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(54) **Magnetic latch for movable receptacle**

(57) The present invention relates to a cabinet apparatus (1) provided with means (11, 10, 12) adapted to effect outwardly movement of one or more receptacles (3) movably mounted in a compartment (2) of the cabinet (1).

The cabinet apparatus (1) according to the invention comprises a compartment (2) having an access opening (6), a closure member (7) for exposing and closing said opening (6), at least one receptacle (3) in said compartment (2), mounting means (4) adapted to mount said receptacle (3) for movement outwardly relative to said

compartment (2) and magnetic means (11) for interconnecting said receptacle (3) and said closure member (7) to effect movement of said receptacle (3) when the closure member (7) is opened. The apparatus (1) is characterised in that said magnetic means (11) are movable between a first operative position in which they effect movement of said receptacle (3) when the closure member (7) is opened and a second resting position in which the position of the receptacle (3) remains unchanged when the closure member (7) is opened.

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Description

[0001] The present invention relates to a cabinet apparatus provided with means adapted to effect outwardly movement of one or more receptacles movably mounted in a compartment of the cabinet.

[0002] US Patent No. 4,087,140 discloses a cabinet having a receptacle mounted on guide means in a storage compartment for movement along a horizontal path. A main door is movable about a main axis for exposing and closing the general opening to the compartment itself. Mounted on and forming part of this main door is a secondary door movable about its own axis with the axes of the two doors being asymmetric with and non-parallel to each other. Magnetic means are provided, including an elongated magnet and an elongated armature that are in full engagement when the secondary door is closed and throughout the extent of its movement when it alone is moved, but which become substantially immediately and progressively disengaged when the main access door is opened.

[0003] A drawback of the cabinet disclosed in US 4,087,140 consists in that a double door arrangement is required to perform the extraction of the receptacle and the accessing to the compartment. In fact, in such solution a single door is dedicated to a single function. This embodiment is not only complicated to be made but it cannot guarantee, with a sufficient grade of reliability, that the receptacle is not moved when the main door is opened. This is due to the fact that the magnetic latch always engages the receptacle when the doors are closed. When the main door is opened for accessing the compartment, the rapidity with which the magnetic connection is disengaged depends on how quick the opening movement is, therefore a limited but not completely null extent of the movement imparted to the receptacle by the main door opening always exists.

[0004] Such solution cannot be efficiently applied when the cabinet door cannot be opened quickly as, for example, when the door is particularly heavy to be moved or when fragile material is supported by the door on its back. In addition the solution proposed in US 4,087,140 is particularly cumbersome because it requires to apply a double door in a cabinet which is not always possible or useful as in the case of an oven door or in the case of a dishwasher door. According to the teachings of US 4,087,140 particularly complicated arrangements providing a secondary door for each receptacle should be made when the cabinet has several receptacles.

[0005] The aim of the present invention is therefore to solve the noted problems, eliminating the drawbacks of the cited known art and thus providing a cabinet apparatus that allows the user to customarily set which receptacles have to be moved when opening the door or setting the cabinet to simply open the door for accessing the compartment without moving any movable receptacle provided in the compartment.

[0006] A further object of the present invention is to

provide a cabinet apparatus simple to be made and provided with means for effecting movement of one or more receptacles that can be applied not only in the cabinet of the present invention but also able to be applied on already existing cabinets having movable receptacles.

[0007] Another object of the present invention is to provide a cabinet apparatus having a magnetic latch of improved reliability compared to latches of known types, the apparatus according to the invention being able to ensure that a receptacle is not moved at all if desired.

[0008] Advantages, objects, and features of the invention will be set forth in part in the description which follows and in part will become apparent to those having ordinary skill in the art upon examination of the following or may be learned from practice of the invention. The objects and advantages of the invention may be realised and attained as particularly pointed out in the appended claims.

[0009] The accompanying drawings, which are included to provide a further understanding of the invention and are incorporated in and constitute a part of this specification, illustrate possible embodiments of the invention and together with the description serve to explain the principles of the invention.

