(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 449 952 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
25.08.2004 Bulletin 2004/35

(51) Int Cl.[7]: **D06F 39/02**

(21) Application number: **03100391.6**

(22) Date of filing: **19.02.2003**

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

(71) Applicant: **WHIRLPOOL CORPORATION**
Benton Harbor Michigan 49022 (US)

(72) Inventor: **Lachenmayer, Rolf**
V.le G. Borghi 21025 Comerio (IT)

(74) Representative: **Guerci, Alessandro**
Whirlpool Europe S.r.l.
Patent Department
Viale G. Borghi 27
21025 Comerio (VA) (IT)

(54) Washing machine with detergent distributor

(57) A washing machine presents a detergent distributor comprising a drawer (16) movable within a housing (18) provided in the front part of the machine. The drawer (16) and the housing (18) are provided with rollers (19,21,29,50,52) rotatably mounted on them and apt to cooperate with longitudinal profiles on the drawer (16) and/or the housing (18) for assuring a smooth movement of the drawer.

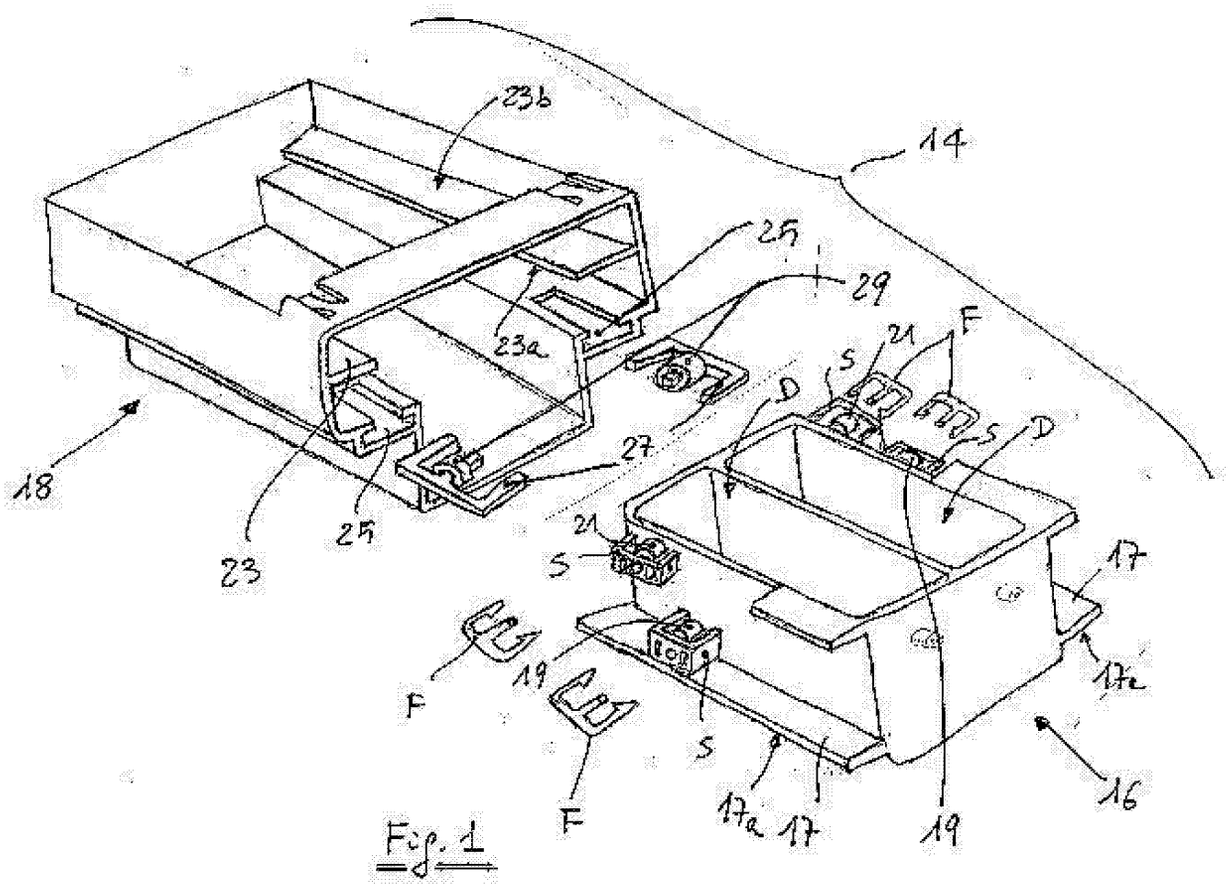

Fig. 1

EP 1 449 952 A1

Description

[0001] The present invention relates to a washing machine with a detergent distributor comprising a drawer movable within a housing provided in the front part of the machine.

[0002] For front loading washing machines, extractable drawers with a plurality of compartments are commonly known into which the user fills the detergent, fabric softener, and bleach. After the drawer is pushed in and the program is started, the machine automatically flushes the detergents into the soap container of the machine at the right time. The guide of this drawer in the corresponding housing or box, into which the drawer is pushed and which is responsible for directing the water into the individual drawer chamber, consists typically of grooves on the left and right side of the box, into which two corresponding ledges of the drawer are slidably inserted.

[0003] There are also models with a rib in the groove, onto which a corresponding profile of the drawer slides and along which the drawer is inserted into the box.

[0004] Due to large tolerances of the plastic material, the guides in both cases do not allow a smooth sliding of the drawer, also in view of friction between the drawer and its housing.

[0005] A solution is known from DE-A-10061155 in which several rollers or balls are interposed between rails in the housing and in the drawer respectively. Such rollers or balls are then interposed between the rails and they need cages to be maintained in the proper position. This kind of construction is quite complex and expensive.

[0006] Moreover, in order to deal with forces directed in different directions when the drawer is pulled out, the number of rolls/balls has to be high and the shape of the cage very complex, increasing the final cost of the detergent distributor. Additionally, the assembly of rollers and cages according to the above piece of prior art is quite difficult.

