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(54) Electrical household appliance

(57) Electrical household appliance (1) comprising:
-a faceplate (2) comprising a user interface (20) for controlling the electrical household appliance (1);
-a machine body (3) coinciding with the parts of the electrical household appliance (1) outside the faceplate (2), the machine body (3) comprising a recess (30) for positioning the faceplate (2);
-means (4) for fastening the faceplate (2) to the positioning housing (30), the fastening means (4) being partly integrated in the faceplate (2) and partly integrated in the machine body (3);

Whereby said fastening means (4) comprises at least a first snap-on connector (41) to allow the faceplate (2) to be connected without the aid of tools outside the electrical household appliance (1).

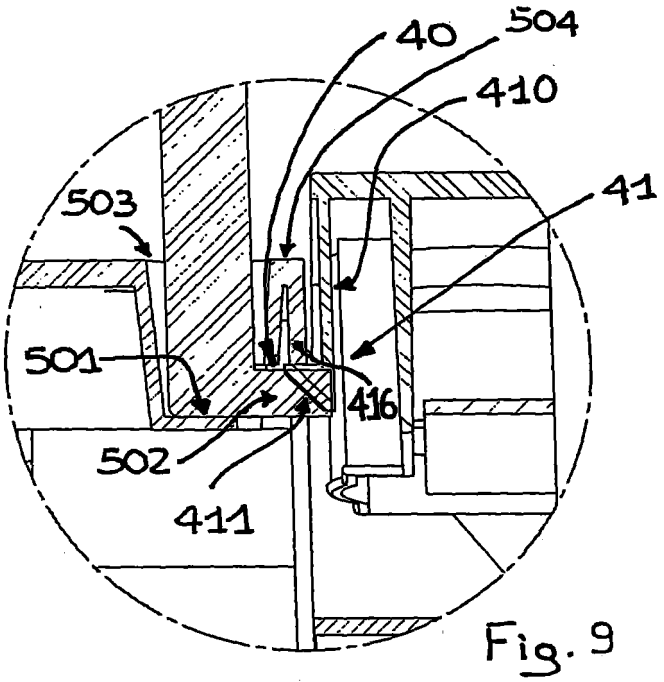

Fig. 9

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Description

[0001] This invention relates to an electrical household appliance, in particular an electrical household appliance comprising means of coupling a control interface. Electrical household appliances are known in the prior art in which the control interface is integrated in a decorative covering panel which covers large surfaces of the electrical household appliance. Electrical household appliances are also known in the prior art in which the control interface is connected by threaded connections to the remaining parts of the electrical household appliance.

[0002] Drawbacks to these embodiments are due to the assembly which inevitably requires highly qualified personnel for making all the electrical and mechanical connections.

[0003] In this context, the technical purpose which forms the basis of this invention is to propose an electrical household appliance that overcomes the above mentioned drawbacks of the prior art.

[0004] More specifically, the aim of this invention is to provide an electrical household appliance which makes the assembly of the electrical household appliance very fast and easy.

[0005] Another aim of the invention is to provide an electrical household appliance which facilitates the replacement of a user interface of the electrical household appliance.

[0006] The technical purpose indicated and the aims specified are substantially achieved by an electrical household appliance comprising the technical features described in one or more of the appended claims.

[0007] Further features and advantages of the invention are more apparent in the non-limiting description which follows of a preferred non-limiting embodiment of an electrical household appliance illustrated in the accompanying drawings, in which:

- Figure 1 is a perspective view of an electrical household appliance according to this invention;
- Figure 2 is a partly exploded perspective view of a detail of an electrical household appliance according to this invention;
- Figure 3 is an exploded view of a detail of a component of Figure 2;
- Figure 4 is a rear view of some components shown in Figure 2;
- Figure 5 is a detail of a component of Figure 2 from a different angle;
- Figure 6 shows a first embodiment according to this invention;
- Figure 7 is a front view of that shown in Figure 6;
- Figure 8 is an enlarged cross section through the plane A-A of Figure 7;
- Figure 9 shows an enlargement of Figure 8;
- Figure 10 shows a second embodiment according to this invention;
- Figure 11 is a front view of that shown in Figure 10;
- Figure 12 is an enlarged cross section through the plane B-B of Figure 11; This invention relates to an electrical household appliance 1. Typically, but not exclusively, the electrical household appliance 1 might be a laundry washer or a dishwasher or a washer-dryer or a refrigerator or an oven or a laundry drier (in the accompanying drawings, in particular in Figure 1, reference is made by way of an example to a laundry washer).