[0010] In the drawings:

[0011] Figure 1 shows a schematic view of a cabinet apparatus according to the present invention;

[0012] Figure 2 shows a perspective view of a receptacle having means to interconnect the receptacle to a closure member;

[0013] Figure 3 shows a perspective view of a closure member provided with magnetic means;

[0014] Figure 4 shows a plan view of the operating means for moving the magnetic means;

[0015] Figure 5 shows a sectional view taken along line 5-5 of Fig. 4;

[0016] Figure 6 shows a sectional view taken along line 6-6 of Fig. 4;

[0017] With reference to Fig. 1 there is provided a cabinet apparatus 1 embodied, as a mere example, in a dishwashing machine. The apparatus 1 comprises a compartment 2 in which receptacles 3 are movably mounted on side tracks 4 such that they can slide along the track path. The arrangement of the mounting means allowing the receptacles 3 to slide is known per se and can consist, for example, in two parallel channels each of which has flanges to guide side wheels placed on the receptacles 3.

[0018] The compartment 2 has an access opening 6 that is closed by a closure member or door 7. This door 7 is mounted on the cabinet 1 for opening movement in a horizontal direction by a conventional hinge that is positioned for door movement about a horizontal axis.

[0019] The forward portion 8 of each receptacle 3 is provided with a bracket 9 as shown in Figure 2 in which the receptacle 3 is in the form of a dish rack. The bracket 9 is connected to the receptacle 3 so that it can rotate and translate. A tubular ferromagnetic element 10 is carried by the bracket 9 and can engage magnetic means

11 located on the rear surface of the closure member 7 in a position facing the receptacle 3 when the door 7 is in a closed position.

[0020] When it is desired to remove the content of the receptacle 3 or simply accessing the compartment 2, the door 7 is moved from its closed position to an outwardly extending position. If a magnetic connection of the tubular element 10 to the magnetic means 11 mounted on the door 7 is established, the receptacle 3 slides out to a forward extended position as shown in Fig. 1. The magnetic connection of the bracket 9 to the magnetic means 11 remains unbroken for a first portion of the door aperture rotation and then it breaks as a consequence of the arched trajectory of the magnetic means 11 driven by the door movement and the linear trajectory of the receptacle. When the magnetic connection has broken, the moved receptacle 3 remains in a forward position so as to make easier for the user to access it.

[0021] In order to allow the user to decide whether moving the receptacles 3 when opening the door 7 and which receptacle 3 has to move outwardly, magnetic means 11 are movable between a first operative position in which they effect movement of said receptacle 3 and a second resting position in which the position of the receptacle remains unchanged when the door 7 is opened.

[0022] When the magnetic means 11 are placed in the operative position and the door 7 is closed, they contact the tubular element 10 so as to pull it when the door opening movement starts. On the contrary, if the magnetic means 11 are placed in the resting position they are spaced apart from the tubular element 10 and therefore the door movement does not effect the receptacle movement so its position remains unchanged.

[0023] Advantageously, if the vertical position of the receptacles 3 within the compartment 2 can be adjusted at different levels, for example to receive dishes of different size, the position of magnetic means 11 can be correspondingly adjusted vertically by the user to follow the displacement of the receptacle 3. In this way the possibility to effect the receptacle movement when the door 7 is opened is maintained also when the vertical level of the receptacle is changed.

[0024] The movement of the magnetic means 11 between the operative and the resting position can be a rotation or a translation or even a combination thereof, as preferred. In addition, the magnetic means 11 can be arranged on the door 7 by means of linear guiding means or pivotally fixing a portion of said magnetic means and allowing a second portion to freely rotate about the pivotal connection.

[0025] Said magnetic means 11 can be arranged on the closure member 7 by way of operating means 12 that allows the magnetic means 11 to be movable between the operative position and the rest position.

[0026] In Fig. 3 operating means 12 are in the preferred form of a knob 13 placed on the back surface of the cabinet door 7, in a position facing the forward portion 8 of the receptacle 3 as shown in Fig. 1.

[0027] In Figures 4 to 6 details of the knob 13 are shown. The knob 13, on its back side 15 facing the back surface of the door 7, has a housing 14 that receives the magnetic means 11 such that the front side 16 of the knob can be manually engaged by the user. To this aim a pair of spaced apart cavities 17 are formed on the front side 16 of the knob 13. Advantageously, the magnetic means 11 has an elongated shape extending perpendicularly to the hinge axis of the door 7 when they are placed in the operative position. In this way a magnetic connection between the magnetic means 11 and the bracket 9 through the ferromagnetic element 10 can be established when the door 7 is closed. Said connection can be broken after the door 7 has turned an angle α , that can be less or equal to 45°.

