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## (54) Door for the drum of a laundry machine

(57) A top-loading laundry machine comprising a cabinet (105) housing a rotatable drum (120) having a access opening (205) with associated therewith a door (210), the door (210) comprising first and second door wings (210a,210b) hinged to the drum (120) in correspondence of said access opening (205), the first and second door wings (210a,210b) being provided with retaining means (310,315,320) operable to keep the door (210) closed. The first and second door wings (210a, 210b) are made of plastic, and the retaining means (310,315,320) comprise at least one retaining element (310) formed in the second door wing (210b) and at least one retaining element (315,320) formed in the first door wing (210a), at least one between the at least one retaining element (310) formed in the second door wing (210b) and the at least one retaining element (315,320) formed in the first door wing (210a) being formed as a single piece with the respective door wing (210a,210b).

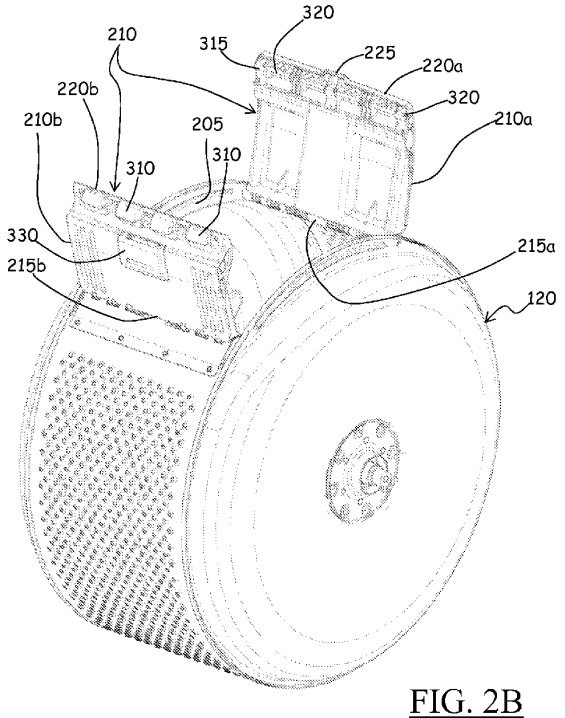


FIG. 2B

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## Description

### Background of the invention

### Field of the invention

**[0001]** The present invention generally relates to the field of household appliances, and in particular to laundry machines. More specifically, the present invention relates to a door for the drum of a laundry machine, particularly for a top-loading laundry machine. The top-loading laundry machine may be for example a washing machine, a top-loading laundry dryer or a top-loading washer/drier.

### Overview of the related art

**[0002]** Doors for the drums of top-loading laundry washing machines are often made of stainless steel.

**[0003]** For example, in EP 1992728 a top-loading laundry washing machine is disclosed, with a tub having a top opening, a drum fitted in a manner such that it can rotate about a substantially horizontal axis inside the tub, at least one door secured to said drum for allowing access to the inside of the drum. In the overview of the prior art provided in that document it is stated that known doors comprise a pair of doors, each secured to the drum on one side of said access opening, in particular through spring-loaded hinges. The free portions of the doors, in particular the portions located on the side opposite to the spring-loaded hinges, are fitted with a closing system which comprises a plurality of hooks arranged on a first door and a plurality of slots arranged on a second door, the open ends of the hooks facing the outer portion of the drum. The springs of the hinges tend to open said first and second doors outwards; consequently, when the elements of the closing system are engaged, the hooks of the first door are pushed into the slots of the second door. In order to open the doors, it is necessary to exert direct pressure onto said first and second doors towards the inside of the drum.

### Summary of the invention

**[0004]** The Applicant tackled the problem of providing a door for the drum of a laundry machine, particularly for a top-loading laundry machine (*e.g.* a washing machine, a drier or a washer/drier), which is simple to manufacture and thereby can be produced with a reduced cost, which is lightweight but nevertheless robust enough to sustain the relatively high stresses to which the door is subjected during the machine operation.

**[0005]** According to the present invention, there is provided a top-loading laundry machine comprising a cabinet housing a rotatable drum having an access opening with associated therewith a door.

**[0006]** The door comprises a first and a second door wings hinged to the drum in correspondence of said access opening, the first and second door wings being provided with retaining means operable to keep the door closed.

**[0007]** The first and second door wings are in plastic material, and said retaining means comprise at least one retaining element formed in the second door wing and at least one retaining element formed in the first door wing; at least one (preferably both) between the at least one retaining element formed in the second door wing and the at least one retaining element formed in the first door wing is formed as a single piece with the respective door wing.

**[0008]** Preferably, at least one of the first and second door wings is totally and exclusively made of plastic material without any metal reinforcement part.

**[0009]** Advantageously, said at least one door wing which retaining element is formed as a single piece therewith is totally and exclusively made of plastic material without any metal reinforcement part.

**[0010]** Advantageously, in order to strengthen the door structure, at least one between the first and the second door wings has a box-shaped structure with at least one hollow chamber formed therein.

**[0011]** Advantageously, said at least one door wing which retaining element is formed as a single piece therewith has a box-shaped structure with at least one hollow chamber formed therein.

**[0012]** Preferably, said at least one of the first and second door wings totally and exclusively made of plastic material without any metal reinforcement part is formed as a single piece therewith has a box-shaped structure with at least one hollow chamber formed therein.

**[0013]** In particular, said at least one hollow chamber may comprise at least one transversal hollow chamber, extending along a direction of a rotation axis of the door wing around its hinge, and/or at least one longitudinal hollow chamber, extending in a direction transversal to said rotation axis.

**[0014]** Advantageously, said at least one transversal hollow chamber is located in correspondence of the retaining means of the respective door wing.

**[0015]** Preferably, still in order to strengthen the door structure, at least one between the first and second door wings comprises, formed as a single piece with the door wing, reinforcing ribs for reinforcing the door wing structure.

**[0016]** Advantageously, said at least one door wing which retaining element is formed as a single piece therewith comprises, formed as a single piece with the door wing, reinforcing ribs for reinforcing the door wing structure.

**[0017]** Preferably, said at least one of the first and second door wings totally and exclusively made of plastic material without any metal reinforcement part comprises, formed as a single piece with the door wing, reinforcing ribs for reinforcing the door wing structure.

**[0018]** Preferably, said at least one between the first and the second door wings having a box-shaped structure with at least one hollow chamber formed therein

comprises, formed as a single piece with the door wing, reinforcing ribs for reinforcing the door wing structure.

**[0019]** Said reinforcing ribs may comprise transversal reinforcing ribs, extending along a direction of a rotation axis of the door wing around its hinge, and/or longitudinal reinforcing ribs, extending in a direction transversal to said rotation axis.

**[0020]** Said reinforcing ribs may in particular comprise external and/or internal walls defining said hollow chamber.

**[0021]** In an embodiment of the present invention, said at least one retaining element formed in the second door wing may comprise at least one hook and said at least one retaining element formed in the first door wing may comprise a seat for receiving said hook, said hook being formed totally and exclusively in plastic material.

