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(54) Washing machine with a detergent distributor

(57) A washing machine presents a detergent distributor comprising a drawer movable within an housing provided in the front part of the machine. Between the drawer and the housing there is interposed, on each

side of the detergent distributor, at least a sliding bar provided with resilient elements adapted to urge with a predetermined force said sliding bar against the drawer or the housing in order to to compensate tolerances between the drawer and the housing.

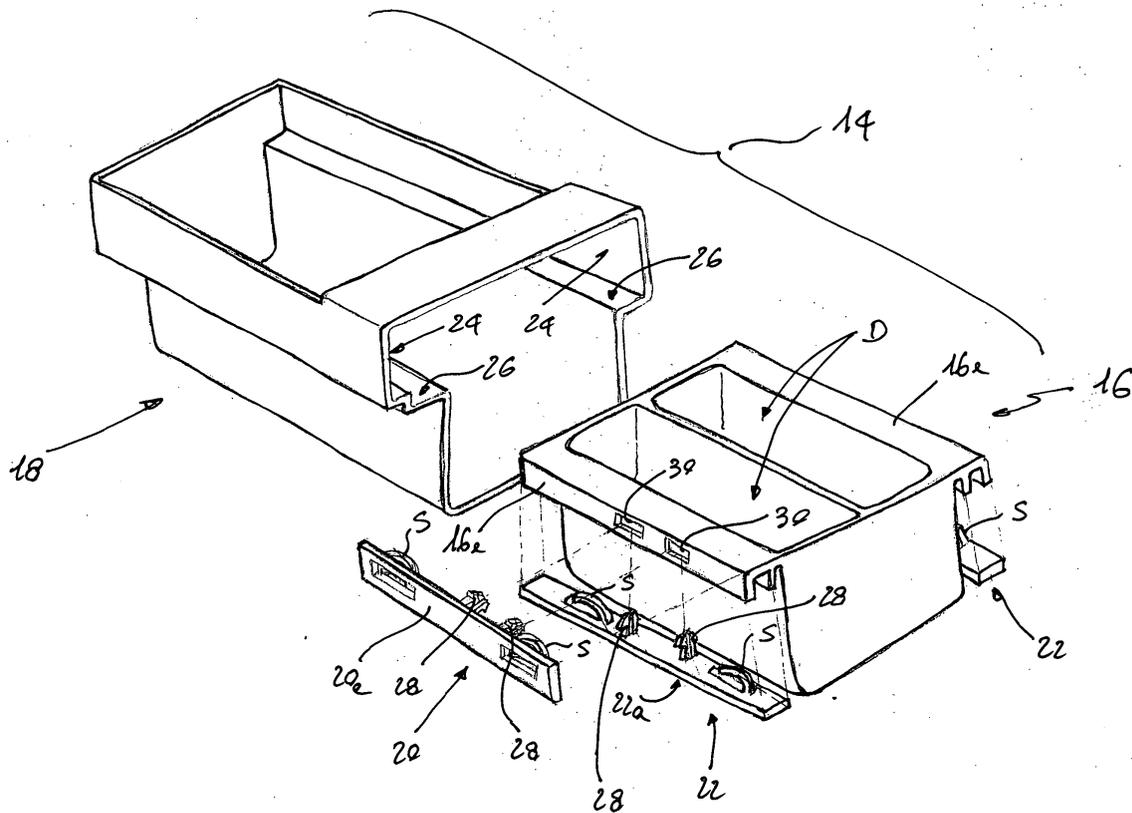


Fig. 2

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## 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. 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. 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.

**[0002]** Due to the large tolerances of the plastic material, the guides in both cases are not without play and it is not possible to prevent the drawer from being wobbly when pulling it out or pushing it in.

**[0003]** In showrooms for household appliances and the like, customers inspect the products and they touch the appliances, trying the movable operating parts of the appliances. The appliances; and in particular the accessible movable operating elements thereof, are touched. The customers check the quality based on their perception of sturdiness. This perception is an important factor in the purchase decision. It is the perceived quality in the purchase decision.

**[0004]** As for washing machines, the main elements that can be opened are the door, the detergent drawer, and the filter door, which is why they are opened and touched by the customers. The sturdiness perceived in the inspection is a very important factor for the purchase decision.

**[0005]** The present invention eliminates the tolerances in the drawer guide and therefore prevents motions that are not in direction of the guide, with a predetermined spring force. The drawer can be moved only against a predetermined small resistance and the user perceives such resistance as sturdiness and therefore as good quality.