[0028] When the user wants the receptacle 3 to remain inside the compartment without the door 7 effecting the receptacle movement, he has only to turn the knob 13 so as to place the magnetic means 11 in a resting position not engaging the bracket 9.

[0029] Conclusively it can be stated that a cabinet apparatus according to the present invention allows the user to set whether and what receptacles have to be moved in order to fully customise the cabinet.

[0030] As the present invention may be embodied in several forms without departing from the spirit or essential characteristics thereof, it should also be understood that the above-described embodiments are not limited by any of the details of the foregoing description, but rather should be construed broadly within its spirit and scope as defined in the appended claims, and therefore all changes and modifications that fall within the meets and bounds of the claims, or equivalence of such meets and bounds are therefore intended to be embraced by the appended claims.

Claims

1. A cabinet apparatus (1) comprising a compartment (2) having an access opening (6), a closure member (7) for exposing and closing said opening (6), at least one receptacle (3) in said compartment (2), mounting means (4) adapted to mount said receptacle (3) for movement outwardly relative to said compartment (2) and magnetic means (11) for interconnecting said receptacle (3) and said closure member (7) to effect movement of said receptacle (3) when the closure member (7) is opened, **characterised in that** said magnetic means (11) are movable between a first operative position in which they effect movement of said receptacle (3) when the closure member (7) is opened and a second resting position in which the position of the receptacle (3) remains unchanged when the closure member (7) is opened.
2. A cabinet apparatus (1) according to claim 1 wherein said magnetic means (11) are slidably or rotatably

mounted on said closure member (7).

3. A cabinet apparatus (1) according to any preceding claim wherein said magnetic means (11) are arranged on said closure member (7) by means of movable operating means (12). 5
4. A cabinet apparatus (1) according to any preceding claim wherein the position of the receptacles (3) within the compartment (2) is vertically adjustable at different levels and the magnetic means (11) are correspondingly vertically adjustable at said levels so as to interconnect the receptacles (3). 10
5. A cabinet apparatus (1) according to claim 3 wherein said operating means (12) comprises a knob (13). 15
6. A cabinet apparatus (1) according to any preceding claim wherein said closure member (7) comprises a door hingedly mounted for movement about an axis and said magnetic means (11) have an elongated shape which extends along a direction substantially perpendicular to said axis when the magnetic means (11) are placed in said operative position. 20
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7. A cabinet apparatus (1) according to claim 6 wherein said closure member (7) effects the receptacle movement outwardly relative to said compartment (2) for an angle α of rotation about said axis less or equal to 45° . 30

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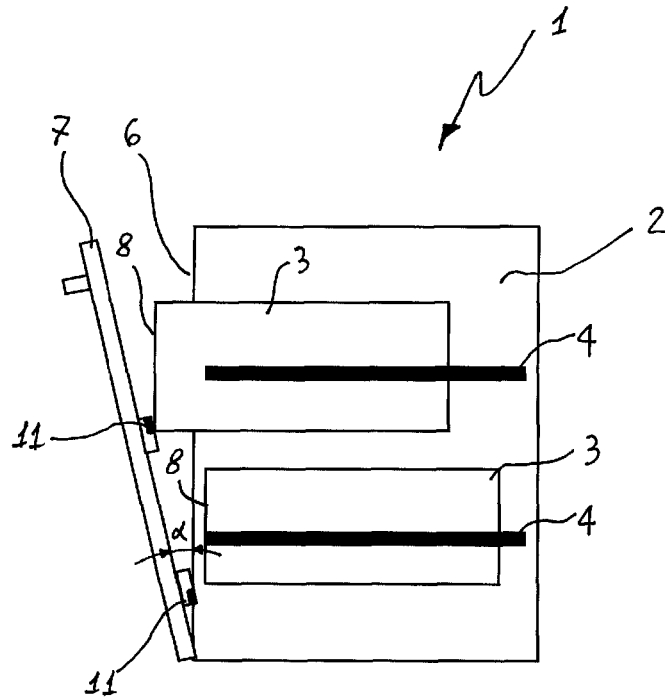