**[0022]** Preferably, said seat for the hook is formed totally and exclusively in plastic material.

**[0023]** In an embodiment of the present invention, said at least one retaining element formed in the first door wing may comprise a metal reinforcement bar arranged for being engaged by and retain the hook when the door is closed. Said seat for the hook may in such a case be defined by said metal reinforcement bar and by longitudinal reinforcing parts extending along a direction transversal to a rotation axis of the door wing around its hinge.

**[0024]** Preferably, said seat for the hook may be formed in correspondence of an inner side of the first door wing that, when the door is closed, faces towards the interior of the drum, whereas an outer side of the first door wing is free from the seat for the hook.

**[0025]** Advantageously, the second door wing is shaped so to have an arc-shaped projection in correspondence of the at least one hook, said arc-shaped projection forming, in use, a lifter for the laundry in the drum.

## Brief description of the drawings

**[0026]** These and other features and advantages of the present invention will be made apparent by the following detailed description of exemplary and non-limitative embodiments thereof, description that for better intelligibility should be read in conjunction with the attached drawings, wherein:

**Figure 1** schematically shows, in cross-sectional view taken along a vertical plane, and with parts not represented for clarity, a top-loading laundry washing machine with a drum door according to an embodiment of the present invention;

**Figures 2A** and **2B** show only the drum of the washing machine of **Figure 1,** with the drum door closed and open, respectively;

**Figures 3A, 3B** and **3B** are sectional views along a plane orthogonal to the drum axis with the drum door in open (**Figure 3A**), intermediate (**Figure 3B**) and closed (**Figure 3C**) positions;

**Figure 4** is a detail in enlarged scale of **Figure 3C;**

**Figure 5** is a top view of the drum door;

**Figures 6A, 6B** and **6C** are sectional views along the lines $\mathbf{VI_A - VI_A}$, $\mathbf{VI_B - VI_B}$ and $\mathbf{VI_C - VI_C}$ in **Figure 5;**

**Figures 7A, 7B, 7C, 7D, 7E** are sectional views along the lines $\mathbf{VII_A - VII_A}$, $\mathbf{VII_B - VII_B}$, $\mathbf{VII_C - VII_C}$, $\mathbf{VII_D - VII_D}$ and $\mathbf{VII_E - VII_E}$ in **Figure 5;**

**Figures 8** and **9** are exploded views of the drum door from above and below, respectively; and

**Figure 10** shows the assembled drum door in perspective from below (on the left) and from above (on the right).

## Detailed description of embodiments of the invention

**[0027]** Making reference to the drawings, in **Figure 1** there is schematically shown a top-loading laundry machine according to an embodiment of the present invention.

**[0028]** It is underlined that the expression laundry machine may indicate as well a top-loading washing machine, a top-loading drier and a top-loading washer/drier.

**[0029]** For example in the embodiment illustrated in the enclosed Figures the laundry machine is a top-loading washing machine, globally denoted as **100,** comprising a cabinet **105** with a top opening **110** closable by a cabinet door **115** hinged to the cabinet **105.**

**[0030]** The cabinet **105** accommodates a washing tub **117,** having a top opening (corresponding to the opening **110** of the cabinet **105**) which is closable preferably by the door **115.**

**[0031]** Clearly if the laundry machine is a drier the washing tub may be not provided.

**[0032]** A laundry drum **120** is rotatably accommodated within the washing tub (or within the cabinet if the tub, as in a drier, is not provided), with a preferably horizontal rotation axis. The drum **120,** better visible in **Figures 2A** and **2B,** preferably made of stainless steel, is generically cylindrical in shape, is closed at the two opposite bases, and has a perforated peripheral wall provided with an opening **205,** for the loading/unloading of the laundry.

**[0033]** A drum door **210** is provided in association with the drum opening **205.** The drum door **210** comprises a first and a second door wings **210a** and **210b,** at least one of which (preferably both of them) is made of plastic material, preferably in reinforced polyolefin, more preferably completely and exclusively made of plastic material (i.e. without metallic parts), , and is for example made by injection molding.

**[0034]** Each one of the two wings **210a** and **210b** of

the drum door **210** is hinged at one end **215a, 215b** thereof to one of two circumferentially opposite sides of the drum opening **205.** The two door wings **210a** and **210b** can be pivoted from a position in which the drum door **210** is open and leaves the drum opening **205** accessible, called open position (**Figures 1, 2A** and **3A**), to a position in which the drum door **210** is closed and closes the drum opening **205,** called closed position (**Figures 2B** and **3C**).

**[0035]** For the hinging to the drum **120,** at least one between the first and second door wings **210a** and **210b** (preferably both of them) comprises a plurality of hinging elements.

**[0036]** Preferably the hinging elements provided on at least one, preferably both of the two door wings **210a** and **210b** for the hinging to the drum **120** are totally and exclusively made of plastic material, without any reinforcing part in metal; preferably, the hinging elements totally and exclusively made of plastic material are in a single piece (*i.e.* integrally formed) with the remaining of the respective door wing, and are for example obtained by properly shaping the mold for the injection molding of the door wings.

**[0037]** Preferably the hinging elements comprise a plurality of eyelets **505,** integrally formed along the ends **215a** and **215b** of the respective door wing, which mesh with corresponding hinging elements, for example corresponding eyelets formed along the sides of the drum opening **205** and through which, preferably, hinge pins **303** pass. For example, in the embodiment illustrated in the enclosed drawings, the eyelets **505** of a door wing comprise standard-width eyelets **505a,** having a first width (along a direction transversal to the door wings) and enhanced-width eyelets **505b** having a second width which is higher (preferably double) than the first width of the standard-width eyelets; each double-width eyelet **505b** is preferably arranged between two standard-width eyelets **505a,** in a position which will be explained afterwards.

**[0038]** Preferably, the hinging elements provided on the first and/or second door wings **210a** and **210b** (for example the plurality of eyelets **505** of the embodiment illustrated in the enclosed figures) are completely made of plastic material (*i.e.* they don't comprise metal parts). Advantageously, the eyelets **505a** and **505b** are so shaped as to form reinforcing ribs **507** on their external surface, for example two reinforcing ribs for the standard-width eyelets **505a** and three reinforcing ribs for the double-width eyelets **505b;** the reinforcing ribs contribute to strengthening the eyelets, and thus the hinging elements.

**[0039]** Advantageously, elastic means, for example torsion springs, not illustrated are provided at the hinges of the door wings **210a** and **210b** for biasing the door wings **210a** and **210b** towards the open position. In order to bring the door wings **210a** and **210b** to the closed position, the user has to push the door wings down against the action of the springs.