**[0006]** Moreover, the present invention solves the task of preventing the wobbling of the drawer when moving it in and out, allowing the drawer to be pulled out and pushing it easily without the risk of jamming. The drawer, and in particular its guide, give the user a solid, stable, and user-friendly impression. The task is solved according to the attached claims.

**[0007]** As will become apparent from the following description, the invention can provide a detergent distributor whose drawer is devoid of tolerances in its movement in and out of its housing, which is therefore more reliable to use.

**[0008]** The features and advantages of the invention will be more clearly apparent from the following description, given solely by way of non-limiting example, of a preferred embodiment, with reference to the accompanying drawings in which:

- Figure 1 is a perspective view of a washing machine having the detergent distributor according to a first embodiment of the invention;
- Figure 2 is a perspective exploded view of the detergent distributor used in the washing machine of figure 1;
- Figure 3 is a perspective view, similar to figure 2, of a detergent distributor according to a second embodiment of the invention;
- Figure 4 is a perspective view, similar to figure 2, of a detergent distributor according to a third embodiment of the invention;
- Figure 5 is a perspective view of a detergent distributor according to a fourth embodiment of the invention, in a closed configuration thereof;
- Figure 6 is a section taken along line VI-VI of figure 5; and
- Figure 7 is a perspective exploded view of a detergent distributor according to a fifth embodiment of the invention.

**[0009]** With reference to the drawings, a washing machine 10 presents a casing 12 provided, in its front wall 12a, 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 2, the drawer 16 is provided with detergent and/or softener/bleach compartment D and, on each of its sides, with a U-shaped edge 16a. Each edge 16a is provided with two slide bars 20 and 22, equipped with integral spring elements S, that are attached between the drawer 16 and the housing 18 so as to cooperate with corresponding rails 24 and 26 of the housing 18. Each of the slide bars 20 and 22 present, opposite to sliding surfaces 20a and 22a respectively, shaped pins 28 which are snap-engaged within corresponding openings 30 in the edges 16a of the drawer 16 so as to fix longitudinally the sliding bars 20 and 22 to the drawer 16, and allowing a lateral movement orthogonal to the movement of the drawer, on a horizontal plane for the bar 20 and on a vertical plane for the bar 22 respectively. In figure 2, these sliding bars 20 and 22 are clipped to the drawer 16 but they might also be clipped to the housing 18 as well.

**[0010]** The sliding bars 20 and 22, equipped with spring elements S in the form of hook-shaped integral portion, even out the tolerances between the drawer 16 and the housing 18.

**[0011]** They press against the surfaces of the drawer rails 24 and 26 in horizontal and vertical direction respectively, with a predetermined force of the springs S. The drawer 16 can therefore be moved easily and only

in the direction of the rails, it does not wobble, and gives to the user a guided, stable, and solid impression.

**[0012]** In the second embodiment shown in figure 3, where the same or similar components are indicated with the same reference numerals, the task of compensating tolerances is solved by suspending the drawer 16 on rollers 31 in horizontal and vertical direction, in addition to the sliding bars 20, 22, wherein the rollers 31 are held by roller holders 32 in corresponding horizontal and vertical roller grooves 34 and 36 respectively provided in the housing 18. Each roller holder 32 is comb shaped and has a plurality of teeth 32a on which the rollers 31 are rotatably mounted: The roller holders 32 are supported in a fixed configuration in the grooves 34 and 36 so that the rollers 31 can rotate freely and can support the sliding bars 20 and 22 when the drawer 16 is pushed in or pulled out of the housing 18 with a reduced friction compared to the first embodiment. Also in this case the resilient sliding bars could be installed in the housing 18 instead of installing them in the drawer 16; in such case the rollers 31 and related roller holders 32 would be installed in grooves of the drawer 16.

**[0013]** In the third embodiment shown in figure 4, the task of compensating tolerances is solved by resilient portions of the drawer and of the housing which replace the resilient sliding bars of the previous embodiments. In detail, as far as the drawer 16 is concerned, the resilient portions consist of three wave-shaped resilient elements 33 each, which are integrally molded with the drawer along the drawer edges 16a. The shape of the resilient elements 33 is so that the drawer 18 can be removed from the mould, used in the injection-molding machine, in the regular removal direction. At the back of the drawer 16, a fourth resilient element 35 is molded in a manner that such element consists of the bent rear edge of the drawer side and in addition, on the bottom part, of a protruding nipple 35a which facilitates inserting the drawer 16 into the drawer housing 18 with a suitable insertion slant. The drawer 16, at its back portion, is also provided with slots 37 that facilitates the spring movement. On the housing side, there are provided resilient portions 38 that cooperate with an upper plane surface 16a of the drawer 16. The molded resilient elements 34 and 35 of the drawer 16, together with the resilient portions 38 of the housing 18, make up for tolerances and create a wobble-free drawer guide. Of course the wave-shaped resilient elements could be integral with the side walls of the housing 18 instead of being provided on the edges 16a of the side of the drawer 16.