[0008] The electrical household appliance 1 comprises:

- a faceplate 2 comprising a user interface 20 for controlling the electrical household appliance 1;
- a machine body 3 of the electrical household appliance 1 comprising the parts of the electrical household appliance outside the faceplate 2, the machine body 3 comprising a recess 30 for positioning the faceplate 2 (the machine body 3 of the electrical household appliance 1 might in turn be an assembly of several components);
- means 4 for fastening the faceplate 2 to the positioning recess 30, the fastening means 4 being partly integrated in the faceplate 2 and partly integrated in the machine body 3.

[0009] Preferably, the positioning recess 30 comprises a cavity 31 made on the machine body 3 of the electrical household appliance 1.

[0010] The faceplate 2 typically comprises a front decorative covering 22 comprising, for example, a pushbutton panel 23 and a knob 24. To the rear of the front decorative covering 22 there is an electronic card 25 comprising, for example, LEDs and various potentiometers. To the rear of the electronic card 25 there might be a rear cover 26. The cover 26 minimises the risk of accidental entry of water into the user interface 20.

[0011] Typically, the machine body 3 comprises a structure comprising the actuators by which the electrical household appliance physically performs the processing operations (washing, drying, etc.) on the external items to be processed (dishes, laundry, etc.). For example, in the case of a laundry washer the machine body 3 comprises a casing containing a washing compartment, a rotating drum and means of introducing washing water into the washing compartment.

[0012] To limit the costs, the manufacturers of electrical household appliances might use this invention to make a common main body which could then be diversified by adding predetermined components such as, for example, but not exclusively, the faceplate. Faceplates may therefore be used having specific silk-screen printing or luminous controls according to the various nations (associated with the language of the marketing country). Moreover, depending on the faceplate used the machine may have more or less sophisticated functions.

[0013] The solution facilitates in particular the man-

agement of warehouse stock.

[0014] Conveniently, the fastening means 4 comprise at least a first connector 41 to allow the faceplate 2 to be connected without the aid of tools outside the electrical household appliance 1. This allows a fast and easy connection and it is particularly interesting as the machine body 3 and the faceplate 2 might also be made in two different production factories and connected in a warehouse where there are not the tools normally available in a production factory. The first connector 41 is a snap-on type. This allows the constraining action following a snap which, overcoming a slight interference, allows the insertion of a protuberance in a corresponding profile.

[0015] Conveniently, the fastening means 4 comprise a second connector 42, the first and the second connector 41, 42 extending on two opposite sides of the perimeter of the faceplate 2 and being designed to interact with the machine body 3 of the electrical household appliance 1. Conveniently, the second connector 42 is configured so as to also perform the function of fulcrum of rotation of the faceplate 2 with respect to the machine body 3. More specifically, the rotation occurs at least approximately about a vertical axis.

[0016] Advantageously, the second connector 42 comprises:

- at least an insert 420;
- a corresponding groove 421 formed in the positioning recess 30 of the faceplate 2 and designed to accommodate at least an insert 420. Conveniently, the insert 420 is rigidly connected to the faceplate 2. Advantageously, the first snap-on connector 41 comprises:
- an elastically deformable member 412 comprising means 413 for anchoring to a portion of the electrical household appliance outside the elastically deformable member 412;
- a housing 40 designed to accommodate the anchoring means 413 when the faceplate 2 is connected to the machine body 3 of the electrical household appliance 1.

[0017] Preferably, the elastically deformable member 412 is fixed to the faceplate 2 and the housing 40 is formed in a portion of the electrical household appliance outside the faceplate 3 (typically in the machine body 3). Typically, for fastening the faceplate 2 in the positioning recess 30 the user (who might also be the assembler) will firstly connect the second rigid connector 42 and then the first connector 41 (using the elastic deformability properties of the first connector and the characteristic of the second connector 42 to act as fulcrum).

[0018] In an first example embodiment (see Figures 6-9) the elastically deformable member 412 comprises an elastically deformable tab 410 and the anchoring means 413 comprise a protrusion 411 which extends transversally to the tab 410. The faceplate 2 extends in thickness along a first direction 21, the tab 410 extending in cantilever fashion along the first direction 21.