**[0040]** Advantageously, when in the closed position, the free end portion **220a** of the first door wing **210a** surmounts the free end portion **220b** of the second door wing **210b.**

**[0041]** Advantageously the second door wing **210b** comprises at least one retaining element; for example, in the embodiment illustrated in the enclosed drawings the free end portion **220b** of the second door wing **210b** is advantageously shaped so as to define at least one retaining element, for example a hook or a succession of hooks **310** like in the shown embodiment (alternatively, a single hook extending for part or all of the width of the free end portion **220b** of the second door wing **210b** may be provided); advantageously the hooks **310** are totally made of plastic material, without any part of metal. Preferably the at least one retaining element of the second door wing **210b** (e.g. the hooks **310** of the embodiment illustrated in the enclosed drawings) is formed as a single piece with the second door wing **210b;** for example the second door wing **210b** may be totally and exclusively made of plastic material (*i.e.* it does not comprise metallic parts), and the retaining elements formed therein may be formed in a single piece (*e.g.* they are obtained during the molding of the second door wing) with the second door wing **210b.** For example, in the embodiment illustrated in the enclosed figures, the hooks **310** are formed in a single piece construction with the second door wing **210b.**

**[0042]** Preferably, but not necessarily, the hooks **310** are box-shaped and hollow.

**[0043]** Advantageously the first door wing **210a** comprises at least one retaining element formed therein adapted to engage and cooperate with the retaining element of the second door wing **210b;** for example, in the embodiment illustrated in the enclosed drawings the free end portion **220a** of the first door wing **210a** is shaped so as to define a retaining element, for example comprising a counter-hook **315,** adapted to engage and cooperate with the retaining element of the second door wing **210b** for keeping the drum door **210** closed (*e.g.* the counter-hook **315** may form a seat adapted to be engaged by the hook or hooks **310** of the embodiment illustrated in the enclosed figures); advantageously the counter-hook **315** may extend for essentially all the width of the free end portion **220a** of the first door wing **210a,** as in the shown embodiment, or for just part of it, or two or more counter-hooks may be provided in succession in positions corresponding to the hooks **310.The** retaining element of the first door wing, *e.g.* the counter-hook **315** (*i.e.* the seat for the hooks **310)** is preferably totally made of plastic material (*i.e.* it does not comprise metallic parts). Preferably, but not necessarily, the at least one retaining element of the first door wing, or part of it (e.g. the counter hooks 315 of the embodiment illustrated in the enclosed drawings), is formed as a single piece with the first door wing **210a.**

**[0044]** Preferably, the retaining element of the first door wing, *e.g.* the counter-hook **315** (*i.e.* the seat for the hooks **310**) is only present on the bottom side of the first door wing **210a** (*i.e.* the side that faces the interior of the

drum when the door wings are in the closed position) and advantageously does not extend to the upper surface of the door wing **210a;** in other words the retaining element of the first door wing is arranged in such a way that when the door **210** is in the closed position, with the retaining element of the first door wing **210a** engaging the retaining element of the second door wing **210b,** the retaining element of the second door wing **210b** (e.g. the hooks **310)** is not accessible (or does not protrude) from the outer side of the drum door **210** (*i.e.* the side that faces the exterior of the drum when the door wings are in the closed position); this fact avoids, for example, that when the door **210** is closed, a user can be harmed by the hooks **310** when touching the door wing **210a.**

**[0045]** Preferably, as in the shown embodiment, the retaining element of the first door wing **210a** comprises a reinforcement bar **320,** made of a suitably stiff and robust material, for example in metal, preferably steel, which is provided in correspondence of the counter-hook **315,** for instance extending for essentially the all width of the free end portion **220a,** passing through eyelets **903** (see **Fig. 9),** which are preferably totally made of plastic without any metal part and are preferably so shaped as to define reinforcing ribs on their external surface (alternatively, the bar **320** may be embedded in the first door wing **210a** by placing the bar **320** in the injection mould).

**[0046]** In a further embodiment the reinforcement bar may be made of plastic material, and it can be obtained in a single-piece construction with the counter-hooks **315,** for example during the molding of the first door wing **210a.**

**[0047]** When the two door wings **210a** and **210b** are pushed down and brought to the closed position, the retaining element of the first door wing **210a** (*e.g.* the counter-hook **315)** engages the retaining element of the second door wing **210b** (*e.g.* the hooks **310),** and the latter retains the retaining element of the first door wing **210a** (*e.g.* the counter-hook **315);** for example, with reference to the embodiment illustrated in the enclosed figures, the hooks **310** engage the seat defined by the counter-hook **315,** and, when in this condition, the action of the hooks **310** is exerted on the bar **320,** which is retained by the hooks **310** and thus prevents the drum door **210** from opening against the bias of the springs.

**[0048]** A door retaining/opening device **325** is provided for selectively retaining and allowing the opening of the drum door **210.** The door retaining/opening device **325** is mounted preferably to the second door wing **210b.** The retaining/opening device **325** comprises a pushbutton **330** that is preferably housed in a seat formed advantageously in the top of the second door wing **210b.** The pushbutton **330** is preferably hollow and frontally open, and it is adapted to be pivoted to the respective door wing **210b** (and in the example disclosed in the enclosed figures pivoted to the pushbutton seat) by suitable pivoting means comprising, for example two rounded projections 335, formed preferably at the bottom of the two lateral walls of the pushbutton, that form pins being received in corresponding rounded recesses **340** formed in the pushbutton seat, so as to allow a pivoting movement of the pushbutton **330** with respect to the pushbutton seat.

**[0049]** The pushbutton **330** advantageously comprises a biasing element adapted for biasing the pushbutton **330** to project outwards from the pushbutton seat in a blocking position, illustrated for example in **Figures 3C** and 4, in which, when the drum door **210** is closed, an upper edge **405** of the front aperture of the pushbutton **330** surmounts an engaging element of the first door wing **210a,** for example a projection **225** of the counter-hook **315** which, in the closed position, protrudes into the pushbutton **330** through the front aperture thereof, so as to prevent, as will be better explained in the following, the unintentional opening of the drum door **210.** In the embodiment illustrated in the enclosed drawings, the biasing element advantageously comprises resilient tongues **345,** *e.g.* formed in a single piece with the pushbutton **330,** extending rearwardly therefrom, and which, by abutting against a wall **350** of the second door wing **210b,** bias the pushbutton 330 to project towards the external of the pushbutton seat in the above mentioned blocking position.

**[0050]** With reference to the attached drawings, in order to open the drum door **210,** the user has to push the pushbutton **330** down against the action of the biasing resilient tongues **345.** By doing this, the pushbutton **330** rotates backwards and the upper edge **405** of the pushbutton **330** moves slightly rearward, up to an unblocking position of the pushbutton **330** (illustrated for example in **Figure 3B**), in which it no longer surmounts the counter-hook projection **225.** When the pushbutton **330** has been completely pushed down into the respective seat, the further pushing by the user causes the second door wing **210b** to rotate downwards around its hinge, and in this way the hook **310** escapes from the counter-hook **315** (**Figure 3B**); under the bias of the torsion spring biasing the first door wing **210a** towards the open position, the first door wing **210a** rotates to the fully open position, and the same occurs to the second door wing **210b,** under the action of the associated torsion spring. When the door wings are in the closed position and the pushbutton **330** is not pressed down, the upper edge **405** surmounting the projection **225** of the counter-hook **315** prevents the first door wing **210a** from rotating downwards of such an extent which is sufficient for the hooks **310** to escape from the counter-hook **315,** and in this way the unintentional opening of the drum door **210** is prevented.