**[0014]** In the fourth embodiment shown in figures 5 and 6, the task of compensating tolerances is solved by a resilient element 40 that consists of an auxiliary longitudinal side wall of the drawer 16 and it is molded on the left and right side of the drawer, wherein the side wall 40 can act as a lateral spring due to its width. The longitudinal auxiliary side wall 40 can also be wave-shaped (as shown in figure 5).

**[0015]** In the embodiment shown in figure 7, the task

of compensating tolerances is solved by a drawer 42 that is guided by one plastic rail 44 on each of the two sides, wherein the rails 44 may be extended like a telescope and inserted into the drawer 18. The rails 44 are equipped with spring elements 44a and 44b in horizontal and vertical direction respectively to make up for the tolerances between the rails and the drawer guide in the housing and to create a wobble-free drawer guide.

## Claims

1. Washing machine with a detergent distributor (14) comprising a drawer (16) movable within an housing (18) provided in the front part of the machine (10), **characterized in that** between the drawer (16) and its housing (18) there are provided resilient sliding means (20, 22, 33, 35, 38, 40, 44a, 44b) adapted to compensate tolerances between the drawer (16) and the housing (18).
2. Washing machine according to claim 1, **characterized in that** between the drawer (16) and the housing (18) there is interposed, on each side of the detergent distributor (14), at least a sliding bar (20, 22) provided with resilient elements (S) adapted to urge with a predetermined force said sliding bar (20, 22) against the drawer (16) or the housing (18).
3. Washing machine according to claim 2, **characterized in that** the drawer (16) comprises, on each side, at least a sliding bar (20, 22) laterally movable and longitudinally fixed to the drawer (16), the resilient element (S) urging the bar (20, 22) against a corresponding rail (24, 26) of the housing (18) and being interposed between the sliding bar (20, 22) and the drawer (16).
4. Washing machine according to claim 3, **characterized in that** the drawer (16) comprises, on each side, two sliding bars (20, 22) laterally movable on a horizontal and vertical plane respectively.
5. Washing machine according to claim 4, **characterized in that** each side of the drawer (16) comprises an upper portion (16a) having a horizontal surface and a vertical surface, each of these surfaces having openings (30) for corresponding mounting pins (28) of said sliding bars (20, 22) for longitudinal fastening thereof, said resilient elements (S) being integral with the bars (20, 22) and cooperating with said horizontal and vertical surfaces of the upper portion (16a) of the drawer (16).
6. Washing machine according to claim 4 or 5, **characterized in that** between the sliding bars (20, 22) and the drawer (16) there are interposed rolling means (31, 32) on which the sliding bars (20, 22)

can move with reduced friction.

7. Washing machine according to claim 6, **characterized in that** the rolling means comprise, for each sliding bar (20, 22), a roll holder (32, 32a) fixed in a corresponding groove (34, 36) of the housing (18), on each roll holder (32, 32a) being rotatably mounted a plurality of rolls (30). 5
8. Washing machine according to claim 1, **characterized in that** each side of the drawer (16) is provided with a shaped edge (16a) having a resilient portion (33, 35, 40). 10
9. Washing machine according to claim 7, **characterized in that** the resilient portion (33, 35, 40) is wave-shaped. 15
10. Washing machine according to claim 7 or 8, **characterized in that** the housing (18) is provided with resilient portions (38) acting on a corresponding top surface of the drawer (16). 20
11. Washing machine according to claim 1, **characterized in that** between the housing (18) and the drawer (42) there are provided telescopic sliding elements (44). 25

