants floating on the liquid. In certain cases there is foam formation for various reasons during the work cycle of the dishwasher, involving formation of a significant foam layer above the lower liquid layer. Even if the liquid level lies below the opening of the overflow spillway, the foam takes with it an undesirable amount of dishwater through the overflow spillway. The overflow spillway of the dishwasher is therefore equipped with a float valve, which is intended to prevent foam and dishwater from disappearing through the overflow spillway even if the dishwater level normally lies below the overflow level. The float valve does not, however, facilitate diversion of the dirt particles to the overflow spillway.

The purpose of the present invention is therefore to achieve an overflow spillway for an abrasive granule dishwasher of the stated type, which has an arrangement which prevents both dishwater and abrasive granules from disappearing through the spillway during the operating cycles of the dishwasher and which reduces the contamination of the dishwater. This is achieved with an overflow spillway which is in the form of a standpipe disposed in the tub and having a valve connected thereto, which is operable between an open and a closed position in such a manner that the standpipe is closed during the work cycle of the dish-washer, and cannot be opened until the work cycle has been completed.

Advantageous further developments and improvements of the invention will be evident in the dependent claims.

A preferred embodiment of the invention will be explained in more detail below with reference to the accompanying schematic drawing. The drawing shows in:

Fig. 1 a dishwasher using abrasive granules with a conventional overflow spillway,

Fig. 2 a strainer for the conventional overflow spillway,

Figs. 3-5 an overflow spillway valve, according to the invention, during different stages of the operating cycle of the dishwasher,

Figs. 6-8 different variants for the positively controlled operation of the overflow spillway valve by means of the movement of the dishwasher lid, its door, or the movement of the dishware rack.

5 Fig. 1 shows a conventional abrasive granule dishwasher 2, having a tub 4 for dishes and a collection tank 6 for dishwater. The tub has a washing spray arm 8 which is connected to the pressure side of a pump 10, the suction side of which is connected to a bottom drain 12 in the tank. A rinse spray arm 14 is also arranged in the tub 4 and is connected to an external source 16 of clean hot water. In the tub 4 of the
10 dishwasher there is a substantially vertical standpipe overflow spillway 18 connected to the dishwasher drain 20.

Since abrasive granule dishwashers operate with granules mixed into the water, the overflow spillway is provided with a strainer 22 to prevent the granules from going
15 out through the drain.

During a washing cycle, the pump 10 draws dishwater from the tank 6 and sprays it through the washing spray arm 8 against the wares to be washed (not shown). The dishwater is collected in the tank 6 and is circulated in this manner until the end of
20 the washing cycle, when the pump stops. The rinse cycle then begins, where clean hot water is supplied from the hot water line 16, showering the dishwares through the rinse spray arm 14. Before the washing begins, the control system of the dishwasher checks that the dishwater level is correct in the tub 4 and further water is added, if necessary, via the external source 16. The amount of water sprayed in
25 during the rinse cycle will raise the level 24 so that water begins to run out through the overflow spillway 18. Since the overflow spillway is provided with the strainer 22, the water must first pass through the strainer. The strainer will, however, not only prevent granules from passing but also grease and other contaminants, floating on the surface of the dishwater, from going out through the drain, and this is undesirable. Furthermore, the excess water will flow towards the drain, as soon as the
30

level has been raised so much that the surface tension of the water at the outlet is broken. This situation causes dirt and grease particles to remain on the water surface around the strainer and the overflow spillway instead of running out with the water.

- 5 According to the invention, however, the strainer 22 has been eliminated and the overflow spillway 18 has instead been provided with a device, preferably in the form of a ball 26 disposed at the opening 28 of the overflow spillway standpipe 18, thereby forming a valve 30. The ball seats against the opening 28 under influence of a weight 31. The valve seals the overflow spillway when the pump 10 is activated.
- 10 During the rinse cycle, using the rinse spray arm 14, no abrasive granules can come into the spillway when the granules are circulating with the dishwasher, since the valve is closed (Fig. 3).