**[0051]** Advantageously, at least one of the two door wings **210a** and **210b,** preferably both of them, has preferably an essentially hollow structure, so as to be lightweight. Preferably, at least the second door wing **210b,** having the retaining element formed therewith, has an essentially hollow structure.

**[0052]** Preferably, but not necessarily, for the purpose of having door wings **210a** and **210b** that are lightweight and at the same time robust, especially in respect of the stresses that the drum door **210** experiences during a

spinning phase of the washing cycle, at least one of, but preferably both, the first and second door wings **210a** and **210b** is shaped so that, on the inner side thereof (the side which, when the door wings are mounted to the drum and in the closed position, faces the drum interior), an internally hollow, box-shaped central rib **705** is defined, having side walls **710a** and an upper wall **710b,** extending longitudinally to the door wing, and which per-se also forms longitudinal reinforcing ribs. Longitudinal reinforcement ribs **715** are also preferably formed in the hollow space internal to the box-shaped central rib **705.** More preferably, in addition to the box-shaped central rib **705,** at least one of the door wings **210a** and **210b,** preferably both of them, is also shaped so as to define a pair of further longitudinal hollow ribs 720, for example located at the two opposite sides of the respective door wing. The hollow ribs **705** and **720** are useful to keep the door wing structure lightweight and at the same time, extending longitudinally, strengthen the door wings structure against stresses that, in use (for example, during the drum spinning phase), act longitudinally to the drum door wings and tend to cause the drum door **210** to open.

**[0053]** In a further embodiment, not illustrated, one or both the door wings comprises a different number of box shaped ribs extending longitudinally to the door wing, and which per-se also forms longitudinal reinforcing ribs.

**[0054]** The lateral walls delimiting laterally the box-shaped ribs (in the embodiment illustrated in the enclosed drawings the lateral walls 710a delimiting laterally the central box-shaped ribs **705**) are preferably located in correspondence of the standard-width eyelets **505a** of the pluralities of eyelets **505** which form the hinging elements of the door wings **210a** and **210b,** whereas the enhanced-width eyelets **505b** are preferably located where the lateral walls **710a** are not present; the reason for this choice is that the hinge is an area of major stress for the door wings, so that the eyelets (to which the stress of the hinge is transmitted) need to be sufficiently robust. Where the lateral walls **710a** are present, they act as reinforcement ribs so that there the door wing structure, and particularly the hinge area, is strengthened, and standard-width eyelets **505a** are sufficient, whereas where the lateral walls **710a** are not present, the door wing structure is less robust and the enhanced-width eyelets **505b** are preferable, in order to strengthen the hinge.

**[0055]** Advantageously in at least one of, but preferably both, the two door wings **210a** and **210b,** a pair of depressions forming chambers **905** are defined between the box-shaped central rib **705** and either one of the further longitudinal hollow ribs **720;** preferably the generic one of the chambers **905** is delimited between the faced side walls of two contiguous box-shaped ribs (in the example of the enclosed figures by one of the side walls **710** of the box-shaped central rib **705** and an inner wall **725** of the respective further longitudinal hollow rib **720.** In use, the chambers **905** advantageously collect water/washing liquid from the bottom of the washing tub (when, during the drum rotation, the drum angular position is such that the drum door **210** is located at the bottom of the washing tub) and lift the water/washing liquid up, for its successive fall down when the drum door **210** moves toward the top of the machine; this helps improving the effectiveness of the laundry washing action.

**[0056]** Preferably, in a position corresponding to the enhanced-width eyelets **505b,** reinforcement ribs **915** are formed which, preferably, starting from the ends **215a, 215b** degrades within the chambers **905.**

**[0057]** Advantageously, the second door wing **210b** has a protrusion **805,** preferably arc-shaped, on the inner side thereof in correspondence of the hooks **310,** and the protrusion **805,** in operation, acts as one of the lifters usually provided inside the drum **120** in circumferential succession along the peripheral wall for lifting the laundry being washed. Preferably, the arc-shaped protrusion **805** has a surface defined by several transversal and longitudinal reinforcing ribs **907** crossing each other; for contributing to keep the door wing structure lightweight and at the same time strong; preferably, the ribs **907** are formed essentially only proximate to the free end of the second door wing **210b** (preferably exception made for the central region of the door wing **210b),** so that when the drum rotates in the direction of arrow **A** in **Figure 9,** the flow of air (opposite to the drum rotation sense) encounters less resistance.

**[0058]** The structure of one or both of the door wings **210a** and **210b** is further strengthened by the provision in one or both of them of one or more transversal hollow chambers **605,** preferably, but not necessarily, in correspondence or proximate to the free ends **220a** and **220b,** *i.e.* where the retaining elements (*e.g.* the hooks **310** and counter-hooks **315**) are formed. The walls defining the chambers **605** act as transversal reinforcing ribs that help increasing the strength of the door wings structure; this is particularly advantageous in correspondence of the area where the first and second door wings **210a** and **210b** engage one with the other when the drum door **210** is closed, since this area is subject to significant stresses when in use the drum is rotated.

**[0059]** Preferably, although not necessarily, internal ribs may be formed inside the chambers **605,** for further strengthening such area of the door wings. The transversal hollow chambers **605** may or not communicate with the interior of the box-shaped central ribs **705.**

**[0060]** Advantageously, one or both of the door wings **210a** and **210b** are preferably formed as single pieces of plastic, for example obtained by injection molding into respective moulds.

**[0061]** The fact that the door wings **210a** and **210b** are entirely in plastic material makes them more suitable to being handled and touched by the user compared to metal door wings; another advantage is that the door wings can be formed in various shapes and colors. Also, plastic material is less subject to corrosion than metal. Moreover, the fact that the door wings **210a** and **210b** are entirely in plastic material reduces the overall weight of the respective door wing, which has may advantages; for

example the overall weight of the drum is reduced, and therefore also the energy consumption for rotating the drum is reduced. Moreover the laundry machine is easier to transport. The present invention has been here described making reference to an exemplary embodiment thereof. Those skilled in the art will of course be able to devise several modifications to the described embodiment, as well as other embodiments of the invention, without departing from the scope of the appended claims.

**[0062]** For example, the retaining means provided on the first and second door wings might, in alternative invention embodiments, not be present, and the closure of the drum door be ensured by the door retaining/opening device only.

