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(54) **Washing machine with liquid washing agents dispenser**

Waschmaschine mit Flüssigwaschmittelausgeber

Machine à laver avec un distributeur d'agents de nettoyage liquides

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(73) Proprietor: **Electrolux Home Products Corporation N.V.**
1930 Zaventem (BE)

(72) Inventors:
• **Fabbro, Edi**
33032 Bertiole (Udine) (IT)

• **Arrigoni, Giancarlo**
33100 Udine (IT)

(74) Representative: **Baumgartl, Gerhard Willi et al**
AEG Hausgeräte GmbH
Group Intellectual Property
90327 Nürnberg (DE)

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EP 1 959 045 B1

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Description

[0001] The present invention relates to a washing machine with a liquid washing agents dispenser.

[0002] Washing machines of known type are normally provided with a user accessible container having one or more compartments adapted to contain washing agents like detergents, softeners, additives and the like. A washing tub is hydraulically connected with said container in order to receive an amount of powdered or liquid agent for washing or treating articles contained therein. Washing agents poured by a user in the container compartments are generally introduced in the tub by flushing said compartments with water and draining the water and detergent mixture in the tub. This kind of washing agents dispensers is in the form of a movable drawer in a laundry washing machine and in the form of an openable container placed in the inner surface of a cabinet door in a dishwasher.

[0003] A disadvantage of the known type washing agents dispensers cited above consists in that they have a limited holding capacity for washing agents, therefore the user must remember to refill the container before every washing cycle.

[0004] In order to improve the amount of washing agents that can be stored and made available for a huge number of washing cycles, it has been proposed washing machines having a washing agents dispenser unit comprising one or more container of relatively high capacity filled with liquid agents. Such containers are connected to the washing tub by means of flexible conduits arranged inside the machine cabinet and provided with a volumetric pump, in particular a peristaltic pump, that leads liquid detergent from containers into the tub. A control unit drives the volumetric pump in such a manner as to supply the tub with metered amounts of liquid agent. Each liquid agent container is connected to a flexible conduit by means of a plug removably associable to the container so as to make very easy to remove the container for substituting or refilling it when it is empty.

[0005] An example of such kind of washing machine is disclosed in British Patent Application No. GB 2 214 524.

[0006] A drawback of such kind of machines consists in that flexible conduits require periodical maintenance involving cleaning of incrustations formed by washing agents flow and substitution of portions of conduits in contact with the peristaltic pump. A further drawback consists in that disassembling operations of flexible conduits is complicated and must be performed by a technician because they are stored inside the machine cabinet, i.e. in a part which is not accessible to a user.

[0007] Another drawback of a machine like that disclosed in GB 2 214 524 consists in the uncomfortable position of the containers which are placed at the bottom of the machine cabinet and force the user to lower for substituting the detergent containers.

[0008] Still another drawback of washing machines cit-

ed above is due to design complications like positioning of the washing tub and motor means, and enlarging the machine cabinet size. These complications are caused by the need of creating, inside the machine cabinet, a chamber adapted to store containers.

[0009] The aim of the present invention is therefore to solve the noted problems and thus providing a washing machine having a liquid washing agents dispenser that allows to perform multiple washing cycles without requiring the user to refill a washing agents container before the start of each washing operation.

[0010] Another object of the present invention is to provide a washing machine with a maintenance-free liquid washing agents dispenser, the latter avoiding also any risk of incrustation formation.

[0011] Still another object of the present invention is to provide a liquid washing agents dispenser that can be installed in an already existing washing machine with minimal modifications. Said dispenser being placed in a position that is very easily reachable by a user.

[0012] 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.

[0013] 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 a possible embodiment of the invention and together with the description serve to explain the principles of the invention.