[0007] The present invention eliminates the above drawbacks and provide a detergent distributor with a cost comparable to the present one, with a smooth pulling out/in movement which is independent on how the force is applied by the user to the drawer. Moreover the detergent distributor according to the invention gives the user a solid, stable, and user-friendly impression. The task is solved according to the attached claims.

[0008] As will become apparent from the following description, the invention can provide a detergent distributor whose drawer has a very smooth movement in and out of its housing, and which is more reliable to use.

[0009] Other features and advantages of the present invention will be more clearly apparent from the following description, given solely by way of non-limiting example, with reference to the accompanying drawings in which:

- Figure 1 is a perspective exploded view of a detergent distributor according to the present invention used in a front-loading washing machine;
- Figure 2 is a perspective view, similar to figure 1, of a detergent distributor according to a second embodiment of the invention;
- Figures 3 and 4 are schematic lateral views showing how the detergent distributor according to figure 1 can work properly even when different forces are applied to the drawer.

[0010] With reference to the drawings, a front loading washing machine (not shown) is provided, in its front wall, with a detergent distributor 14 comprising a drawer 16 and a housing 18 in which the drawer 16 is slidably mounted. With reference to the first embodiment shown in figure 1, the drawer 16 is provided with detergent and/or softener/bleach compartments D and, on each of its sides, with a first longitudinal rib 17 and with two rollers 19 and 21 respectively

[0011] The two rollers 19 and 21 on each side of the drawer 16 are placed in the rear area thereof and they are staggered in height, so that the fist roller 19 is at a lower level compared to the second roller 21, and it is placed at a longer distance from the rear wall of the drawer 16 compared to the second roller 21. Both rollers 19 and 21 are rotatably mounted to the side of the drawer by means of E-shaped clip elements F which are apt to be snap-engaged in corresponding apertures (not shown) in the sides of the drawer 16. The clip elements F are used to fasten U-shaped supports S in which rollers 19 and 21 are rotatably mounted. The housing 18 is provided, in its front area, with a couple of seats 25 in the form of grooves apt to receive two E-shaped roller holders 27 on which rollers 29 are rotatably mounted, one for each side of the housing 18. Such rollers 29 are designed to cooperate with a lower surface 17a of the first rib 17 as will be clear from the following description, particularly with reference to figures 3 and 4. Both rollers 19 and 21 are dimensioned so as to cooperate with a second longitudinal rib 23 integral with the housing 18. In particular, the first or lower roll 19 is apt to cooperate with a lower surface 23a of the rib 23, while the second or upper roll 21 is designed to cooperate with an upper surface 23b of the rib 23.