[0019] The protrusion 411 has:

- a guide (typically a surface 414 inclined at an angle to the first direction 21) to facilitate bending of the tab 410 following contact of the inclined surface 414 with the machine body 3;
- an abutment surface 415 substantially at right angles to the first direction 21.

[0020] The machine body 3 comprises a retaining portion 416 in contact with the abutment surface 415. The retaining portion 416 is interposed between the abutment surface 415 and a zone in front of the faceplate 2 and outside the electrical household appliance 1.

[0021] In a second embodiment (see Figures 10-12), the first snap-on connector 41 comprises:

- an inlet 72 formed on a lateral portion 27 of the faceplate 2 interposed between a front surface 28 and a rear surface 29;
- a protrusion 71 outside the faceplate 2 and positioned in the inlet 72 when the faceplate 2 is connected to the machine body 3.

[0022] This invention also relates to a system comprising:

- an electrical household appliance 1 having one or more of the technical features described above;
- means 5 for releasing the faceplate 2.

[0023] This is essential, for example, for any operations for maintenance and replacement of the faceplate 2.

[0024] For example, in the case of the first above-mentioned embodiment (see Figures 6-9), the release means 5 comprise a tool 50 which is both outside of, and removable from, both the faceplate 2 and the machine body 3 of the electrical household appliance 1 and designed to interact with the first connector 41.

[0025] The tool 50 is by way of an example a key 51 insertable into a cavity 500 formed in the electrical household appliance 1.

[0026] The key 51 comprises a tooth 52 and inside the cavity 500 it can turn between a first configuration and a second configuration, the passage from the first to the second configuration being at least partly accompanied by a pushing action of the tooth 52 on the first connector 41 to disengage it from the machine body 3 of the electrical household appliance 1. The cavity 500 allows the insertion and the extraction of the key 51 only by performing a translation of the cavity when the latter is in the first configuration. The cavity 500 has an end of stroke position which stops the insertion of the key 51 in the cavity 500. The cavity 500 allows the rotation of the key 51 from the first to the second configuration only when the key 51 is in contact with the end of stroke position 501. More specifically, when the key 51 passes from the

first to the second configuration the tooth 52 applies a pushing action on the elastically deformable member 412 (in particular - see Figure 9 - on the protrusion 411).

[0027] The cavity 500 is conveniently formed on the machine body 3 of the electrical household appliance 1 alongside the positioning recess 30. The cavity 500 is also adjacent to the housing 40 and in communication with the latter by a first opening 502 which is positioned away from an opening 503 for inserting the key 51. There is a separation structure 504 between the first opening 502 and the insertion opening 503. The separation structure 504 bends the elastically deformable member 412 during the insertion of the faceplate 2 in the positioning recess 30.

[0028] In a second embodiment (see by way of example, but without limiting the scope of the invention, Figures 10 to 12) the release means 5 are integrated in the electrical household appliance 1 and comprise a cam 73 which can rotate between a first and a second configuration about an axis of rotation 76. In the first configuration the cam 73 blocks a portion of the faceplate 2 preventing the removal from the positioning recess 30 (see Figure 12) whilst in the second configuration the cam allows the extraction of the faceplate 2 from the positioning recess 30 (embodiment not illustrated).

[0029] Conveniently, the cam 73 is connected to a rotating pin 74 accessible from the outside of the electrical household appliance 1. Advantageously, the pin 74 comprises a slot 75 for facilitating rotation of the pin (for example, a coin or a thin item may be introduced into the slot 75).

[0030] Conveniently, in the first configuration the cam 73 comprises a surface 731 sloping relative to the axis of rotation 76 of the cam 73, facing toward the outside of the electrical household appliance 1 and extending inside the positioning recess 30. The cam 73 comprises a surface 732 for locking a portion of the faceplate 2, the locking surface 732 being substantially at right angles to the axis of rotation of the cam 73 and in the first configuration extending inside the positioning recess 30 for constraining the faceplate 2. The sloping surface 731 and the locking surface 732 are formed on the protrusion 71.

[0031] In the second configuration the surface 732 for locking the faceplate 2 is removed from the inside of the positioning recess 30 allowing the removal of the faceplate 2. More specifically, in the second configuration the protrusion 71 is outside the inlet 72 allowing the removal of the faceplate 3. The faceplate 2 comprises a single electrical connector 6 designed to interact electrically with the machine body 3 of the electrical household appliance 1 through a respective electrical connector 60 made in the positioning recess 30. Advantageously, the single electrical connector 6 made on the faceplate 2 is a male connector, whilst the corresponding connector 60 made in the positioning recess 30 is a female connector. This facilitates the electrical connection when the faceplate 2 is inserted in the positioning recess 30. In an alternative embodiment the single connector 6 of the faceplate 2 might be female and in that case the corresponding connector 60 made in the positioning recess 30 would be a male connector.

