

Description

[0001] The present patent application refers to a system used to automatically push furniture drawers or any other pull-out structure for furniture, such as columns or shelf/basket-holding racks, to end of opening and closing travel.

[0002] Patent protection is also extended to the furniture provided with the system of the invention.

[0003] The purpose of the invention is to find a solution to a problem that has recently drawn the attention of furniture manufacturers, with special reference to modular kitchens. In addition to ordinary drawers, modular kitchen units are often fitted with shelf-holding metal frames that slide on horizontal guides, in such a way that they can be partially or totally pulled out of the unit to make loading and unloading operations easier.

[0004] This type of units is normally closed with a door fixed on the front of the bearing structure and designed to follow the alternate opening and closing travels of the structure that slides on telescopic guides.

[0005] The aforementioned problem refers to perfect closing of pull-out structures: perfect closing should be ensured with requiring the user's special attention to avoid causing a violent shock at the end of the closing travel, which may stress the pull-out structure, and especially the front covering panel, whose borders engage with the borders of the walls of the unit in which the pull-out element is contained.

[0006] To avoid the aforementioned elements, the user should gently push the pull-out element along its entire closing travel, without pushing it too strongly; however, low acceleration might not be sufficient to guarantee complete closing, while high acceleration would cause a dangerous shock at the end of the closing travel.

[0007] Based on the aforementioned considerations, automatic devices used to guarantee perfect closing of pull-out elements for furniture have been devised recently.

[0008] Although of different construction, these devices have the same operating principle based on a spring that automatically engages with the pull-out element in the last section of the closing travel, designed to bring it to the end of the travel.

[0009] The spring actuates in combination with a shock-absorbing means, usually an hydraulic cylinder, designed to oppose the action of the spring to ensure slow and gentle closing to the end of the travel.

[0010] The opening travel of the pull-out element is entirely entrusted to the user, who initially exerts sufficient force to load the return spring, which automatically disengages from the pull-out element and remains loaded after the first section of the opening travel.

[0011] The known devices are not designed or able to control and manage the last section of the opening travel, which may cause the same inconvenience described above, in case of brisk opening of the pull-out element with a violent stop at the end of the travel.

[0012] In such a case, the most stressed elements would be the stops located on the telescopic sliding guides and the fixing elements of the front covering panel, where the driving force exerted by the user's hand is discharged.

[0013] Based on the above considerations, a system has been devised to automatically guarantee complete closing and opening of pull-out elements, ensuring soft closing and opening thanks to the absorbed braking action opposed to the force that pushes the pull-out element at the end of the opening or closing travel.

[0014] Another purpose of the invention is to devise a system that guarantees stable balance of the pull-out element in maximum opening position.

[0015] This additional result has been achieved thanks to the fact that the pull-out element is subject to a modest expulsive action, after reaching the end of the opening travel, to oppose the backward motion of the pull-out element in case of accidental push or shock.

[0016] The system of the invention makes use of ordinary gas springs located in intermediate position between the furniture frame and pull-out element.

[0017] In the preferred embodiment of the system of the invention, the gas spring is placed between the furniture frame and the pull-out element frame; however, the desired result can also be achieved by fixing the gas spring to any other structure that slides with the pull-out element, such as the rod of the telescopic guide that is directly fixed to the pull-out element frame.

[0018] Gas springs are composed of a cylinder, whose stem constantly receives the expulsive action of the compressed air contained in the cylinder, with the possibility of adjusting the power of the said action by changing the air pressure.

[0019] The expulsion travel of the stem is opposed by the resistance caused by oil seeping between two adjacent chambers inside the cylinder, it being provided with small overflows in one direction and large overflows in the opposite direction, in such a way that the oil flow from one chamber to the other one does not generate appreciable resistance when the stem is pushed inside the cylinder and vice versa.

[0020] According to the system of the invention, the cylinder of gas springs is fixed to the furniture frame near the opening by means to a first horizontal pivoting pin, while the end of the stem in extended position is fixed to the pull-out element frame or to any other structure that slides together with the pull-out element by means of a second horizontal pivoting pin.