- As best can be seen in Fig. 4, the water level 24 during the rinse cycle rises to a higher level 32. During the rinse cycle, approximately 3-15 liters of clean hot water are supplied while the valve 30 is still closed, which means that the water level 24 will be raised to a new level 32, which for the stated amount of added hot water, lies 10-15 mm above the lower level 24. After completed rinsing, the valve 30 is opened by lifting the ball 26 upwards (see Fig. 5). Due to the greater level differential, a significantly better flow is obtained, which effectively draws with it dirt and food particles floating on the surface of the dishwater. Since the strainer 22 has been eliminated, the contamination of the water in the dishwasher tank is reduced so that the dishwater does not need to be changed as often as in other overflow spillway designs.

25

- The movement of the valve can of course be achieved in various manners, for example by electromechanical (linear) means or by water hydraulics, but a simple and cost-saving method is to use the existing mechanical movements in the operating cycles of the dishwasher. In a dishwasher of the type in question, there are three such suitable mechanical movements. Such movements can be closing or opening
- 30

of the tub, for example, if the dishwasher has a lid 34 or doors 36. Certain machines have a rotating rack (not shown in the drawing) which is driven by a drive mechanism comprising a drive shaft 38 which is displaced upwards, as seen on the drawing, to engage the rack or downwards to release it. At the end of the operating cycle of the dishwasher, the lid 34 is lifted, the doors 36 are opened or the rack drive mechanism 38 moves down for emptying the machine so that it can be used again.

Fig. 6 shows the operation of the valve 30 in a dishwasher 2, the lid 34 resting in its closed position on the dishwasher 2. An operating arm 42 is fixed 44 with one end to the inside of the lid 34. The ball 26 has a hole slidably fitted to the cross-section of the operating arm, and by means of which the ball can be displaced along the arm 42. The other end of the arm is made as an end abutment 46, and a compression spring 48 acts between a spring shoulder 49 on the operating arm and the ball 26, which is thus pressed towards the end abutment 46 when the lid is open and against the opening 28 of the overflow spillway standpipe when the lid 34 is closed. The ball 26 is thus directly actuated by the movement of the lid via the arm 42 and the spring 48 in both directions, as shown by the double arrow. When the lid 34 of the dishwasher is lifted, its movement in the direction of the single arrow can thus be used to open the valve 30 by virtue of the fact that the arm 42 lifts the ball from its seat in the opening 28 of the overflow spillway standpipe. The valve ball 26 will in this case assume the position shown in Fig. 5, and since the dishwater at the end of the work cycle of the dishwasher has assumed a higher level 32, the excess water will run out through the overflow spillway 28 with a relatively powerful flow, which means that practically all of the grease, food particles and other contaminants floating on the surface of the dishwater will flow with the dishwater out through the overflow spillway.

Fig. 7 shows an additional embodiment of a dishwasher 2 which has openable doors 36. A double-ended lever 50 has a 90 degree bend and is pivoted 52 in the dishwasher 2. One arm rests against the door 36 when the door is closed and is provided

with a weight 54, while the other arm is connected to the ball 26. The ball 26, when the door 36 is closed, is pressed against the opening 28 of the overflow spillway.

When the door is opened, the valve 30 is moved to its open position by virtue of the fact that the weight 54 is released and tips forward against the dishwasher 2, and this in turn lifts the other end of the lever and the ball 26 from the opening 28, thereby opening the valve.

Fig. 8 shows an additional embodiment for controlling the valve 30 utilizing the movement of the drive shaft 38 for the drive mechanism of a rotating rack (not shown). In this embodiment a straight, two-armed lever 56 is pivoted 58 centrally in the dishwasher 2. One end of the lever is actuated by the drive shaft 38 which, when it is in its engaged position shown in Fig. 8, is located immediately above the lever, the other end of which is connected to the ball 26 which seats, due to its weight, against the opening 28. When the drive shaft 38, after the dishwasher has completed its work cycles, moves in the direction of the arrow, the ball 26 is lifted by the lever 56 from its seat in the opening 28, and the valve is thus opened.