[0032] In a non-limiting example embodiment the user interface 20 comprises:

- the knob 24;
- a connecting port positioned to the rear of the knob for allowing an exchange of data and/or instructions between the electrical household appliance and an external device. For example, the device allows the connection with a device allowing programming of the electrical household appliance 1.

[0033] In the preferred embodiment the knob 24 conceals the connecting port (embodiment not illustrated). The knob 24 is removable from the remaining parts of the user interface 20 for allowing access to the connecting port. Conveniently, for removing the knob 24 a pulling force greater than a predetermined value must be applied (for removing the knob 24 from a shaft on which it is connected) or special tools must be used. The aim of the above-mentioned precautions is to prevent the user from accidentally removing the knob 24 to prevent careless touching of what is behind the knob 24 causing electrocution.

[0034] Conveniently, the electrical household appliance 1 also comprises a decorative covering 8 applicable to a support 80 underlying the electrical household appliance 1. Preferably, the decorative covering 8 is removably connectable to the underlying support 80, but could also be irremovably connectable to the support 80. In this regard, there are elastically deformable connecting means 81 which have a guide for facilitating the connection and an anchoring device hindering the removal. Preferably, the elastically deformable connecting means 81 are made on the decorative covering 8 whilst suitable counter-profiles 82, designed to accommodate the elastically deformable connecting means 81, are formed in the support 80. In the washing appliances the decorative covering 8 may be applied, for example, on a detergent tray 83 (the tray 83 being in that case the support 80). This embodiment is particularly advantageous as the front of the detergent tray typically shows information regarding the programs to select according to the type of products to be washed. With the above-mentioned precaution the decorative covering 8 may be applied with the silk-screen printing written in the language used in the country in which the electrical household appliance 1 will be marketed (the majority of the remaining parts may, however, be in common for all the electrical household appliances 1 and assembled in the main assembly line). As described above, the decorative coating 8 may be removably connectable to the tray 83. In that case, the force necessary for separating the decorative covering 8 from the tray 83 is greater than a force necessary for extracting the tray 83 from its housing.

[0035] The connection of the faceplate 2 to the ma-

chine body 3 comprises the following steps:

- placing a perimeter side of the faceplate 2 in which the second connector 42 is partly made in the positioning recess 30 connecting the second connector 42 (this advantageously positions insert 420 in the groove 421 or the inserts 420 in the grooves 421);
- rotating the faceplate 2 relative to an imaginary axis extending along the perimeter side (preferably the axis being vertical) substantially positioning the full perimeter of the faceplate 2 alongside the positioning recess 30. The step of connecting the first connector 41 is performed at least partly simultaneously with the step of rotating the faceplate 2.

[0036] During the end part of the step of rotating the faceplate 2 the first snap-on connector 41 is connected. In the first above-mentioned embodiment (see for example Figures 6-9) the elastically deformable member 412 coming into contact with the machine body 3 bends elastically and reassumes the undeformed position when reaching in the housing 40.

[0037] In the second above-mentioned embodiment (see for example Figures 10-12) the connection of the first snap-on connector 41 presupposes the insertion of the protrusion 71 in the inlet 72 (thereby creating an interference between the cam 73 and the faceplate 2).

[0038] The disconnection of the faceplate 2 from the machine body 3 in the first embodiment comprises the following steps:

- inserting the key 51 in the cavity 500;
- rotating the key 51, the step causing a pushing action of the tooth 52 of the key 51 on the protrusion 411 of the tab 410 which disengages from the retaining portion 416;
- extracting the faceplate 2.

[0039] The disconnection of the faceplate 2 from the machine body 3 in the second embodiment (see Figures 10-12) comprises the following steps:

- rotating the cam 73 about its axis 76 of rotation; this step positions the locking surface 732 outside the positioning recess 30 and no longer in contact with the faceplate 2;
- extracting the faceplate 2.

[0040] The invention has many advantages linked to the speed and the practicality of assembly and, if necessary, disassembly of a user interface.