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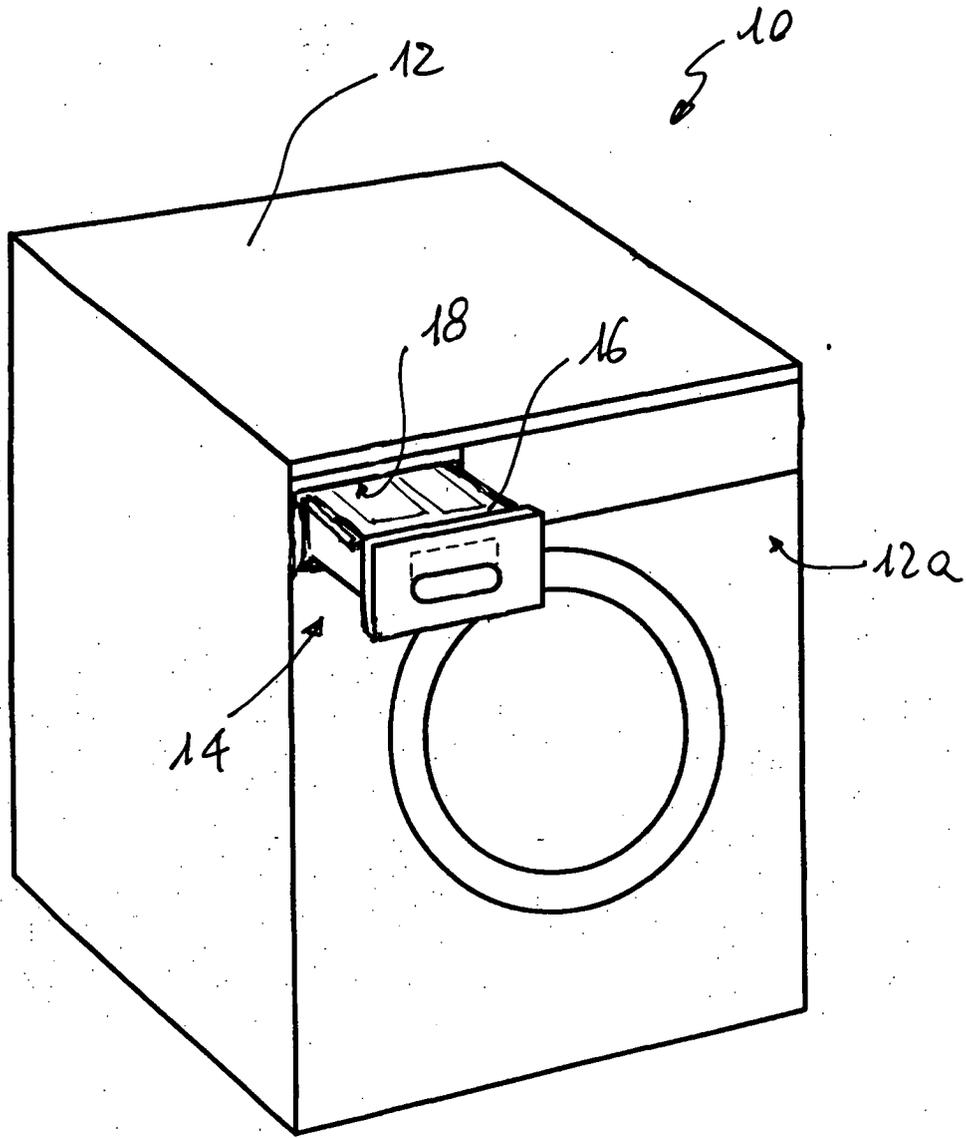