[0014] In the drawings:

[0015] Figure 1 shows a washing machine according to the invention embodied as a laundry washing machine;

[0016] Figure 2 shows a plan view of a liquid washing agents dispenser;

[0017] Figure 3 shows a liquid washing agent dispenser according to a sectional view taken along line III-III of figure 2;

[0018] Figure 4 shows a washing machine according to the invention embodied as a dishwasher;

[0019] With reference to figure 1, it is disclosed a washing machine according to the invention embodied as a laundry washing machine. The latter comprises a cabinet 22, a washing chamber 1 in which articles to be washed are placed during washing operations, and further comprises a liquid washing agents dispenser 2 which supplies a metered amount of washing agents such as detergents, fabric softeners, bleach and the like, to the chamber 1.

[0020] The liquid washing agents dispenser 2, which is placed in a conventional detergent distributor drawer 23 in an upper region of the laundry washing machine, is provided with one or more compartments 3 in which a flexible-walled container 4 filled with a washing agent can

be housed. Said container 4, known per se, is formed by a sack made of a flexible foil and by a compressible tube 5, preferably of silicone plastics. Each compartment 3 carrying one of the flexible-walled containers 4 is provided with a peristaltic pump 6 comprising a multi-lobed rotating wheel turning inside a housing 7 defined by walls 8 surrounding the rotating wheel (see figure 2). Compressible tube 5 is displaced between a portion of walls 8 and the rotating wheel such that when the latter turns, its lobes repetitively compress and release a portion of the tube 5 causing the washing agent contained in the sack 4 to come out.

[0021] The amount of washing agent supplied by the flexible-walled container 4 may be poured in a further compartment 10 provided in the dispenser 2 in fluid communication with water supplying means 9 which spray water onto the compartment 10 for flushing away agents contained therein. Compartment 10 is also provided for receiving washing agents, for example a detergent powder, poured by a user such that the laundry washing machine can work in a conventional manner, i.e. without the intervention of the pump 6; to this aim further compartments 11 can be provided in the dispenser 2. If desired, the washing agent supplied by the container 4 can even be introduced directly inside the washing chamber 1 by means of a manifold 12, collecting liquors from the dispenser 2 and pouring them into the chamber 1.

[0022] The peristaltic pump 6 is driven by motor means, preferably in the form of a stepper motor 13, controlled by an electronic board 14 that drives and checks all functional parameters of the washing machine, and, in addition, it can also receive input from the user, like the washing program chosen, the preferred washing temperature and so on. Thanks to the pump 6 and to its driving means, it is possible to precisely dose the amount of washing agent to be drained from the container 4 thereby improving the quality of laundry washing cycles and avoiding wasting unnecessary amounts of washing agents.

[0023] As mentioned above the pump 6 and compartment 3 are placed in a drawer 23 slidably associated to the cabinet 22, preferably in an upper region of the latter. This allows a user to easily reach the dispenser 2 for periodically substituting the container 4 when it is empty. In order to give the user an indication of the amount of washing agent filling the flexible container 4, a washing agent level indication means not shown in the figures can be provided in the dispenser 2. Such level indication means, known per se, can be in made in a plurality of embodiments. For example, the container 4 can be supported by a plate suspended on springs and provided with a switch that activates an alarm when the weight of container 4 lowers below a preset value.

[0024] The peristaltic pump 6 is powered by a circuit comprising a primary electrical circuit 15 connected to a main alternate voltage power supply 16 (see figure 3) which supplies an electrical power to a first ferromagnetic element 17 having a first electric coil 18 wrapped around

it. The pump 6 powering circuit further comprises a secondary electrical circuit 19 having a second ferromagnetic element 20 around which a second electrical coil 21 is wrapped. The secondary circuit 19 is contactlessly powered by the primary circuit 15 and such electrical power is supplied to the pump 6. Electrical energy for activating the peristaltic pump 6 is contactlessly transferred from the primary circuit 15, which is stationary mounted within the cabinet 22, to the secondary circuit 19, which is mounted on the movable drawer 23 together with the pump 6 and containers 4, by means of the first and second ferromagnetic elements 17, 20 facing each other when the drawer 23 is completely inserted inside the cabinet 22. In such position, said elements 17, 20 form a magnetic circuit interrupted by an air gap due to the drawer 23 and cabinet 22 walls thickness. Therefore the first and second ferromagnetic elements 17, 20 and the first and second coils 18, 21 forms an electric transformer wherein the secondary circuit 19 is associated to the pump 6. It can be observed that the best efficiency in the electrical energy transferred contactlessly from the primary circuit 15 to the secondary circuit 19 can be obtained when said magnetic circuit operates at the resonating frequency or at a frequency very close to it. For this reason it is preferred that the main alternate voltage power supply 16 comprises an oscillating circuit able to supply the power needed at a pre-set frequency which is said resonating frequency.