## Claims

1. A top-loading laundry machine comprising a cabinet (**105**) housing a rotatable drum (**120**) having a access opening (**205**) with associated therewith a door (**210**), the door comprising a first and a second door wings (**210a,210b**) hinged to the drum in correspondence of said access opening, the first and second door wings being provided with retaining means (**310,315,320**) operable to keep the door closed, **characterized in that** the first and second door wings are in plastic material, and **in that** said retaining means comprise at least one retaining element (**310**) formed in the second door wing (**210b**) and at least one retaining element (**315,320**) formed in the first door wing (**210a**), at least one between said at least one retaining element formed in the second door wing and said at least one retaining element formed in the first door wing being formed as a single piece with the respective door wing.

2. The laundry machine of claim 1, wherein at least one **(210b)** of the first and second door wings is totally and exclusively made of plastic material without any metal reinforcement part.

3. The laundry machine according to claim 1 or 2, wherein at least one between the first and the second door wings has a box-shaped structure with at least one hollow chamber (**705,720,605**) formed therein.

4. The laundry machine according to claim 3, wherein said at least one hollow chamber comprises at least one transversal hollow chamber (**605**), extending along a direction of a rotation axis of the door wing around its hinge, and/or at least one longitudinal hollow chamber (**705,720**), extending in a direction transversal to said rotation axis.

5. The laundry machine of claim 4, wherein said at least one transversal hollow chamber is located in correspondence of the retaining means of the respective door wing.

6. The laundry machine according to any one of the preceding claims, wherein at least one between the first and second door wings comprises, formed as a single piece with the door wing, reinforcing ribs (**710a,715,725,915,907,507**) for reinforcing the door wing structure.

7. The laundry machine according to claim 6, wherein said reinforcing ribs comprise transversal reinforcing ribs, extending along a direction of a rotation axis of the door wing around its hinge, and/or longitudinal reinforcing ribs, extending in a direction transversal to said rotation axis.

8. The laundry machine according to claim 6 or 7 as depending on claim 3, wherein said reinforcing ribs comprise external and/or internal walls defining said at least one hollow chamber.

9. The laundry machine according to any one of the preceding claims, wherein said at least one retaining element formed in the second door wing comprises at least one hook (**310**) and said at least one retaining element formed in the first door wing comprises a seat (**315**) for receiving said hook, said hook being formed totally and exclusively in plastic material.

10. The laundry machine according to claim 9, wherein said seat for the hook is formed totally and exclusively in plastic material.

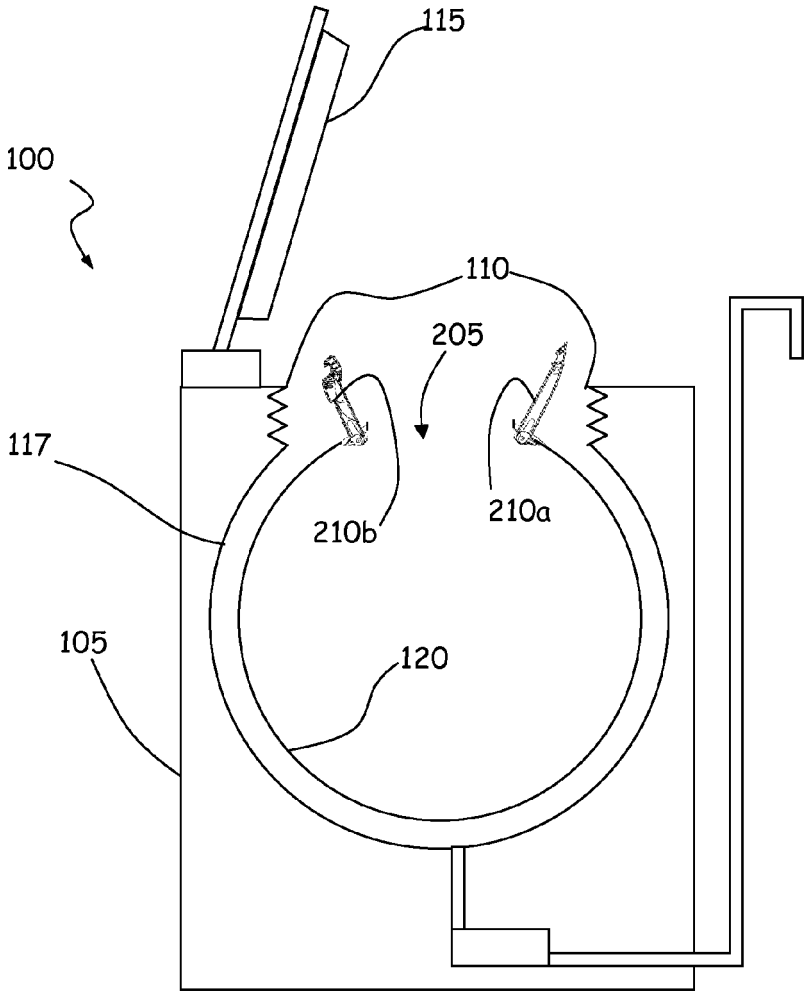
11. The laundry machine according to claim 9, wherein said at least one retaining element formed in the first door wing comprises a metal reinforcement bar (**320**) arranged for being engaged by and retain said at least one hook when the door is closed.

12. The laundry machine according to claim 11, wherein said seat for the hook is defined by said metal reinforcement bar and by longitudinal reinforcing parts extending along a direction transversal to a rotation axis of the door wing around its hinge.

13. The laundry machine according to any of claims 9 to 12, wherein said seat for the hook is formed in correspondence of an inner side of the first door wing that, when the door is closed, faces towards the interior of the drum, whereas an outer side of the first door wing is free from the seat for the hook.

14. The laundry machine according to any one of the claims 9 to 13, wherein the second door wing is shaped so to have an arc-shaped projection in correspondence of the at least one hook, said arc-shaped projection forming, in use, a lifter for the laundry in the drum.