[0041] At the same time, the embodiment allows a range of products to be diversified in an extremely simple fashion providing several electrical household appliances in which only certain manufacturing components differ and the main machine body is kept unchanged. It shall be understood that the invention described above may be modified and adapted in several ways without departing from the scope of the inventive concept. Moreover, all the details of the invention may be substituted by other technically equivalent elements. In practice, all the materials used, as well as the dimensions, may vary according to requirements.

Claims

1. An electrical household appliance comprising:

   - a faceplate (2) comprising a user interface (20) for controlling the electrical household appliance (1);
   - a machine body (3) coinciding with the parts of the electrical household appliance (1) outside the faceplate (2), the machine body (3) comprising a recess (30) for positioning the faceplate (2);
   - means (4) for fastening the faceplate (2) to the positioning housing (30), the fastening means (4) being partly integrated in the faceplate (2) and partly integrated in the machine body (3);

   characterized in that the fastening means (4) comprise at least a first snap-on connector (41) to allow the faceplate (2) to be connected without the aid of tools outside the electrical household appliance (1).

2. The electrical household appliance according to claim 1, **characterized in that** the first snap-on connector (41) comprises:

   - an elastically deformable member (412) comprising means (413) for anchoring to a portion of the electrical household appliance (1) outside the elastically deformable member (412);
   - a housing (40) designed to accommodate the anchoring means (413) when the faceplate (2) is connected to the machine body (3) of the electrical household appliance (1).

3. The electrical household appliance according to claim 2, **characterized in that** the elastically deformable member (412) is fixed to the faceplate (2) and the housing (40) is formed in a portion of the electrical household appliance outside the faceplate (2).

4. The electrical household appliance according to claim 2 or 3, **characterized in that** the elastically deformable member (412) comprises an elastically deformable tab (410), the anchoring means (413) comprising a protrusion (411) which extends transversally to the tab (410).

5. The electrical household appliance according to claim 4 when it depends directly or indirectly on claim 3, **characterized in that** the faceplate (2) extends

in thickness along a first direction (21), the tab (410) extending in cantilever fashion along the first direction (21), the protrusion (411) comprising:

- a surface (414) inclined at an angle to the first direction (21) to facilitate bending of the tab (410) following contact of the inclined surface (414) with the machine body (3);
- an abutment surface (415) substantially at right angles to the first direction (21);

a portion (416) for retaining the machine body (3) being in contact with the abutment surface (415) and being interposed between the abutment surface (415) and a zone in front of the faceplate (2) and outside the electrical household appliance (1).

6. The electrical household appliance according to any of the foregoing claims, **characterized in that** the fastening means (4) comprise a second connector (42), the first and the second connector (41, 42) extending on two opposite sides of the perimeter of the faceplate (2) and being designed to interact with the machine body (3) of the electrical household appliance (1).

7. The electrical household appliance according to any of the foregoing claims, **characterized in that** the faceplate (2) comprises a single electrical connector (6), designed to interact electrically with the machine body (3) of the electrical household appliance (1) through a respective electrical connector (60) made in the positioning recess (30).

8. A system comprising:

- an electrical household appliance according to any of the claims from 1 to 7;
- means (5) for releasing the faceplate (2) from the rest of the electrical household appliance.

9. The system according to claim 8, **characterized in that** the release means (5) comprise a tool which is both outside of, and removable from, both the faceplate (2) and the machine body (3) of the electrical household appliance (1) and which is designed to interact with the first connector (41).

10. The system according to claim 9, **characterized in that**:

- the electrical household appliance (1) comprises a cavity (500);
- the tool (50) is a key (51) insertable into the cavity (500) of the electrical household appliance.

11. The system according to claim 10, **characterized in that** the key (51) comprises a tooth (52) and, inside the cavity (500), can turn between a first configuration and a second configuration, the passage from the first to the second configuration of the key (51) being at least partly accompanied by a pushing action of the tooth (52) on the first connector (41) to disengage it from the machine body (3) of the electrical household appliance (1).