[0025] As an alternative the pump 6 can be powered in a conventional manner, i.e. by means of electrical wires.

[0026] In figure 4 the washing machine is embodied as a dishwasher. A liquid washing agents dispenser 202 like that described above with reference to figure 1 to 3 is placed on a door 223 hingedly connected to a cabinet 222 for closing a loading aperture of a washing chamber 201. In particular, the dispenser 202 is placed on a surface of the door 223 facing the inner region of the washing chamber 201 such that washing agents can be introduced into the latter during articles washing operations.

[0027] As described above, the dispenser 202 comprises a compartment 203 in which a flexible-walled container 204 filled with a washing agent can be placed. Said container 204, known per se, has the same features described with reference to container 4. A peristaltic pump 206 is further provided in the compartment 203 for repetitively compressing a tube 205 connected to the container 204 in order to extract from the latter a metered amount of washing agent. Said agent can be poured in a further compartment 210 provided in the dispenser 2 in fluid communication with water supplying means, not shown in figure 4, which spray water onto the compartment 10 for flushing away agents contained therein. If desired, washing agent supplied by the container 204 can be introduced directly inside the washing chamber 201.

[0028] The peristaltic pump 206 is driven by the same means and in the same manner as already described above with reference to figure 1 to 3. Also in the dish-

washer embodiment of the present invention the dispenser 202 can comprise level indication means providing a signal indicative of the amount of washing agent filling the container 204.

[0029] A lid 224 can be provided for covering the peristaltic pump 206 and the compartment 203 receiving the flexible-walled container 204 during washing operations. If a further compartment 210 is present in the dispenser 202, another lid 225 can be provided for covering the compartment 210. Lids 224 and 225 are preferably pivotally connected to the door 223.

[0030] Conclusively it can be stated that a washing machine according to the invention allows the user to perform washing cycles more easily, without taking care of refilling the machine with washing agents every time it has to be used. A washing machine according to the invention helps also to avoid washing articles with erroneous amounts of washing agents causing either the articles not to be properly washed in case the washing agent dose is insufficient or an environment pollution if the washing agent dose is excessive. Maintenance of washing agents dispenser components provided in the proposed washing machine is substantially not necessary.

Claims

1. Washing machine comprising a cabinet (22, 222), an articles washing chamber (1, 201) and a liquid washing agents dispenser (2, 202) having at least one first compartment (3, 203) for storing a liquid washing agent flexible-walled container (4, 204), said first compartment (3, 203) being provided with a peristaltic pump (6, 206) suitable for repetitively compressing at least a portion of the container (5, 205) such that a dosed amount of liquid washing agent is transferred from the compartment (3, 203) to the articles washing chamber (1, 201), **characterised in that** said at least one first compartment (3, 203) and said peristaltic pump (6, 206) are placed on a member (23, 223) which is movable with respect to said cabinet (22, 222).
2. Washing machine according to claim 1 wherein said movable member (23, 223) comprises at least a second compartment (10, 210) adapted to receive an amount of a washing agent, said second compartment (10, 210) being in fluid communication with water supply means (9) and with said first compartment (3, 203) for further receiving liquid washing agent from the first compartment (3, 203).
3. Washing machine according to any preceding claim wherein the liquid washing agents dispenser (2, 202) comprises an electronic board (14) for controlling a stepper motor means (13) driving the peristaltic pump (6, 206).