FIG. 1



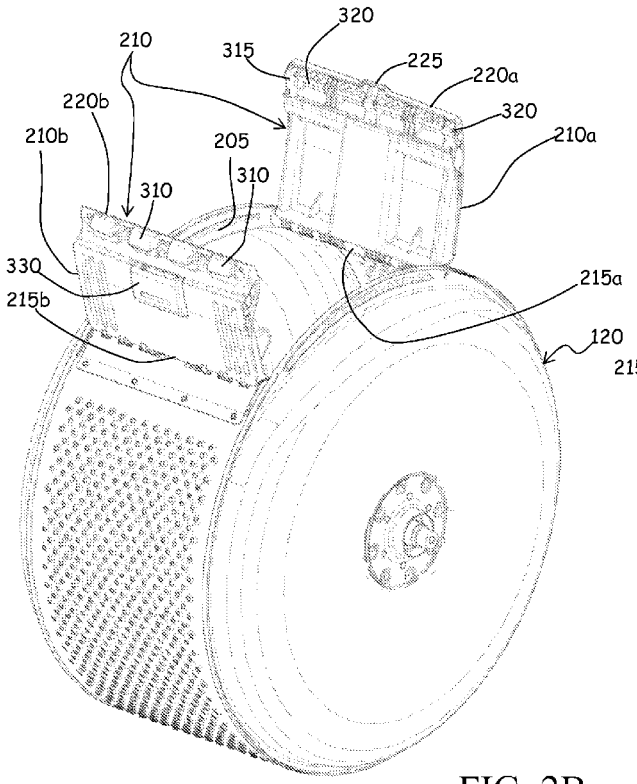

320
315
225
220a
320
210a
210
220b
210b
205
310
310
330
215b
215a
120

FIG. 2B

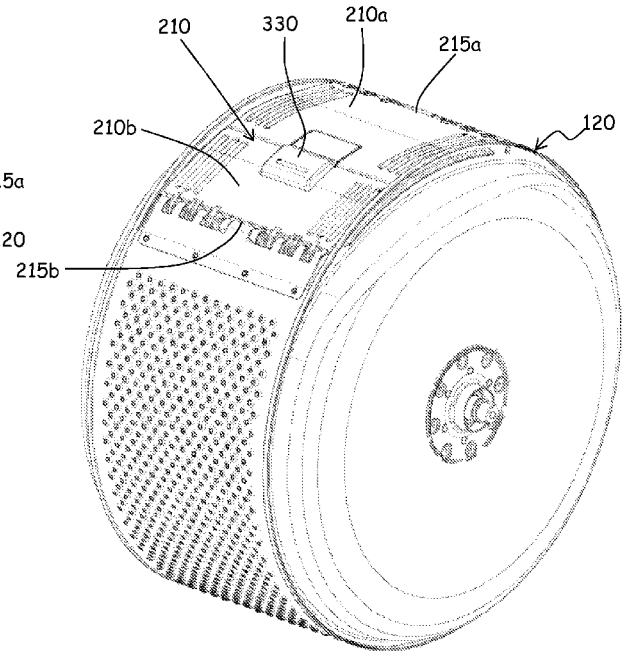

210
330
210a
215a
210b
120
215b

FIG. 2A

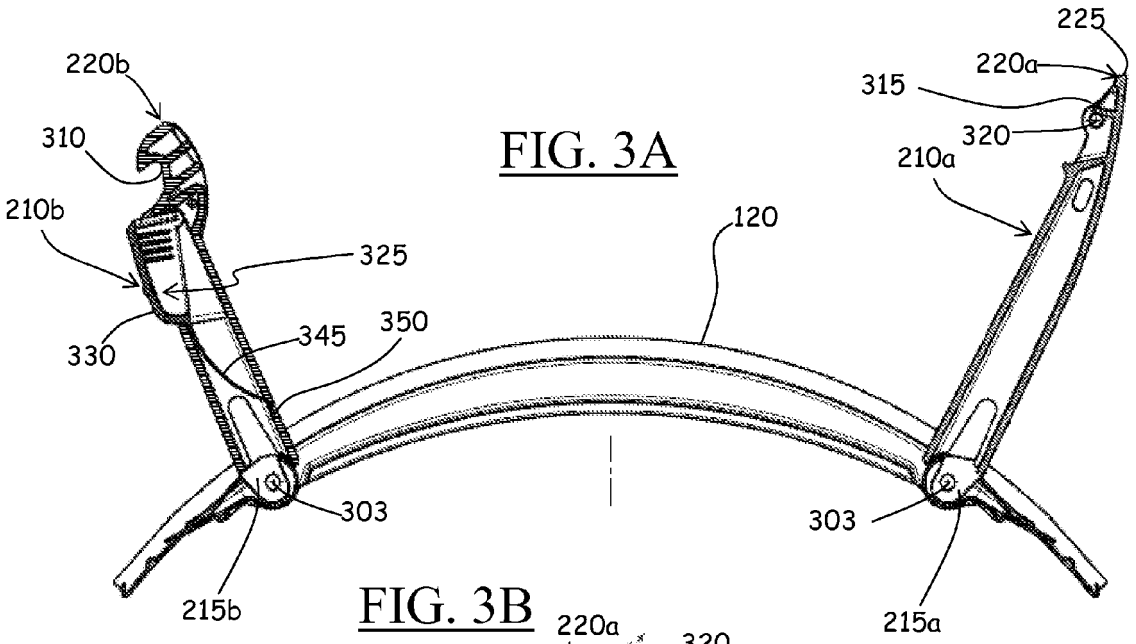



FIG. 3A

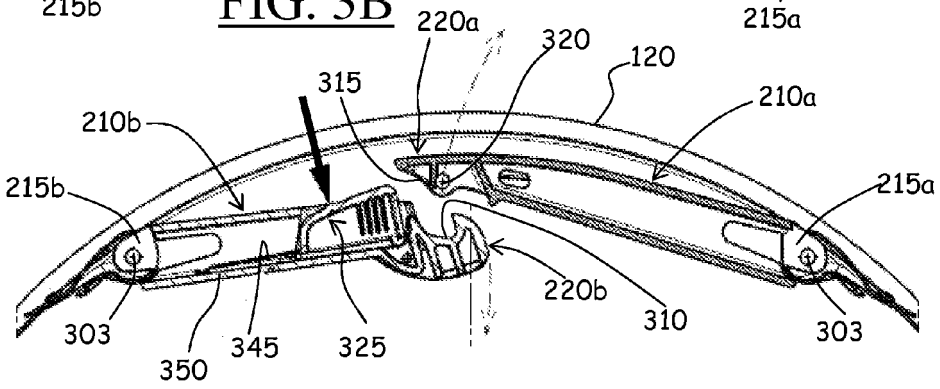



FIG. 3B

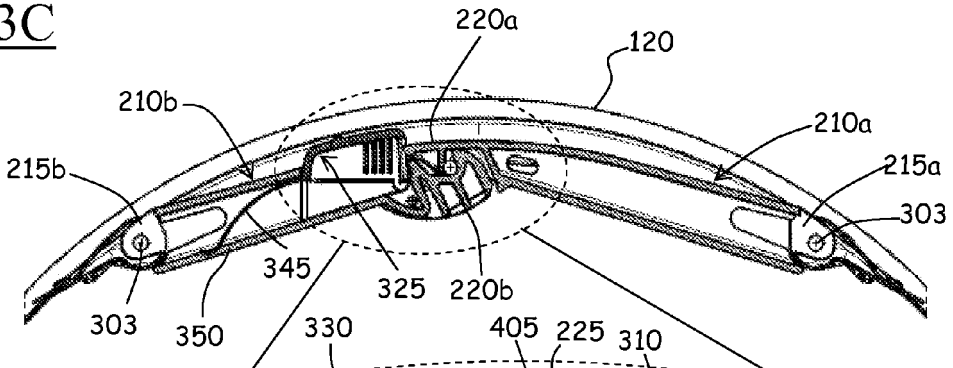



FIG. 3C