Fig. 1

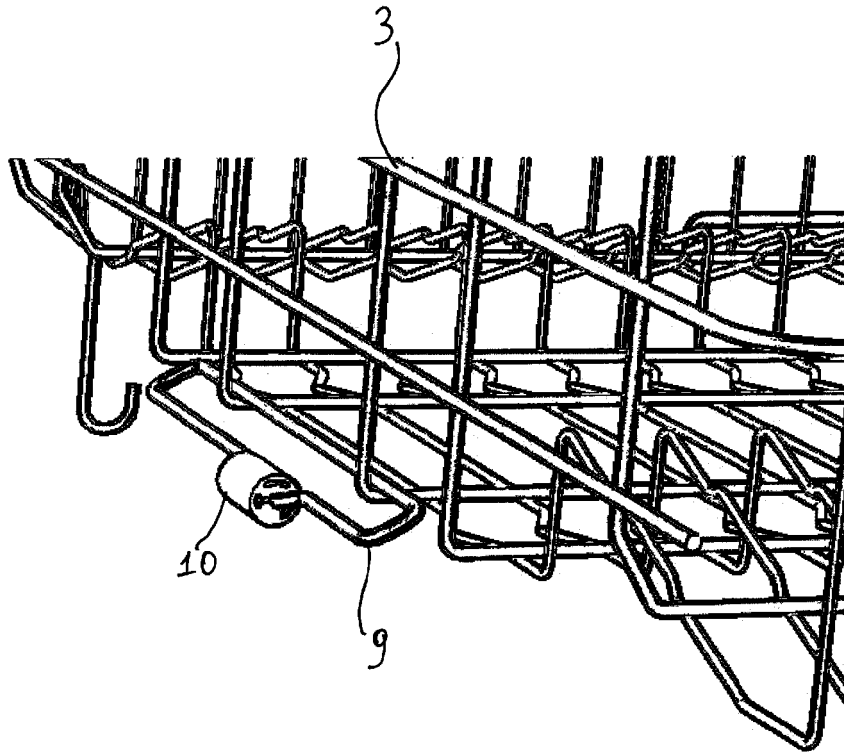


Fig. 2

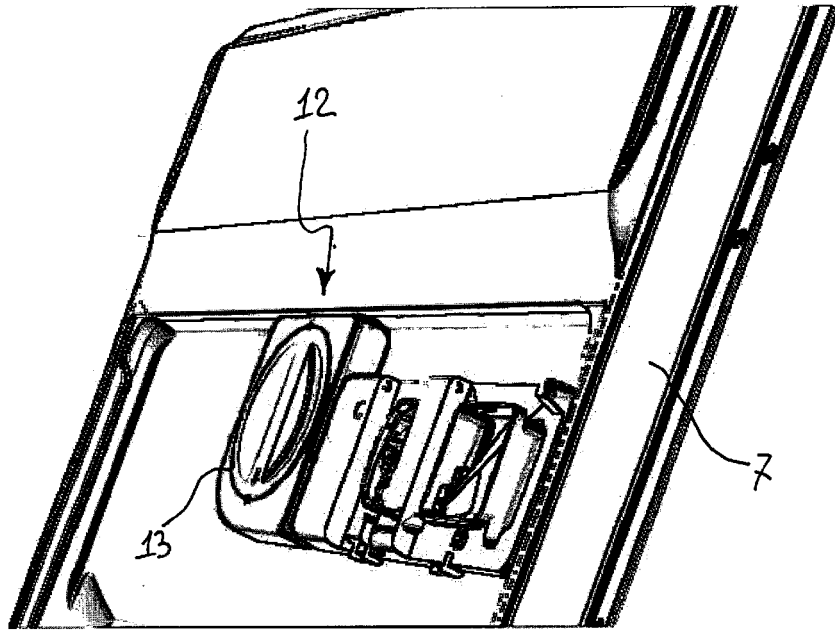


Fig. 3

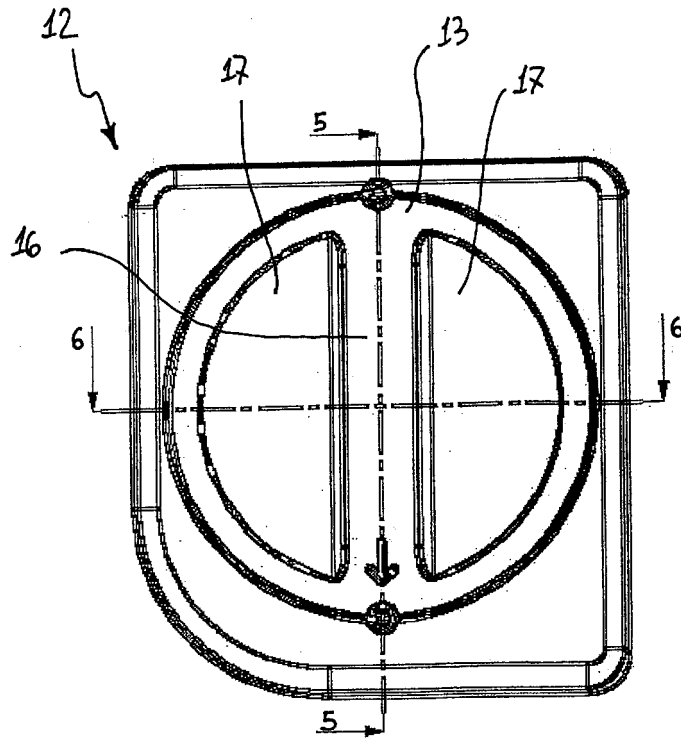


Fig. 4

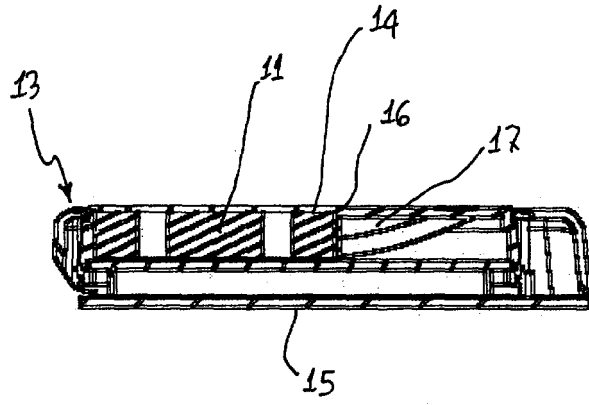


Fig. 5

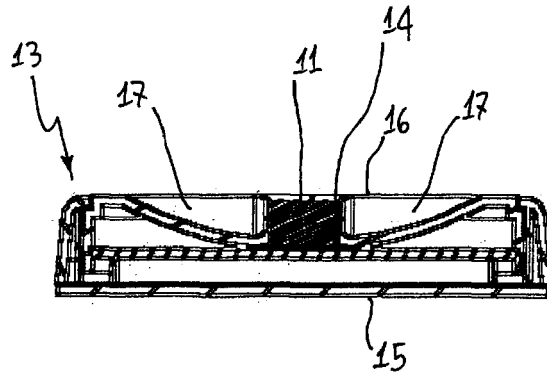


Fig. 6



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A,D	US 4 087 140 A (LINSTROMBERG ET AL) 2 May 1978 (1978-05-02) * the whole document *	1	A47L15/42 A47L15/50
A	----- GB 1 028 203 A (PORLESTER LIMITED) 4 May 1966 (1966-05-04) * page 1, left-hand column, line 10 - line 19 * * page 2, left-hand column, line 32 - page 2, right-hand column, line 114 * * figures 1,2 *	1	
A	----- DE 102 53 157 A1 (BSH BOSCH UND SIEMENS HAUSGERAETE GMBH) 27 May 2004 (2004-05-27) * page 2, paragraph 11 - page 3, paragraph 12 * * figures 1,2 *	1	
A	----- DE 92 11 953 U1 (BOSCH-SIEMENS HAUSGERAETE GMBH, 8000 MUENCHEN, DE) 22 October 1992 (1992-10-22) * page 5, line 16 - line 22 * * figures 1,4 *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			A47L F24C F25D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 21 March 2006	Examiner Redelsperger, C
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	

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

EP 05 10 9911

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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21-03-2006

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US 4087140	A	02-05-1978	NONE	

GB 1028203	A	04-05-1966	NONE	

DE 10253157	A1	27-05-2004	NONE	

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

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 4087140 A [0002] [0003] [0004] [0004]