4. Washing machine according to any preceding claim wherein the peristaltic pump (6, 206) is electrically connected to a secondary circuit (19) associated to the movable member (23, 223), said secondary circuit (19) being contactlessly powered by means of a primary circuit (15) connected to a main alternate voltage supply (16).
5. Washing machine according to claim 4 wherein each of said primary and secondary circuits (15, 19) comprise a coil (18, 21) wrapped around a ferromagnetic element (17, 20).
6. Washing machine according to claim 5 wherein the primary circuit (15) comprises an oscillating circuit able to provide the coil (18) with an alternate voltage at a pre-set frequency.
7. Washing machine according to any preceding claim wherein the liquid washing agents dispenser (2, 202) comprises a washing agent level indication means providing a signal indicative of the amount of washing agent filling the flexible-walled container (4, 204).
8. Washing machine according to any preceding claim wherein said movable member (23) is a drawer slidably coupled to the cabinet (22).
9. Washing machine according to any claim 1 to 7 wherein said movable member (223) is a door hingedly connected to the cabinet (222) for closing the articles washing chamber (201).
10. Washing machine according to claim 9 wherein said at least one first compartment (203) and said peristaltic pump (206) are covered by a lid (224).

Patentansprüche

1. Waschmaschine, die ein Gehäuse (22, 222), eine Artikelwaschkammer (1, 201) und ein Ausgabelade (2, 202) für Flüssigwaschmittel mit mindestens einem ersten Fach (3, 203) zur Aufnahme eines Behälters (4, 204) mit elastischen Wänden für ein Flüssigwaschmittel umfasst, wobei das erste Fach (3, 203) mit einer Peristaltikpumpe (6, 206) ausgestattet ist, die dazu geeignet ist, zumindest einen Teil des Behälters (5, 205) zusammen zu drücken, so dass eine dosierte Menge eines Flüssigwaschmittels vom Fach (3, 203) in die Artikelwaschkammer (1, 201) befördert wird, **dadurch gekennzeichnet, dass** das mindestens eine erste Fach (3, 203) und die Peristaltikpumpe (6, 206) auf einem Element (23, 223) platziert sind, das im Verhältnis zum Gehäuse (22, 222) beweglich ist.
2. Waschmaschine gemäß Anspruch 1, wobei das be-

wegliche Element (23, 223) mindestens ein zweites Fach (10, 210) umfasst, das geeignet ist, eine Menge Waschmittel aufzunehmen, wobei das zweite Fach (10, 210) in Fluidkommunikation mit einem Wasserzuführungsmittel (9) und mit dem ersten Fach (3, 203) zur weiteren Aufnahme von Flüssigwaschmittel aus dem ersten Fach (3, 203) ist.

3. Waschmaschine gemäß einem der vorangehenden Ansprüche, wobei die Ausgabelade (2, 202) für Flüssigwaschmittel eine elektronische Tafel (14) zur Steuerung eines Schrittmotormittels (13) umfasst, das die Peristaltikpumpe (6, 206) antreibt.
4. Waschmaschine gemäß einem der vorangehenden Ansprüche, wobei die Peristaltikpumpe (6, 206) elektrisch mit einem sekundären Schaltkreis (19) verbunden ist, der dem beweglichen Element (23, 223) zugeordnet ist, wobei der sekundäre Schaltkreis (19) von einem an eine Hauptstrom-Wechselspannungsquelle (16) angeschlossenen Primärschaltkreis (15) kontaktlos mit Energie versorgt wird.
5. Waschmaschine gemäß Anspruch 4, wobei sowohl der Primär- wie auch der Sekundärschaltkreis (15, 19) eine Spule (18, 21) umfassen, die um ein ferromagnetisches Element (17, 20) gewickelt ist.
6. Waschmaschine gemäß Anspruch 5, wobei der Primärschaltkreis (15) einen Schwingkreis umfasst, der geeignet ist, die Spule (18) mit einer Wechselspannung mit einer bestimmten Frequenz zu versorgen.
7. Waschmaschine gemäß einem der vorangehenden Ansprüche, wobei die Ausgabelade (2, 202) ein Mittel zur Waschmittelpiegelanzeige umfasst, das ein Signal abgibt, welches die Menge des Waschmittels anzeigt, das den Behälter (4, 204) mit elastischen Wänden füllt.
8. Waschmaschine gemäß einem der vorangehenden Ansprüche, wobei das bewegliche Element (23) eine Lade ist, die mit dem Gehäuse (22) verschiebbar gekoppelt ist.
9. Waschmaschine gemäß einem der Ansprüche 1 bis 7, wobei das bewegliche Element (223) eine Tür ist, die schwenkbar mit dem Gehäuse (222) verbunden ist, um die Artikelwaschkammer (201) schließen zu können.
10. Waschmaschine gemäß Anspruch 9, wobei das mindestens eine erste Fach (203) und die Peristaltikpumpe (206) von einem Deckel (224) bedeckt sind.