[0012] The drawer 16 can then be inserted into the horizontal rib 23 between the two rollers 19 and 21 in the rear area, wherein the rib 23 is molded to the housing or box 18. The drawer is guided between the two rollers 19 and 21 and it is thus supported on the top and bottom.

[0013] In the front area of the housing 18 each roller 29 is attached to the left and right side of the box, and the drawer 16 runs, by means of rib 17 thereof, on these rollers 29 as well. The drawer then runs on rollers with reduced surface friction drag and gives the customer the perception of being easily operated.

[0014] With reference to figures 3 and 4, it is clear that the rollers 19, 21 and 29 do not always contact the rib

17 and 23 fixed to the drawer 16 and to the housing 18 respectively, since this depends on how forces are applied to the drawer by the user. As a matter of fact the user can pull out the drawer exerting also a vertical force Fa downwardly directed (figure 3). In this case there will be a gap between the rib 17 and the lower roller 19 of the drawer, and a gap between the rib 23 of the housing and the upper roller 21 of the drawer. The movement of the drawer 16 will be then mainly guided by the roller 29 of the housing 18 and by the lower roller 19 of the drawer.

[0015] If the user exerts a vertical force Fb upwardly directed (figure 4), there will be a gap between the rib 17 and the two rollers 19 and 29, and therefore the movement of the drawer 16 will be mainly guided by the rollers 19 and 21 of the drawer rolling on the rib 23 of the housing 18.

[0016] In view of the above, it is clear that there is no roller between two ribs, rails or tracks as in prior art according to DE-A-10061155, rather there are three fixed rollers (on each side of the drawer) which are not in contact with both ribs. A part from the advantage of having only three rollers on each side of the drawer, the detergent distributor according to the above-described embodiment is easy to disassemble and to clean.

[0017] In a second embodiment of the invention (figure 2), the drawer 16 is suspended on rollers in horizontal and vertical direction, wherein the rollers 50 and 52 are held by roller holders 50a and 52a respectively mounted in corresponding grooves 54 and 56 in the housing 18, so that the drawer can be pulled out with reduced friction. In this embodiment the drawer 16 present two upper wing portions 58 in which are defined U-shaped channels 58a in which the rollers 50 can rotate. The rollers 52 with vertical axes rotate on side surfaces 58b of the wing portions 58.

Claims

1. Washing machine with a detergent distributor comprising a drawer movable within a housing provided in the front part of the machine, **characterized in that** the drawer (16) and/or the housing (18) are provided with rollers (19, 21, 29, 50, 52) rotatably mounted on them and apt to cooperate with longitudinal profiles (17, 23, 58, 58a, 58b) on the drawer (16) and/or the housing (18) for assuring a smooth movement of the drawer.

2. Washing machine according to claim 1, **characterized in that** the drawer is provided, on each side, with two rollers (19, 21) at different levels, the housing (18) being provided, on each side thereof, with a third roller (29) apt to cooperate with a longitudinal profile (17) of the drawer (16), the first two rollers (19, 21) being apt to cooperate, on opposite sides (23a, 23b), with a longitudinal auxiliary profile (23) of the housing (18).

3. Washing machine according to claim 2, **characterized in that** said two rollers (19, 21) are rotatably mounted nearby the rear portion of the drawer (16), a first roller (19) being at a lower compared to a second roller (21), the second roller (21) being closer to the rear wall of the drawer (16) compared to the first one (19), the third roller (29) being rotatably mounted on the housing (18) at a level lower than the first two rollers (19, 21).