In the embodiments described, the valve means is in the form of a ball 26, but the valve means can, of course, be in the form of a flat valve disc or a conventional valve disc, or can have another form suitable to its valve function. The opening 28 of the overflow spillway standpipe should also be made with a shape complementary to the valve means.

Claims

1. Dishwasher (2) using abrasive granules and comprising a tub (4) having an arrangement (8) for spraying washing liquid against dishwares in the tub, means
5 (14) for supplying rinse water and an overflow spillway (18) arranged for regulating the water level (24,32) in the tub, **characterized** in that the overflow spillway is in the form of a standpipe (18) disposed in the tub (4) and having a valve (30) connected thereto, which is operable between an open and a closed position in such a manner that the standpipe (18) is closed during the work cycle of the
10 dishwasher, and cannot be opened until the work cycles have been completed.
2. Dishwasher in accordance with Claim 1, **characterized** in that the valve (30) is in the form of an opening (28) to the standpipe (18) and a valve means (26), said opening (28) being sealable by means of the valve means, which is joined to
15 operating means (42,50,56), which control the valve as a function of whether the tub is opened or closed.
3. Dishwasher according to Claim 2, **characterized** in that the operating means
20 comprise an operating arm (42,50,56), which can be actuated by means of mechanical movements positively controlled at the beginning or end of the work cycles.
4. Dishwasher according to Claim 3, **characterized** in that the operating arm (42) is controlled by the lid (34) of the dishwasher.
- 25 5. Dishwasher according to Claim 3, **characterized** in that the operating arm (50) is controlled by the doors (36) of the dishwasher.
6. Dishwasher according to Claim 3, **characterized** in that the operating arm (56) is controlled by a drive shaft (38), which is movably arranged for engaging a
30 rotating dishware rack.

7. Dishwasher according to Claim 4, **characterized** in that the operating arm (42) is connected at one end (44) to the lid (34) and with its other end (46) to the valve means (26).