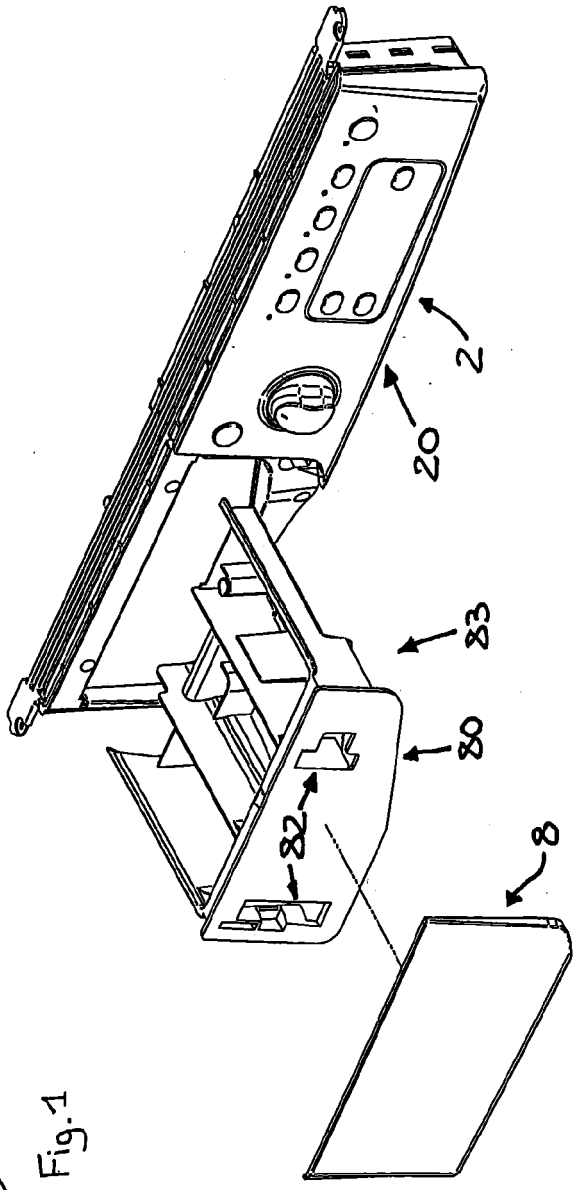


Fig. 2

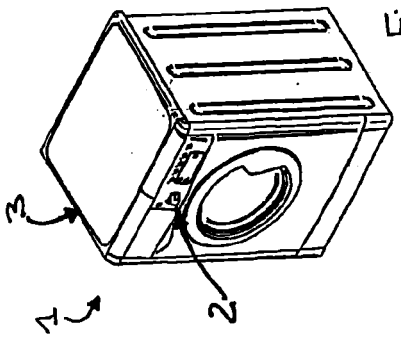


Fig. 1

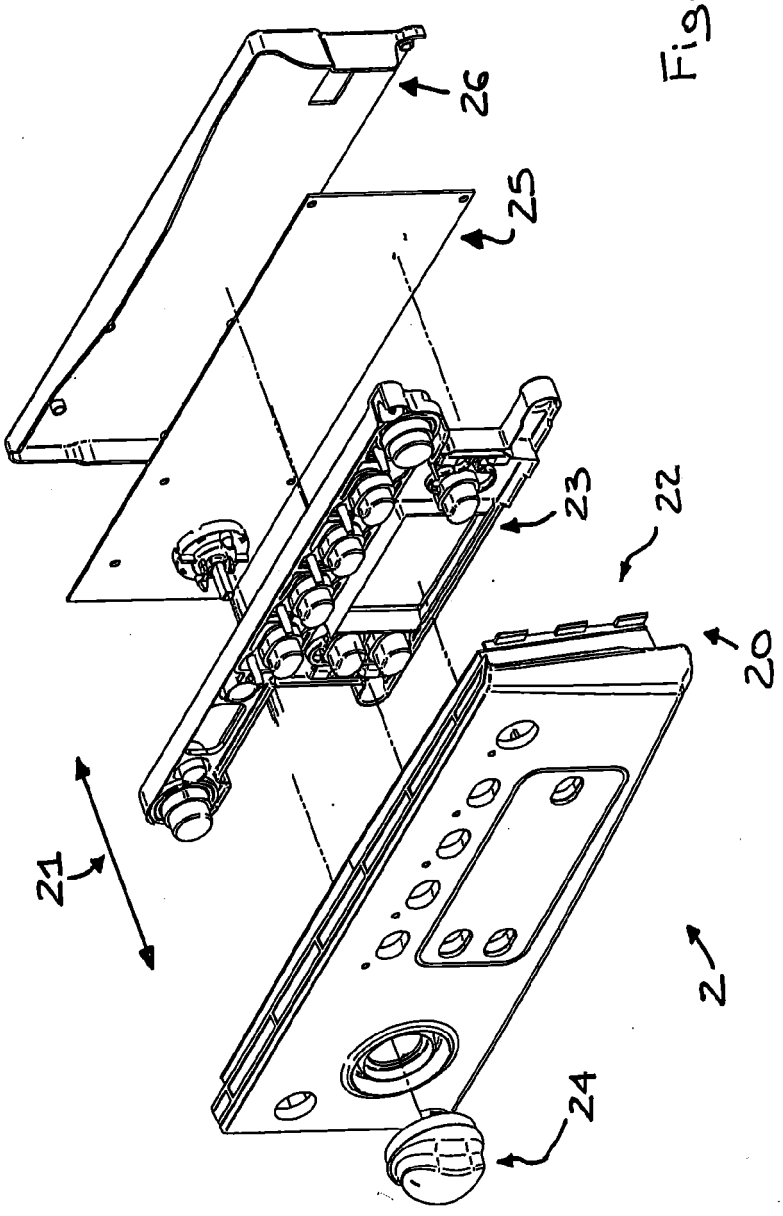


Fig. 3