4. Washing machine according to claim 2 or 3, **characterized in that** the first two rollers (19, 21) are mounted to the drawer (16) by means of snap-engaging elements (F, S).

5. Washing machine according to claim 2 or 3, **characterized in that** the third roller (29) is mounted on a roller holder (27) installed in a groove (25) of the housing (18).

6. Washing machine according to claim 1, **characterized in that** the housing (18) comprises, on each side thereof, a longitudinal horizontal groove (54) and a longitudinal vertical groove (56) in which are installed rollers holder (50a, 52a) carrying a plurality of rollers (50, 52) apt to cooperate with the drawer (16).

7. Washing machine according to claim 6, **characterized in that** the drawer (16) present two upper side wings (58, 58a, 58b) apt to cooperate with the rollers (50, 52).

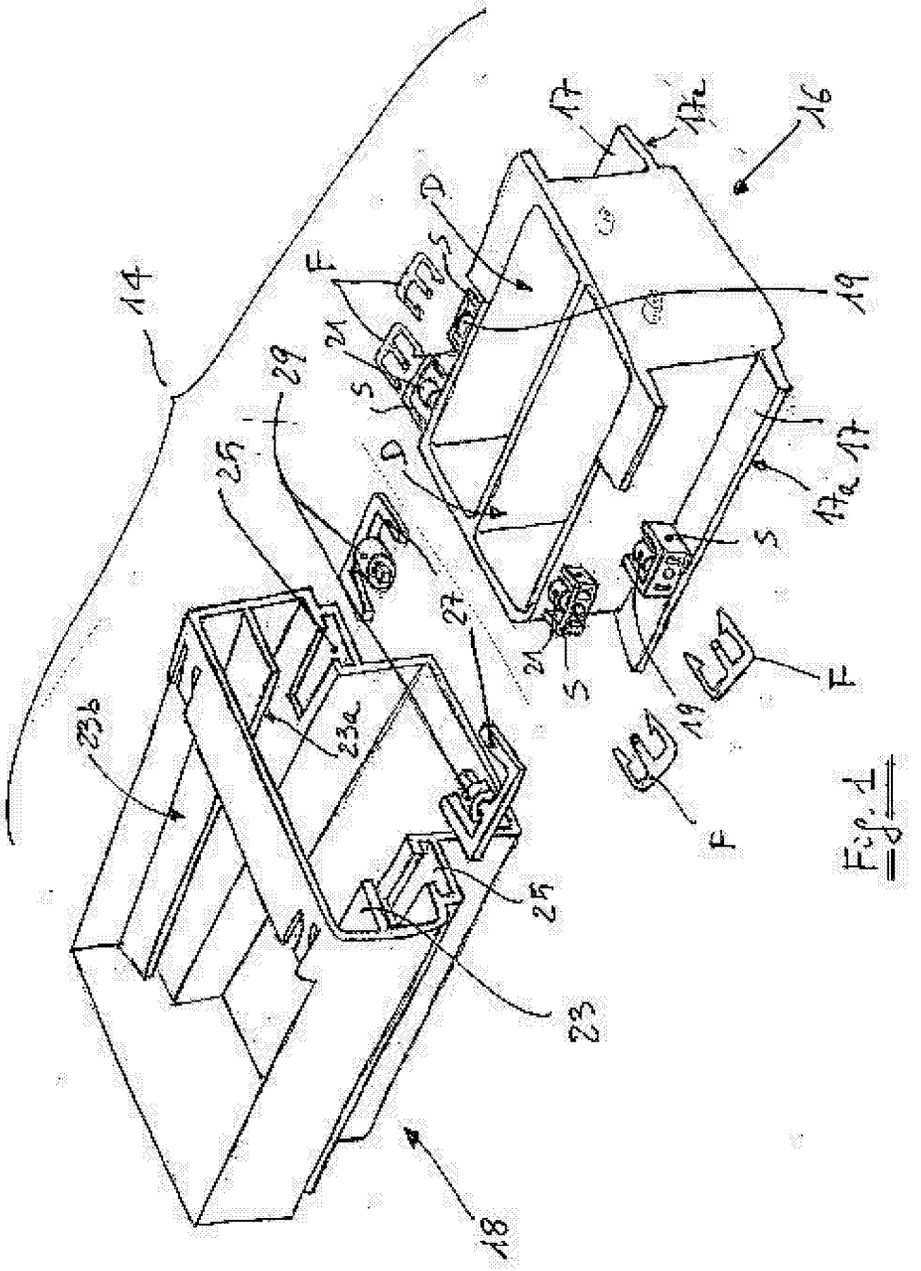

Fig. 1

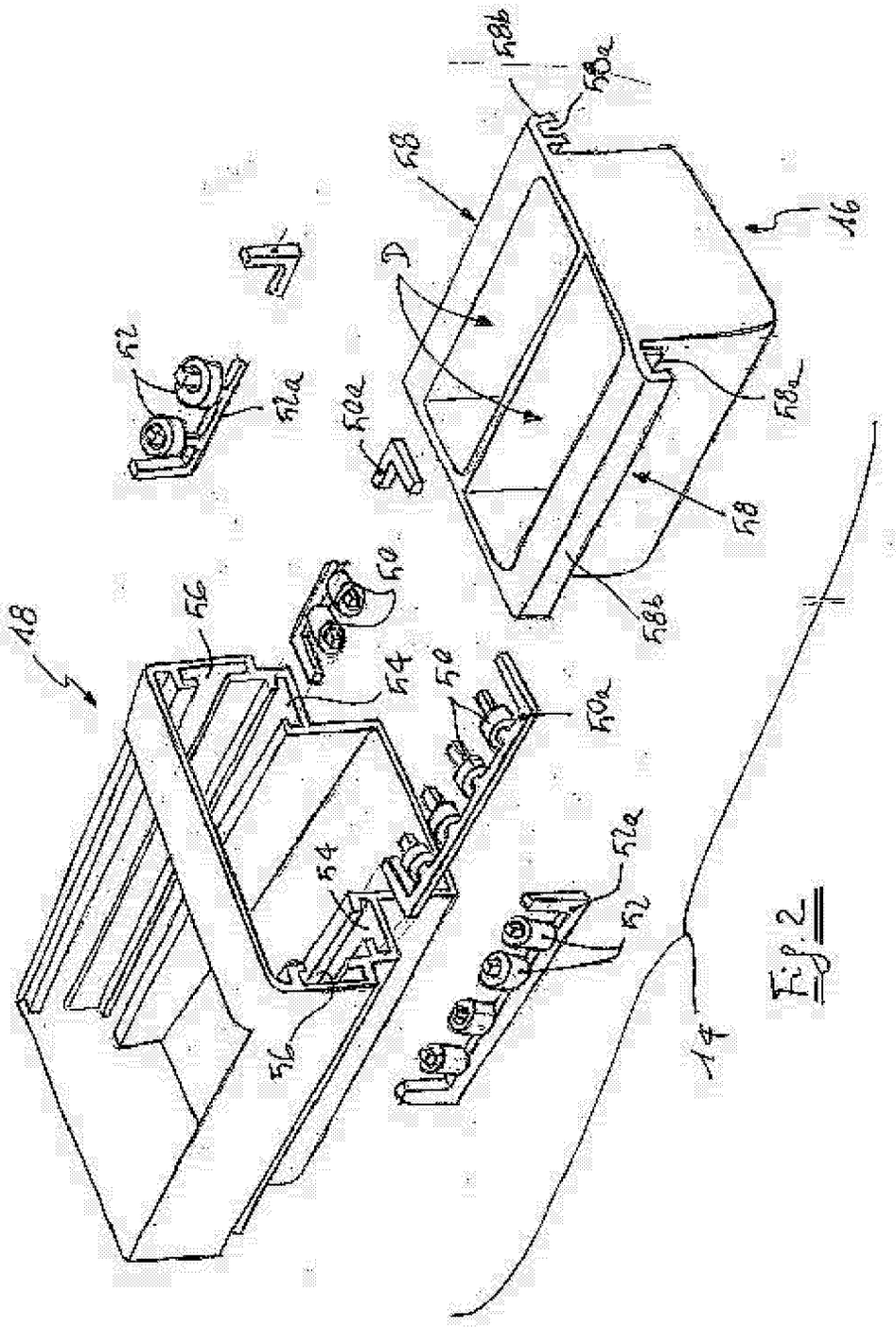

Fig. 2

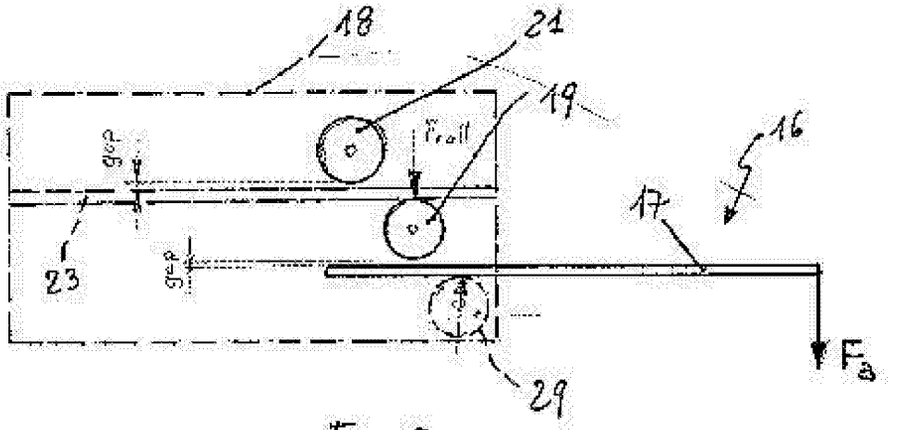
18
21
19
16
17
23
gap
gap
F_{roll}
F_b
29

Fig. 3

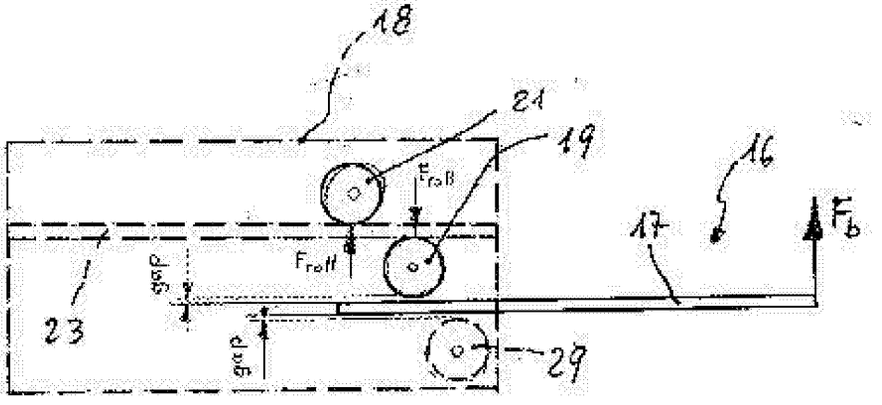
18
21
19
16
17
23
gap
gap
F_{roll}
F_{roll}
F_b
29

Fig. 4

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 10 0391

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.7)
A	GB 1 211 560 A (WILKINS & MITCHELL LIMITED) 11 November 1970 (1970-11-11) * page 3, line 47 - line 54; figures * ---	1	D06F39/02
A,D	DE 100 61 155 A (BSH BOSCH UND SIEMENS HAUSGERÄTE GMBH) 27 June 2002 (2002-06-27) * claim 1; figures * -----	1	

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

D06F
A47L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	18 July 2003	Courrier, G

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 ON EUROPEAN PATENT APPLICATION NO. EP 03 10 0391

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

18-07-2003

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 1211560 A	11-11-1970	NONE	
DE 10061155 A	27-06-2002	DE 10061155 A1	27-06-2002

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82