Revendications

1. Machine à laver comprenant une carrosserie (22, 222), une enceinte de lavage d'articles (1, 201) et un distributeur d'agents de lavage liquide (2, 202) ayant au moins un premier compartiment (3, 203) pour stocker un contenant à parois flexibles d'agent de lavage liquide (4, 204), ledit premier compartiment (3, 203) étant muni d'une pompe péristaltique (6, 206) apte à compresser à plusieurs reprises au moins une portion du contenant (5, 205) de sorte qu'une quantité dosée d'agent de lavage liquide est transférée du compartiment (3, 203) à la chambre de lavage d'articles (1, 201), **caractérisée en ce que** ledit au moins un premier compartiment (3, 203) et ladite pompe péristaltique (6, 206) sont placés sur un élément (23, 223) qui est déplaçable par rapport à ladite carrosserie (22, 222).
2. Machine à laver selon la revendication 1, dans laquelle ledit élément mobile (23, 223) comprend au moins un deuxième compartiment (10, 210) apte à recevoir une quantité d'agent de lavage, ledit deuxième compartiment (10, 210) étant en communication fluidique avec un moyen d'amenée d'eau (9) et avec ledit premier compartiment (3, 203) pour recevoir en outre l'agent de lavage liquide du premier compartiment (3, 203).
3. Machine à laver selon l'une quelconque des revendications précédentes, dans laquelle le distributeur d'agents de lavage liquides (2, 202) comprend un panneau électronique (14) pour commander à un moyen formant moteur pas-à-pas (13) d'entraîner la pompe péristaltique (6, 206).
4. Machine à laver selon l'une quelconque des revendications précédentes, dans laquelle la pompe péristaltique (6, 206) est électriquement connectée à un circuit secondaire (19) associé à l'élément mobile (23, 223), ledit circuit secondaire (19) étant alimenté sans contact par un circuit primaire (15) connecté à l'alimentation principale de tension alternative (16).
5. Machine à laver selon la revendication 4, dans laquelle chacun desdits circuits primaire et secondaire (15, 19) comprend une bobine (18, 21) enroulée autour d'un élément ferromagnétique (17, 20).
6. Machine à laver selon la revendication 5, dans laquelle le circuit primaire (15) comprend un circuit oscillant apte à fournir à la bobine (18) une tension alternative à une fréquence pré-établie.
7. Machine à laver selon l'une quelconque des revendications précédentes, dans laquelle le distributeur d'agents de lavage liquides (2, 202) comprend un moyen d'indication de niveau de l'agent de lavage

fournissant un signal indiquant la quantité d'agent de lavage remplissant le contenant à parois flexibles (4, 204).