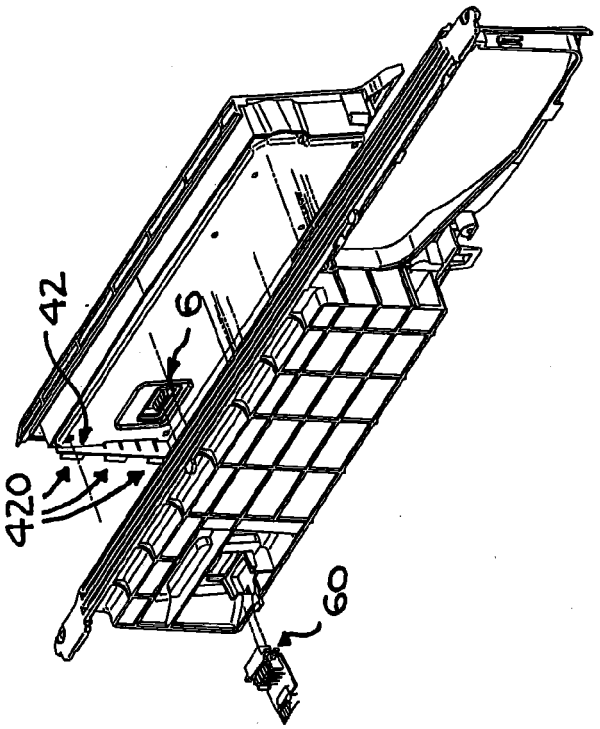


Fig. 4

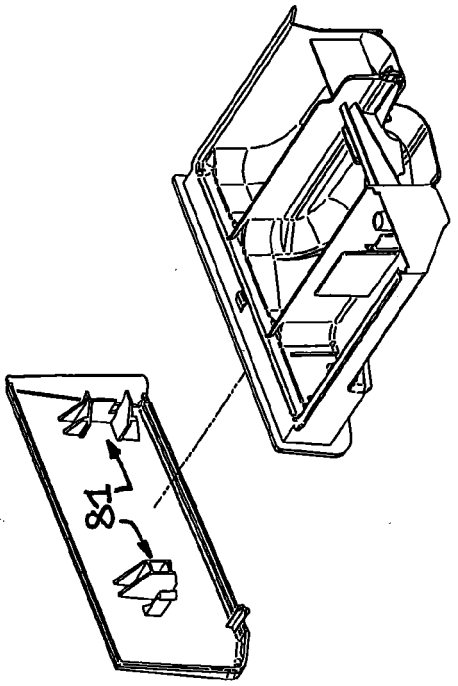


Fig. 5

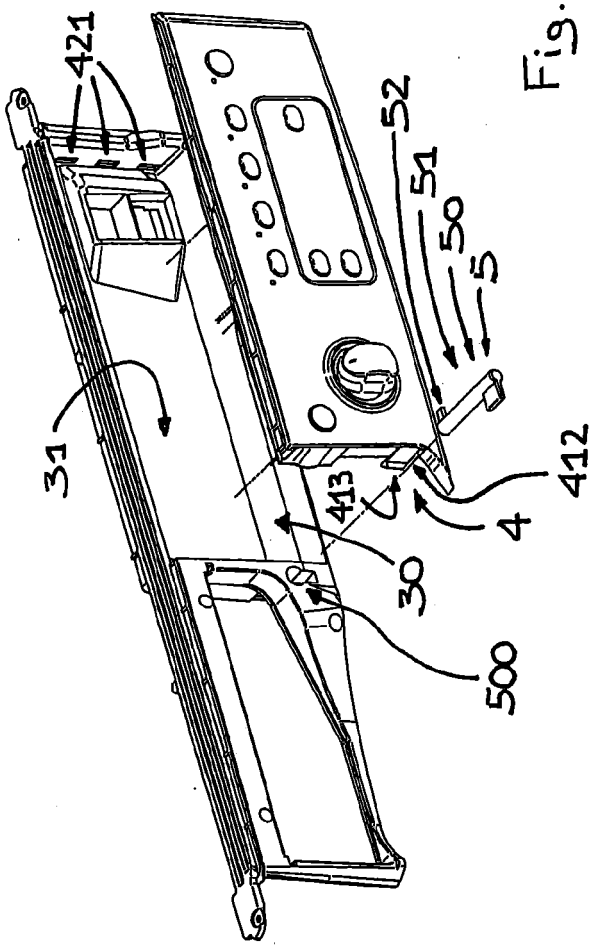


Fig. 6