FIG. 4

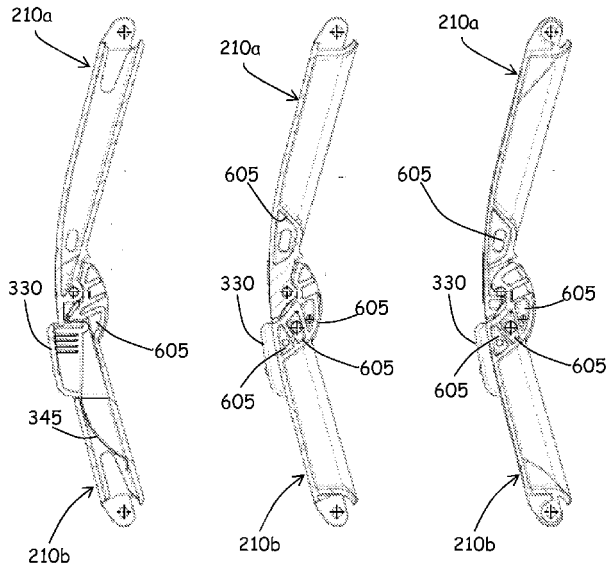



FIG. 6C FIG. 6B FIG. 6A

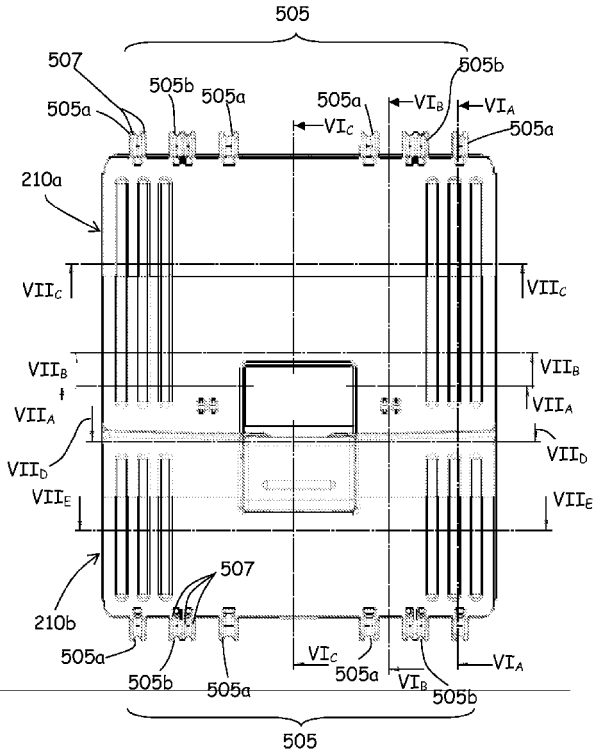



FIG. 5

FIG. 7A

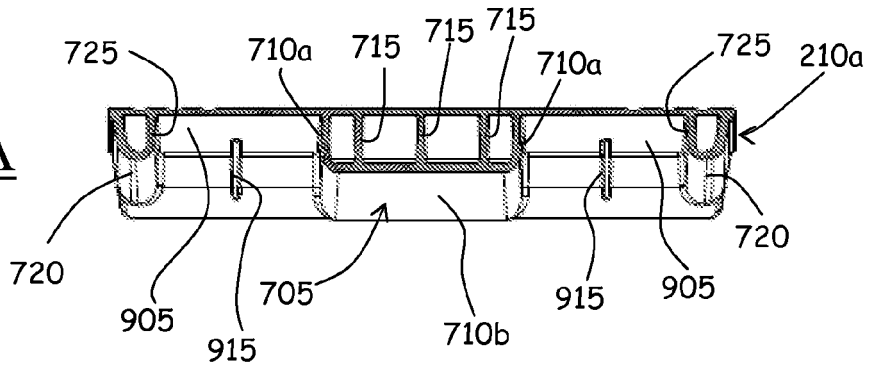



FIG. 7B

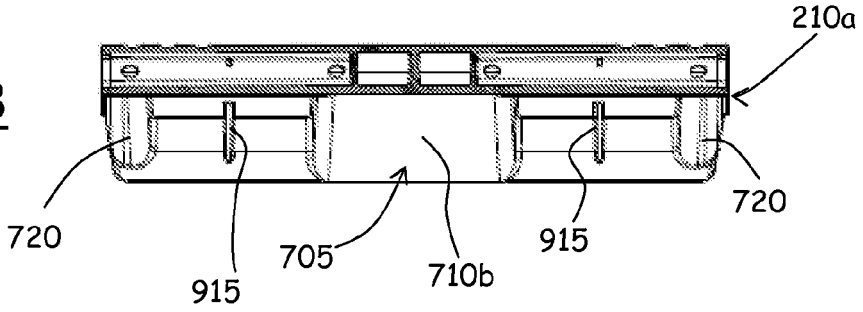



FIG. 7C

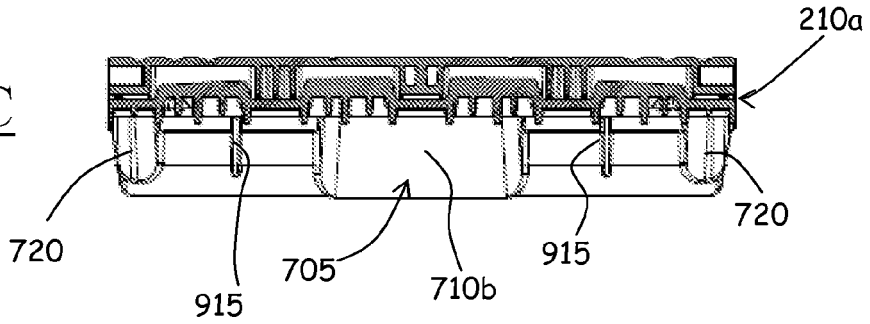



FIG. 7D

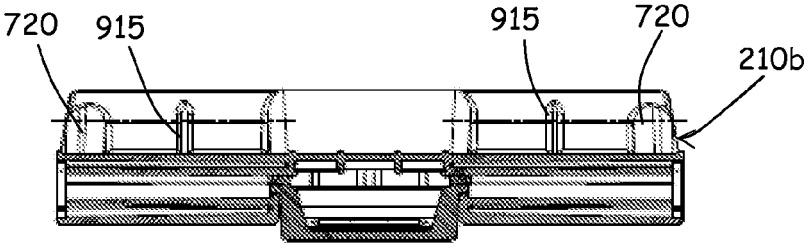
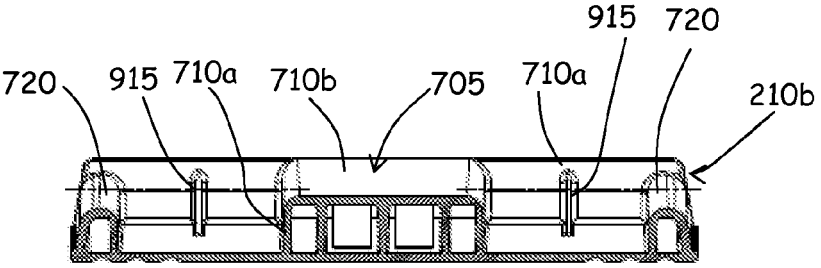