Fig. 1

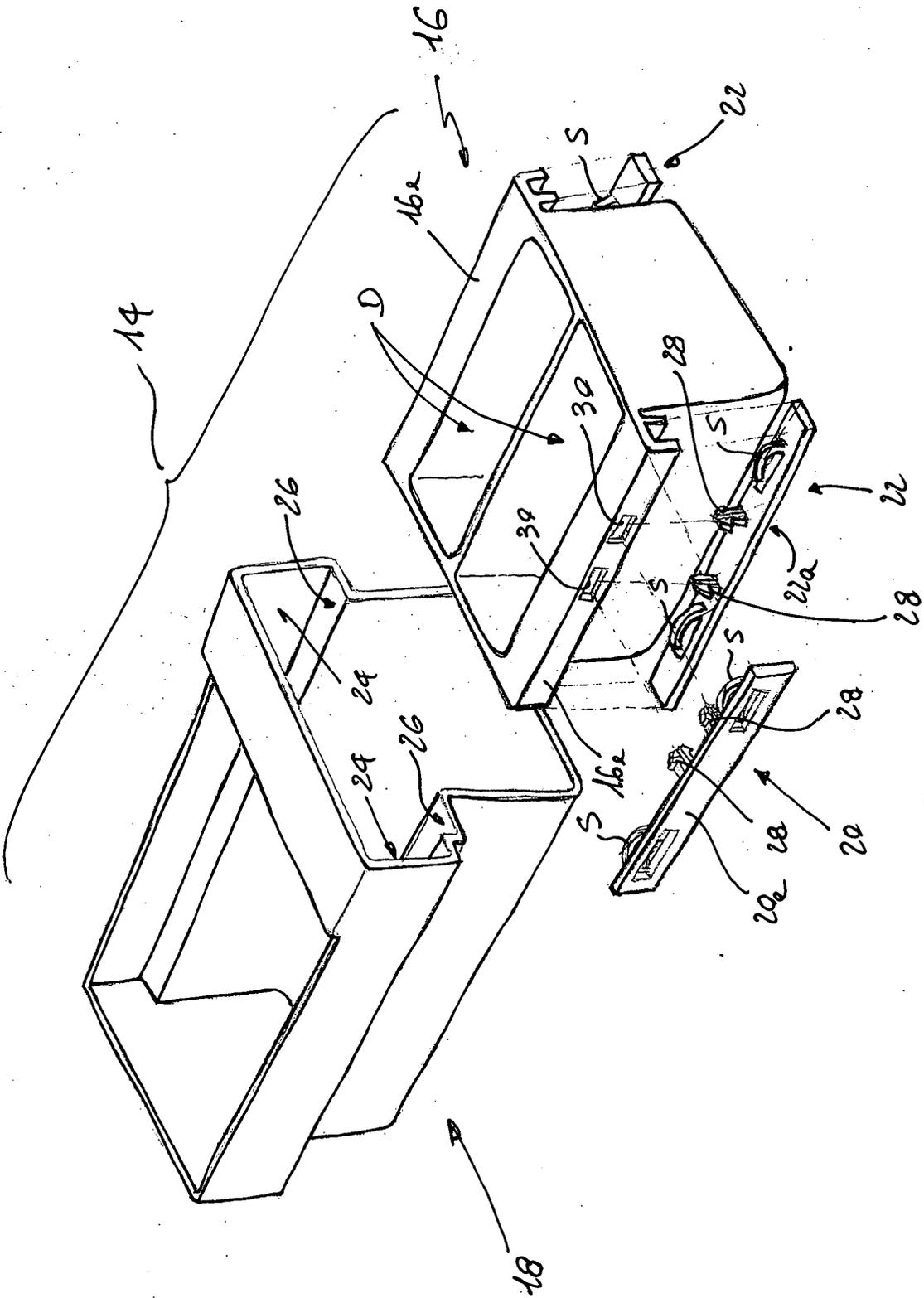


Fig. 2

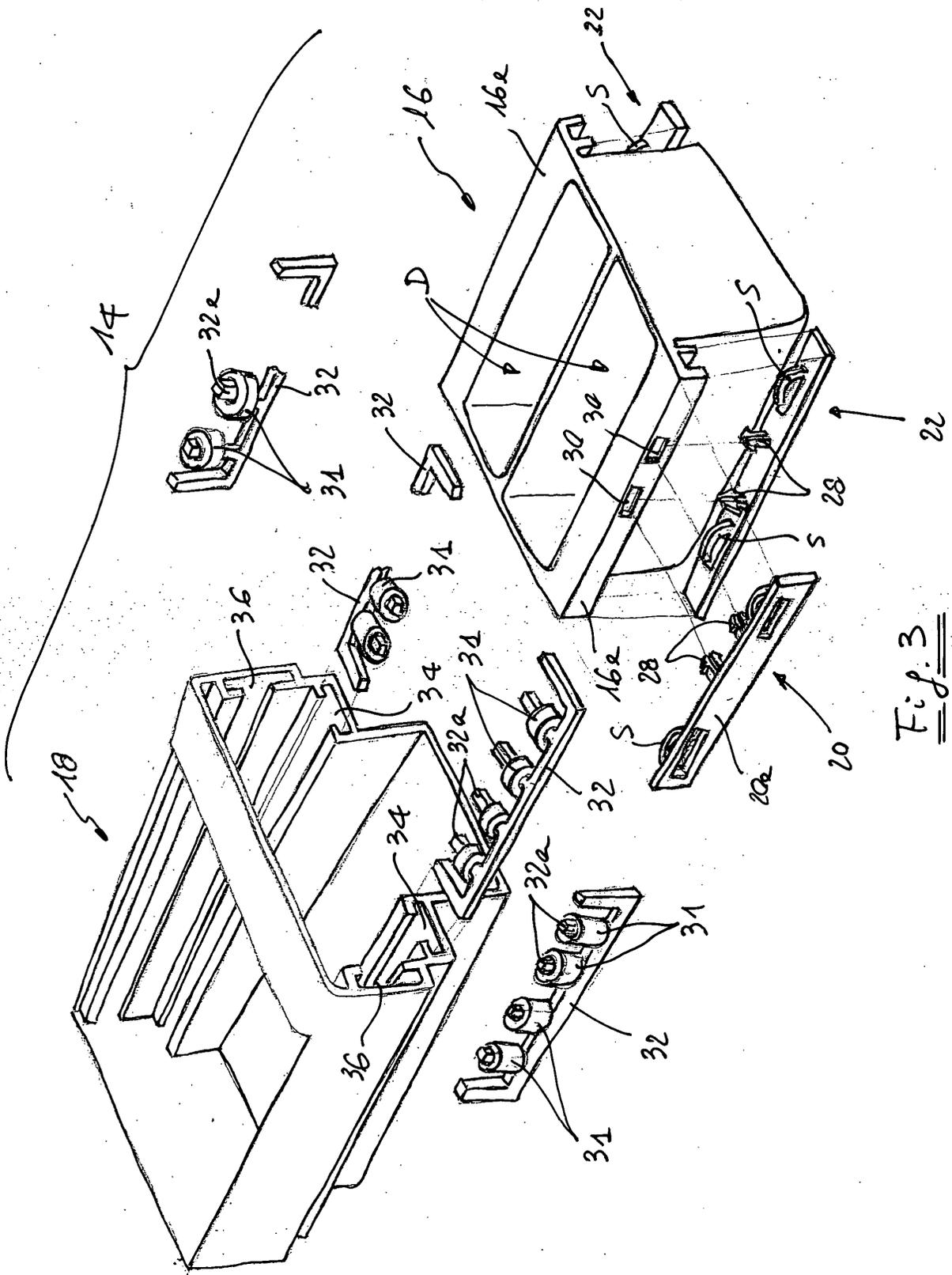


Fig. 3

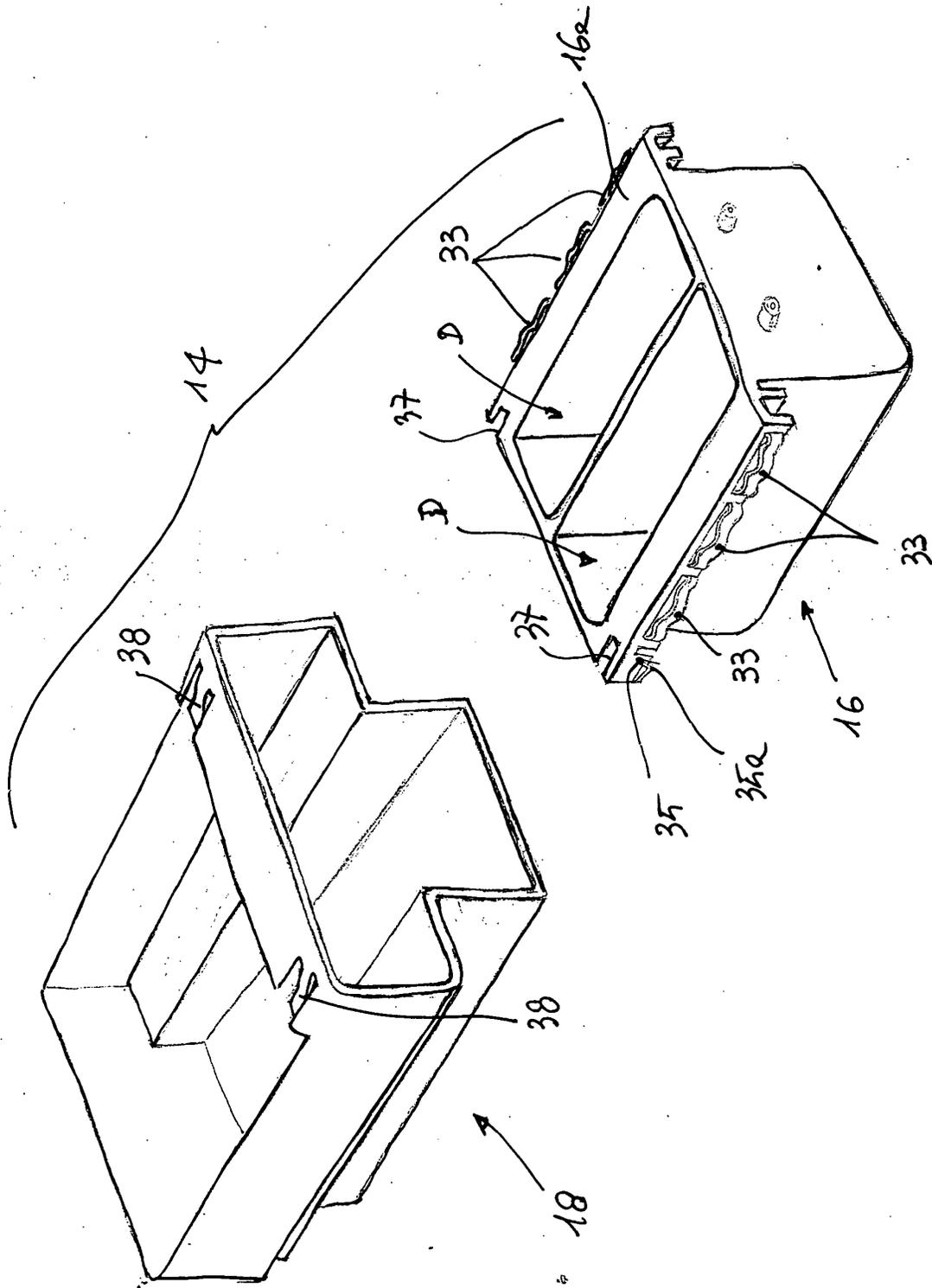


Fig. 4

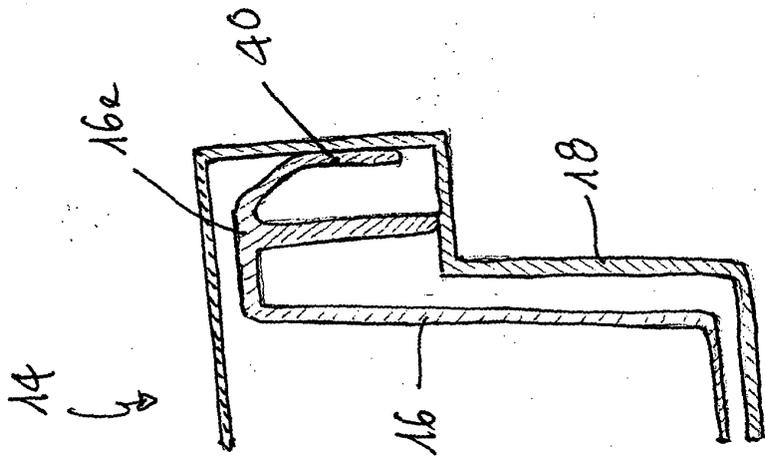


Fig. 6

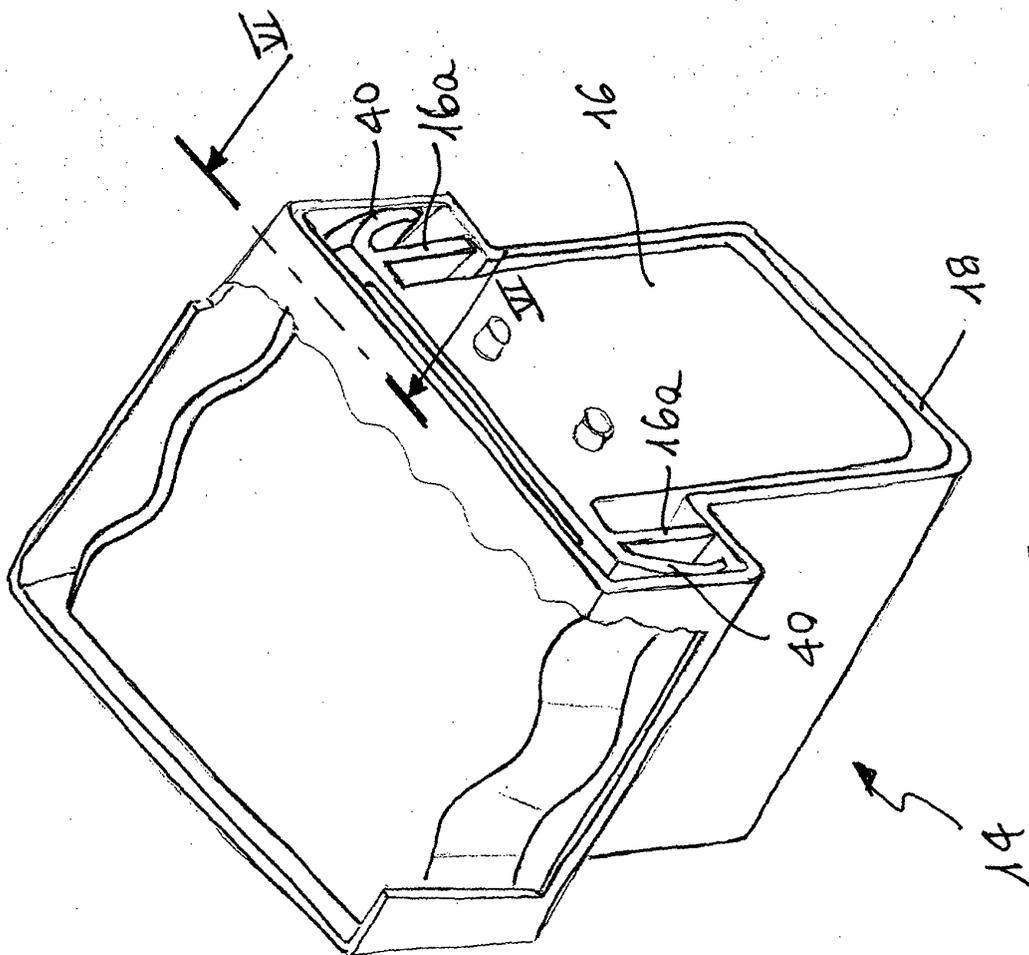


Fig. 5

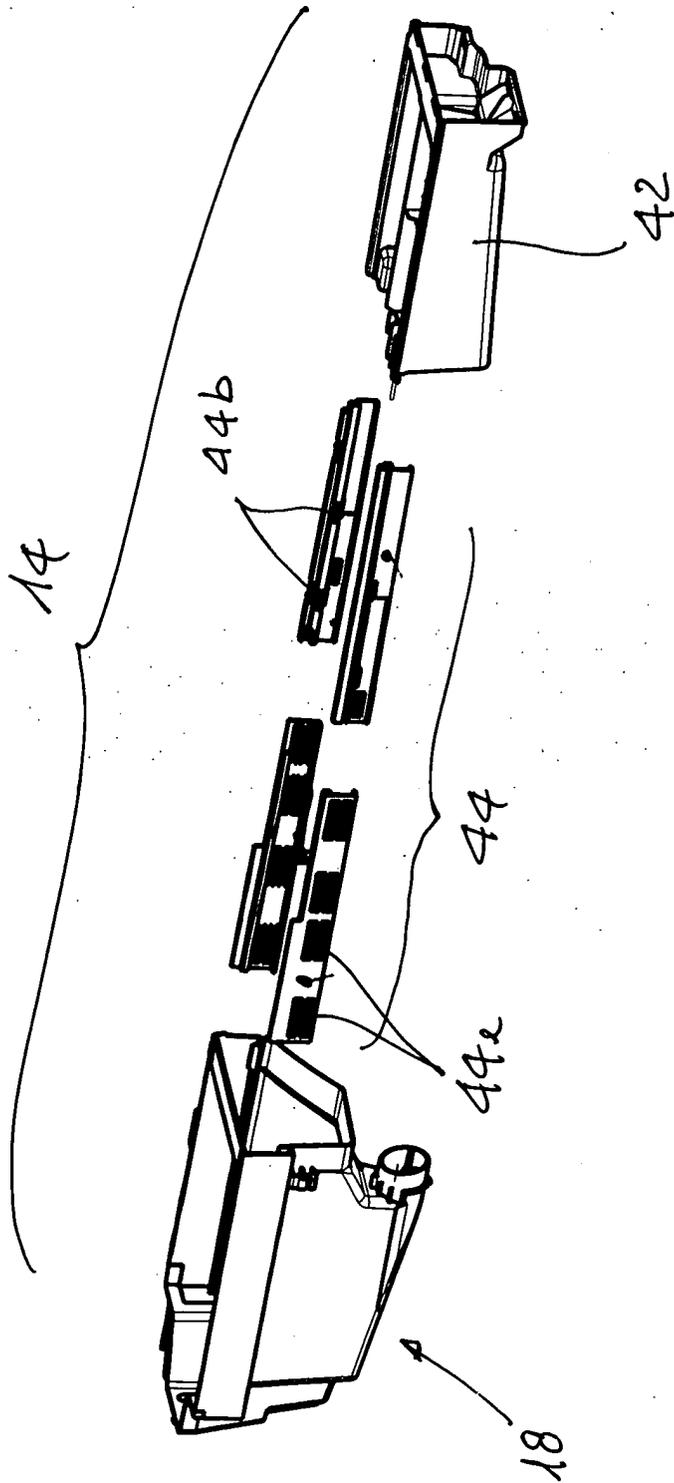


Fig. 7



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EUROPEAN SEARCH REPORT

Application Number  
EP 03 01 7543

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)
X	DE 100 61 155 A (BSH BOSCH UND SIEMENS HAUSGERÄTE GMBH ) 27 June 2002 (2002-06-27) * column 4, line 11 - line 21; figures 1,5,6 *	1,8	D06F39/02
A	GB 1 211 560 A (WILKINS & MITCHELL LIMITED) 11 November 1970 (1970-11-11) * figures *	1	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			D06F
The present search report has been drawn up for all claims			
Place of search <b>THE HAGUE</b>		Date of completion of the search <b>17 May 2004</b>	Examiner <b>Courrier, G</b>
CATEGORY OF CITED DOCUMENTS		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	
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ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.

EP 03 01 7543

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17-05-2004

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