5

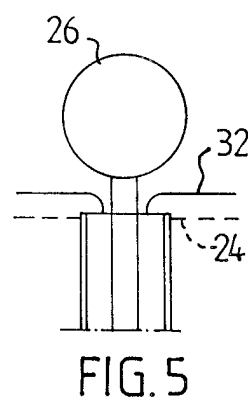
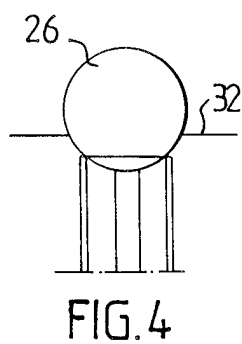
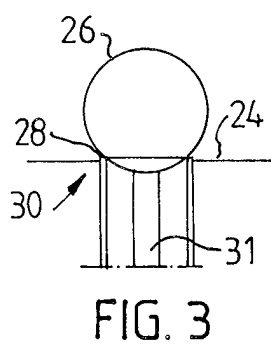
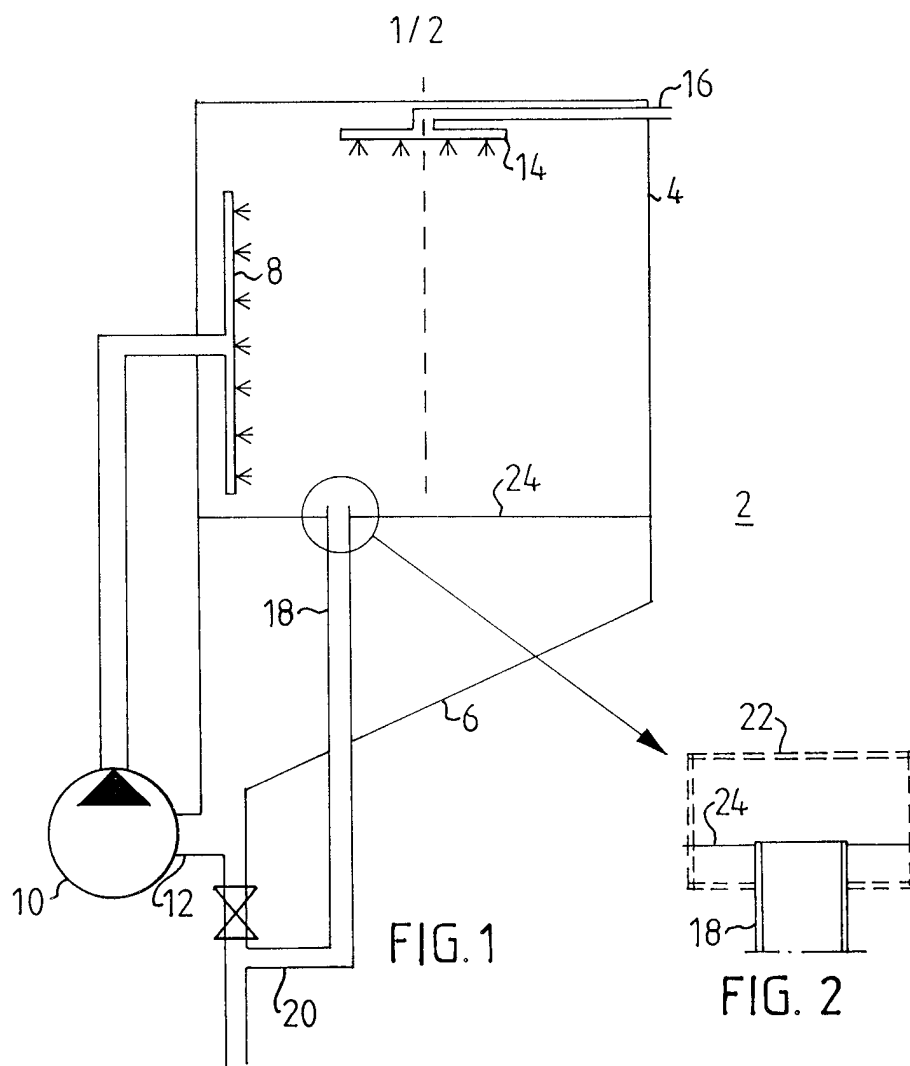
8. Dishwasher according to Claim 5, **characterized** in that the operating arm is a two-armed lever (50), which is pivoted (52) in the dishwasher (2) between its ends, one end forming an essentially 90 degree angle with the other end, that the first end is provided with a weight (54) and that the other end is articulated to the valve means (26).

10

9. Dishwasher according to Claim 6, **characterized** in that the operating arm is a two-armed lever (56), which is pivoted (58) in the dishwasher (2) between its ends, one end being actuatable by the drive shaft (38) of the dishware rack and the other end being articulated to the valve means (26).

15

10. Dishwasher according to one of Claims 2-9, **characterized** in that the valve means is a ball (26) and that the standpipe (18) is essentially vertically oriented in the tub (4).