FIG. 7E



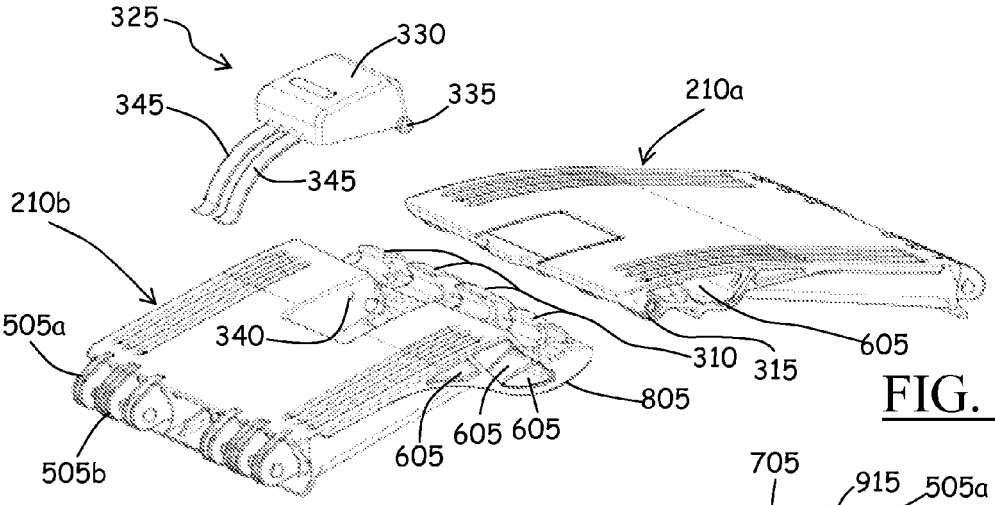



FIG. 8

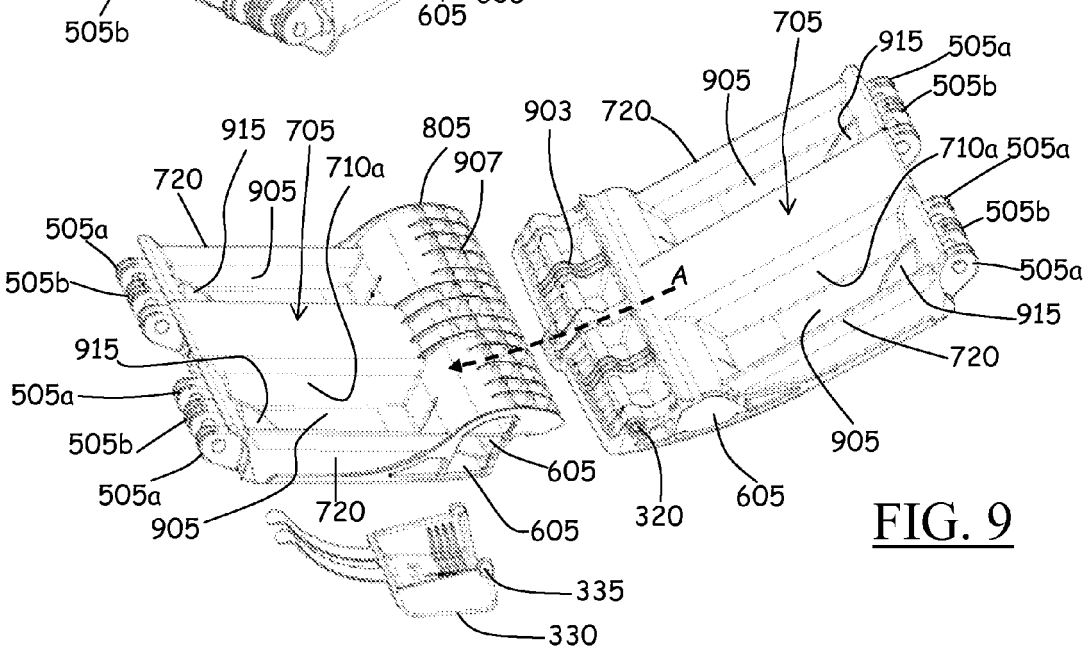



FIG. 9

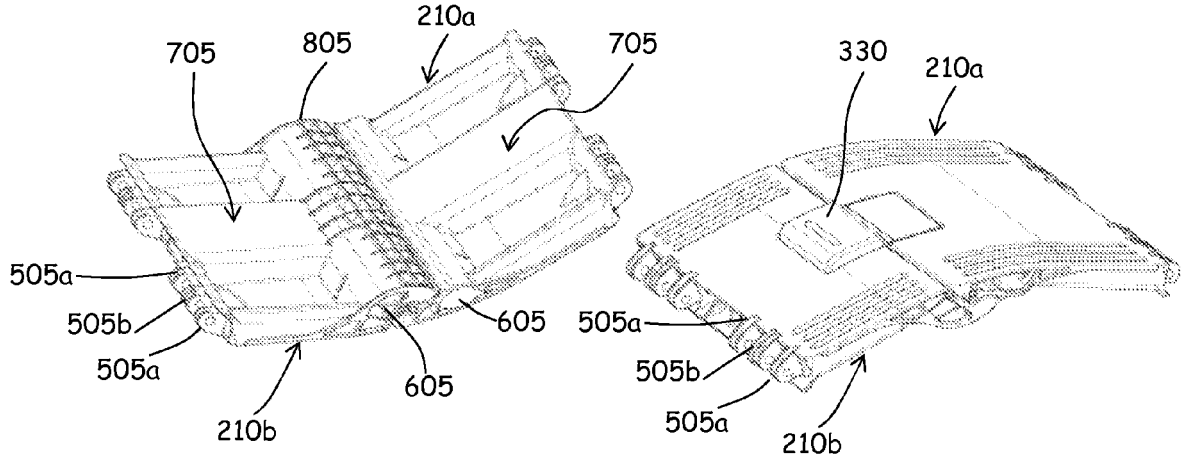



FIG. 10

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# EUROPEAN SEARCH REPORT

Application Number
EP 10 17 2162

## 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<br>A | EP 1 245 712 A2 (WHIRLPOOL CO [US])<br>2 October 2002 (2002-10-02)<br>* paragraphs [0001], [0013] - [0016], [0019]; claims; figures *<br>----- | 1-5, 9-11,13<br>6-8,12, 14 | INV.<br>D06F37/10 |
| A | DE 200 09 053 U1 (ELECTROLUX ZANUSSI ELETTRODOME [IT])<br>10 August 2000 (2000-08-10)<br>* claims; figures *<br>----- | 1-14 | |
| A,D | EP 1 992 728 A2 (INDESIT CO SPA [IT])<br>19 November 2008 (2008-11-19)<br>* the whole document *<br>----- | 1-14 | |
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The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| Munich | 3 February 2011 | Clivio, Eugenio |

CATEGORY OF CITED DOCUMENTS

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1 EPO FORM 1503 03.82 (P04C01)

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03-02-2011

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

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