8. Machine à laver selon l'une quelconque des revendications précédentes, dans laquelle ledit élément mobile (23) est un tiroir couplé d'une manière coulissante à la carrosserie (22). 5
9. Machine à laver selon l'une quelconque des revendications 1 à 7, dans laquelle ledit élément mobile (223) est une porte articulée à la carrosserie (222) pour fermer l'enceinte de lavage d'articles (201). 10
10. Machine à laver selon la revendication 9, dans laquelle ledit au moins un premier compartiment (203) et ladite pompe péristaltique (206) sont couverts par un couvercle (224). 15

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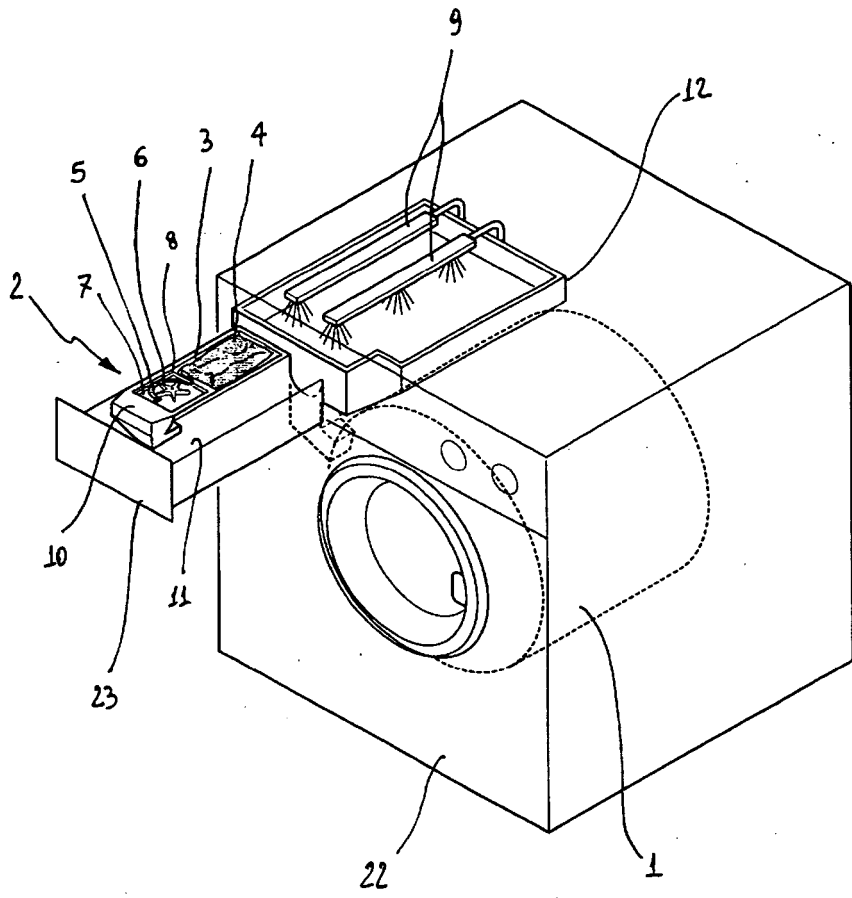