2/2

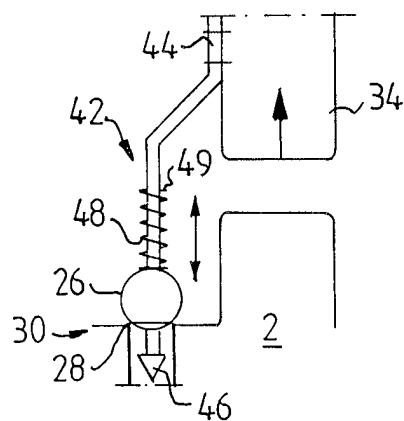


FIG. 6

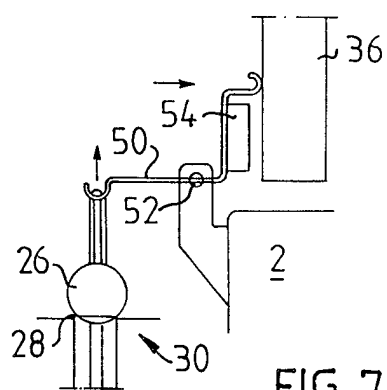


FIG. 7

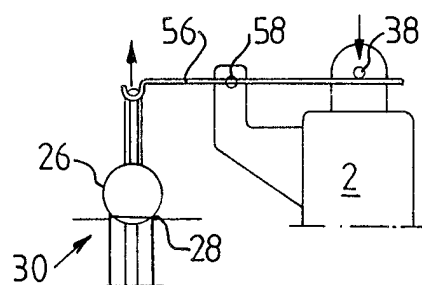


FIG. 8

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 97/01959

A. CLASSIFICATION OF SUBJECT MATTER		
IPC6: A47L 15/42 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)		
IPC6: A47L		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
SE,DK,FI,NO classes as above		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
WPI		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0333251 A2 (UNILEVER NV), 20 Sept 1989 (20.09.89), figures 1-3, abstract --	1-10
A	WO 8808270 A1 (WEXIÖDISK AB), 3 November 1988 (03.11.88), figure 1, abstract --	1.10
A	US 4257454 A (E.O. VILEN), 24 March 1981 (24.03.81), figures 1-2, abstract --	1-10
A	SE 469923 B (GRANULDISK AB), 11 October 1993 (11.10.93), figure 1, abstract --	1-10
☒ 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 "E" earlier document but published on or after the international filing date "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) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "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 "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 "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 "&" document member of the same patent family		
Date of the actual completion of the international search		Date of mailing of the international search report
30 January 1998		12.02.98
Name and mailing address of the ISA/ Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. +46 8 666 02 86		Authorized officer Paul Winblad Telephone No. +46 8 782 25 00

INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 97/01959

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4086929 A (R.E. FOCHT), 2 May 1978 (02.05.78), figure 2, abstract --	1-10
A	GB 2043433 A (LICENTIA PATENT-VERWALTUNGS-GMBH), 8 October 1980 (08.10.80), figure 1, abstract -- -----	1-10

INTERNATIONAL SEARCH REPORT

Information on patent family members

07/01/98

International application No.

PCT/SE 97/01959

Patent document cited in search report			Publication date	Patent family member(s)	Publication date
EP	0333251	A2	20/09/89	SE 0333251 T3 AU 3133089 A	21/09/89
WO	8808270	A1	03/11/88	SE 457324 B,C SE 8701678 A	19/12/88 24/10/88
US	4257454	A	24/03/81	NONE	
SE	469923	B	11/10/93	AT 137093 T AU 668140 B BR 9206903 A DE 69208103 D,T DE 69302373 D,T EP 0615495 A,B SE 0615495 T3 EP 0629121 A,B SE 0629121 T3 FI 942656 A FI 944056 A JP 7501770 T NO 300721 B NO 942172 A NO 943258 A SE 9200639 A US 5527066 A WO 9317610 A	15/05/96 26/04/96 21/11/95 30/05/96 19/09/96 21/09/94 21/12/94 06/06/94 02/09/94 23/02/95 14/07/97 10/06/94 02/09/94 04/09/93 18/06/96 16/09/93
US	4086929	A	02/05/78	CA 1071974 A DE 2749344 A,C FR 2369820 A,B GB 1591535 A	19/02/80 21/09/78 02/06/78 24/06/81
GB	2043433	A	08/10/80	DE 2907269 A FR 2449432 A,B	28/08/80 19/09/80