[0021] In order to open or close the pull-out element, the user must exercise a traction or push force on the pull-out element only for a first section of the travel, that is to say the section that corresponds to the insertion of the stem inside the cylinder and ends with a dead point, in which the cylinder is in a vertical position that corresponds to the maximum retraction of the stem.

[0022] After the dead point, the stem starts to extend and automatically continues extension under the expul-

sive action of the air, whose pressure reaches the maximum pressure in the said dead point.

[0023] After the dead point, the compressed air pushes the pull-out element until it reaches complete opening or closing, thus guaranteeing soft stop at the end of the travel, thanks to the braking action that intervenes always and only during the extension of the stem.

[0024] For major clarity, the description of the system of the invention continues with reference to the enclosed drawings, which are intended for purposes of illustration only and not in a limiting sense, whereby:

- Fig. 1 is a diagrammatic axonometric view of a unit sectioned with a vertical plane, provided with the system of the invention to move a pull-out element housed inside the unit, of the type composed of a rack, shown in completely inserted position inside the unit;
- Fig. 2 is basically the same as Fig. 1, except for the fact that it shows the pull-out rack in completely extracted position from the unit;

[0025] With reference to the aforementioned figures, the system of the invention makes use of ordinary gas springs (1) positioned between the bearing structure of the unit (2) and the frame (3) of the pull-out element (4). In the aforementioned figures, the pull-out element (4) consists in a rack formed of a rectangular metal frame, composed of two transversal rods (4a) and two uprights (4b), provided with hooks (4c) used to support wire baskets, not shown, overhanging on the front of the frame, which lays and slides on a vertical plane, near one of the sides (2a) of the unit (2).

[0026] Telescopic guides (5) are positioned between the pull-out element (4) and the side (2a), whose sliding rod is fixed to the transversal rods (4a), while the bearing track of the guide (5) is fixed to the side (2a).

[0027] According to the system of the invention, the cylinder (1 a) of the gas springs (1) is fixed to the side (2a) of the unit (2) by means to a first horizontal pivoting pin (6), while the end of the stem (1 b) in extended position is fixed to the frame of the pull-out element (4) frame by means of a second horizontal pivoting pin (7), after bringing the pull-out element (4) at the end of the opening or closing travel.

[0028] In this case, the stem (1 b) is fixed to the frame of the pull-out element (4) on the lower transversal rod (4a).

travel of the pull-out element (4) is carried out automatically under the absorbed action exercised by the gas springs (1) during extension.

2. System used to automatically push pull-out elements of furniture units to the end of the opening and closing travel, as defined in claim 1, **characterised in that** the gas springs (1) are positioned between the frame of the unit (2) and the frame of the pull-out element (4).
3. System used to automatically push pull-out elements of furniture units to the end of the opening and closing travel, as defined in claim 1, **characterised in that** the gas springs (1) are positioned between the frame of the unit (2) and a structure that slides together with the pull-out element (4).
4. System used to automatically push pull-out elements of furniture units to the end of the opening and closing travel, as defined in claim 3, **characterised in that** the gas springs (3) are positioned between the frame of the unit (2) and the telescopic rod (5) fixed directly to the frame of the pull-out element (4).
5. Furniture unit housing one or more pull-out elements that slide on guides, **characterised in that** it is provided with gas springs (1) positioned between the furniture unit (2) and pull-out element (4) to automatically push the pull-out element (4) to the end of the opening and closing travel, according to the system described in the four preceding claims.