Fig. 1

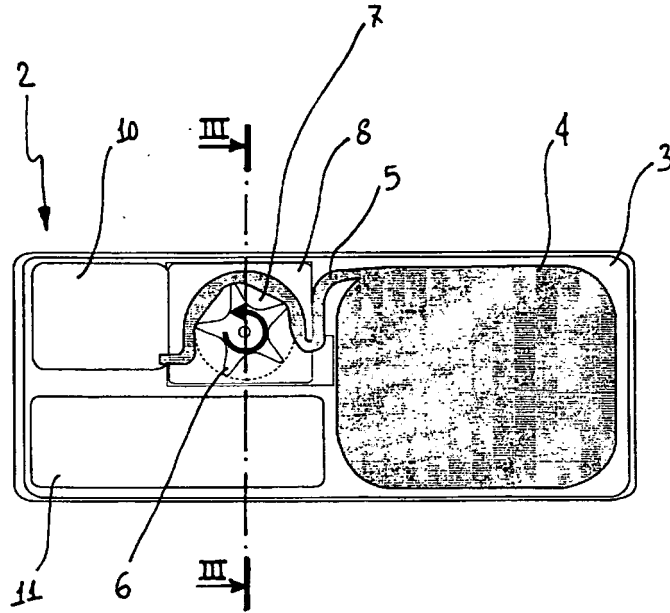


Fig. 2

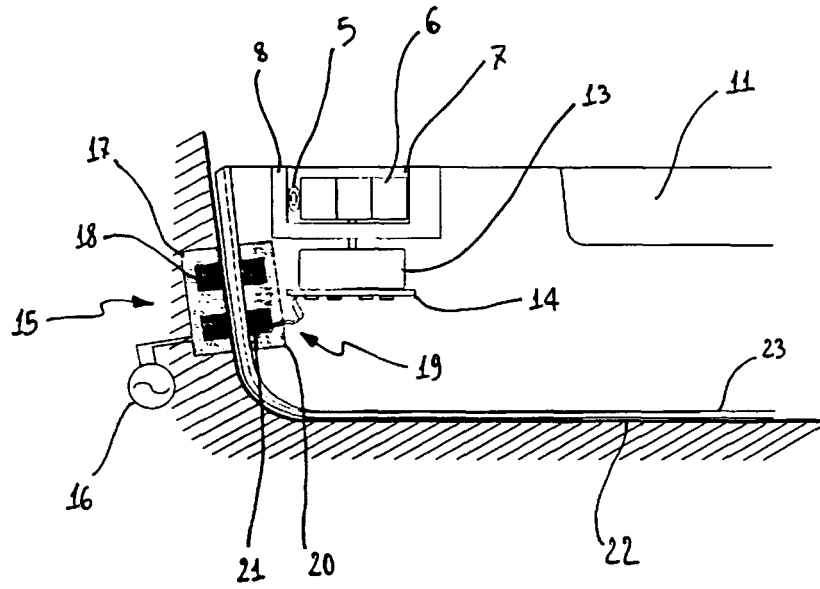


Fig. 3

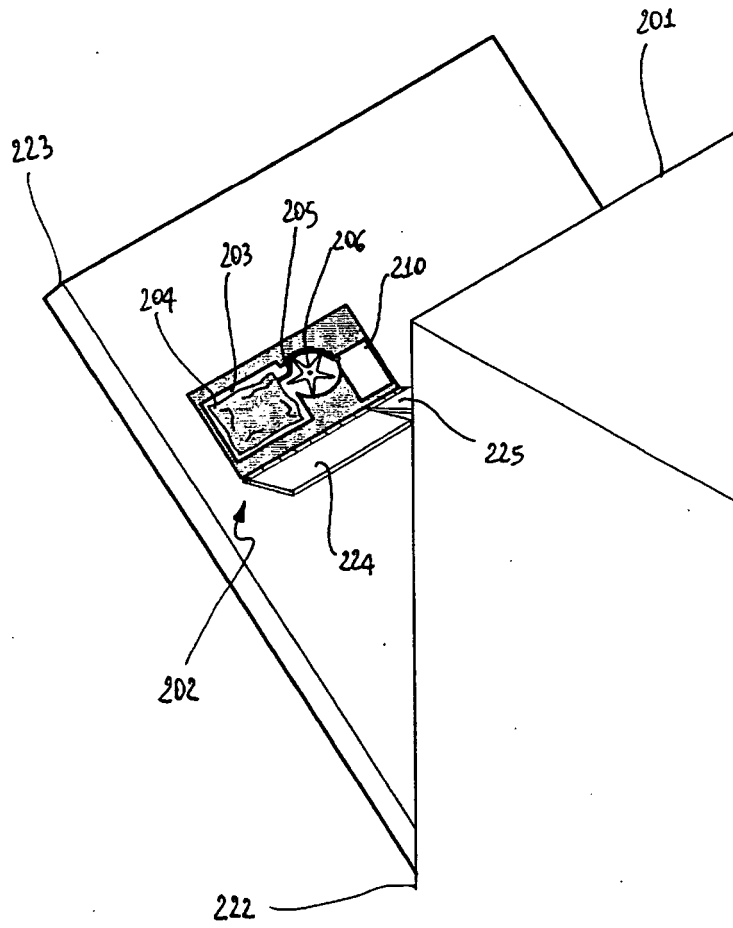


Fig. 4

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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