Claims

1. System used to automatically push pull-out elements of furniture units to the end of the opening and closing travel, **characterised in that** it makes use of ordinary gas springs (1) positioned between the frame of the unit (2) and the pull-out element (4), in such a way that the last section of the closing and opening

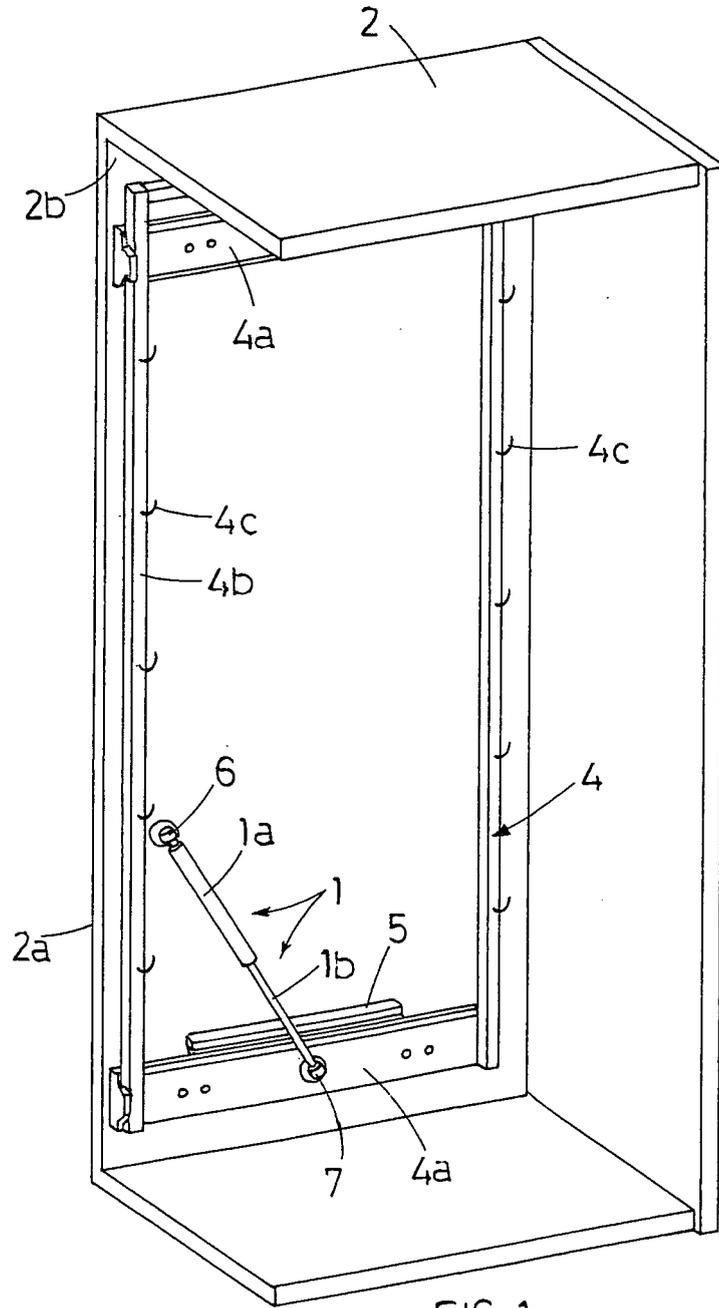
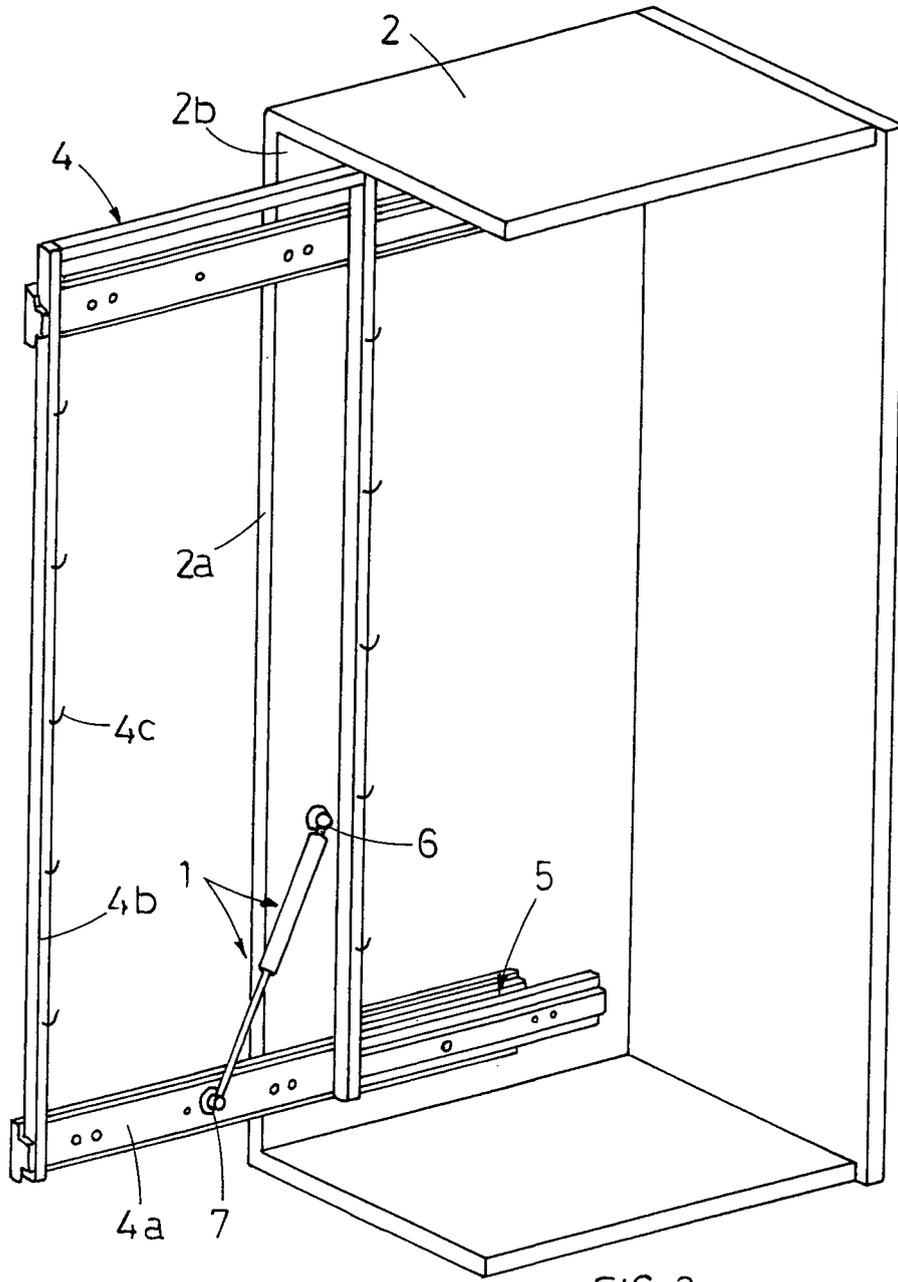


FIG. 1





DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 1 258 586 A (HETAL-WERKE FRANZ HETTICH GMBH & CO) 20 November 2002 (2002-11-20) * column 6, line 6 - line 12 * * paragraph [0024]; figures 1-5 *	1,2	E05F1/08 A47B88/04
Y	DE 203 08 217 U1 (HETTICH-HEINZE GMBH & CO. KG) 31 July 2003 (2003-07-31) * page 7, line 27 - page 12, line 16 *	1-5	
Y	FR 2 781 004 A (SA CABINES DENIZET) 14 January 2000 (2000-01-14) * page 4, line 4 - page 6, line 2; figures *	1-5	
A	DE 26 33 787 A1 (STANLEY WERKE GMBH; STANLEY WERKE GMBH, 5620 VELBERT; STANLEY WERKE GM) 2 February 1978 (1978-02-02) * page 7, line 23 - page 8, line 12; figures *	1-5	
			TECHNICAL FIELDS SEARCHED (IPC)
			E05F A47B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		21 November 2005	Di Renzo, R
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	

5 EPO FORM 1503 03 82 (P04G01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 05 42 5625

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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21-11-2005

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