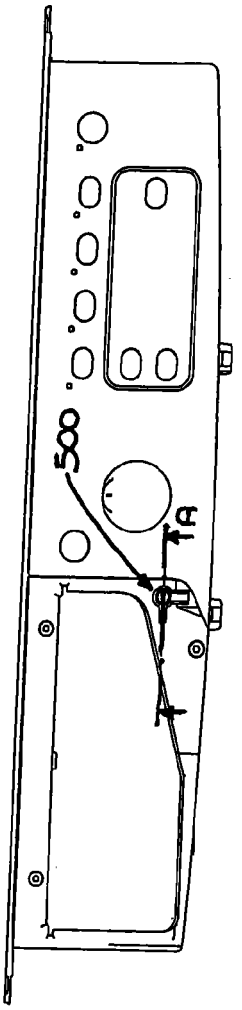


Fig. 7

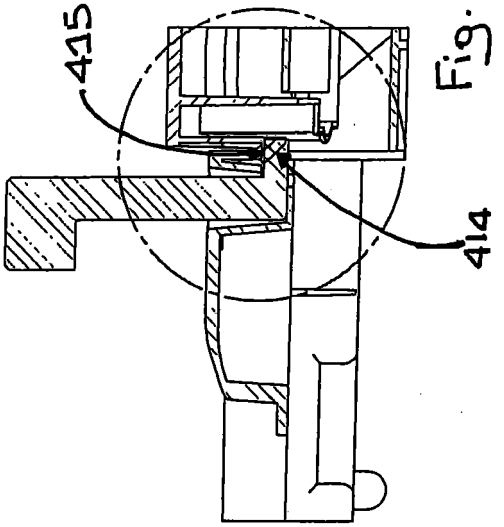


Fig. 8

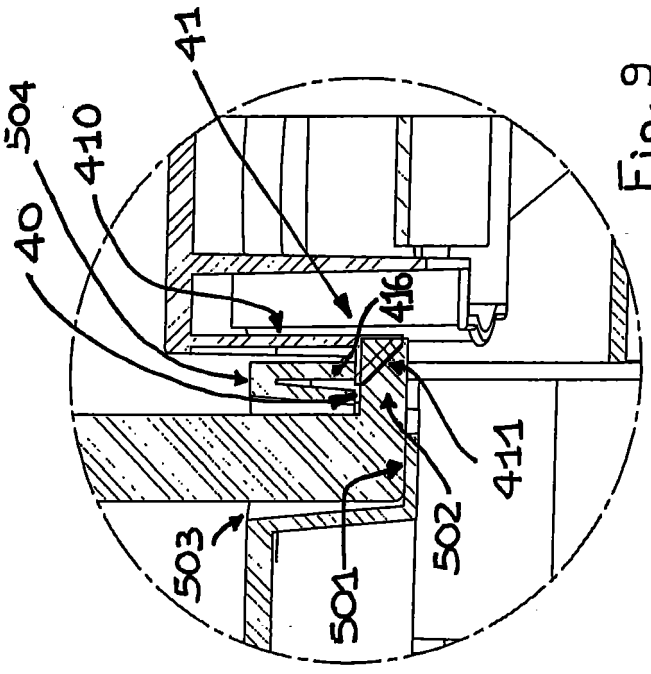


Fig. 9

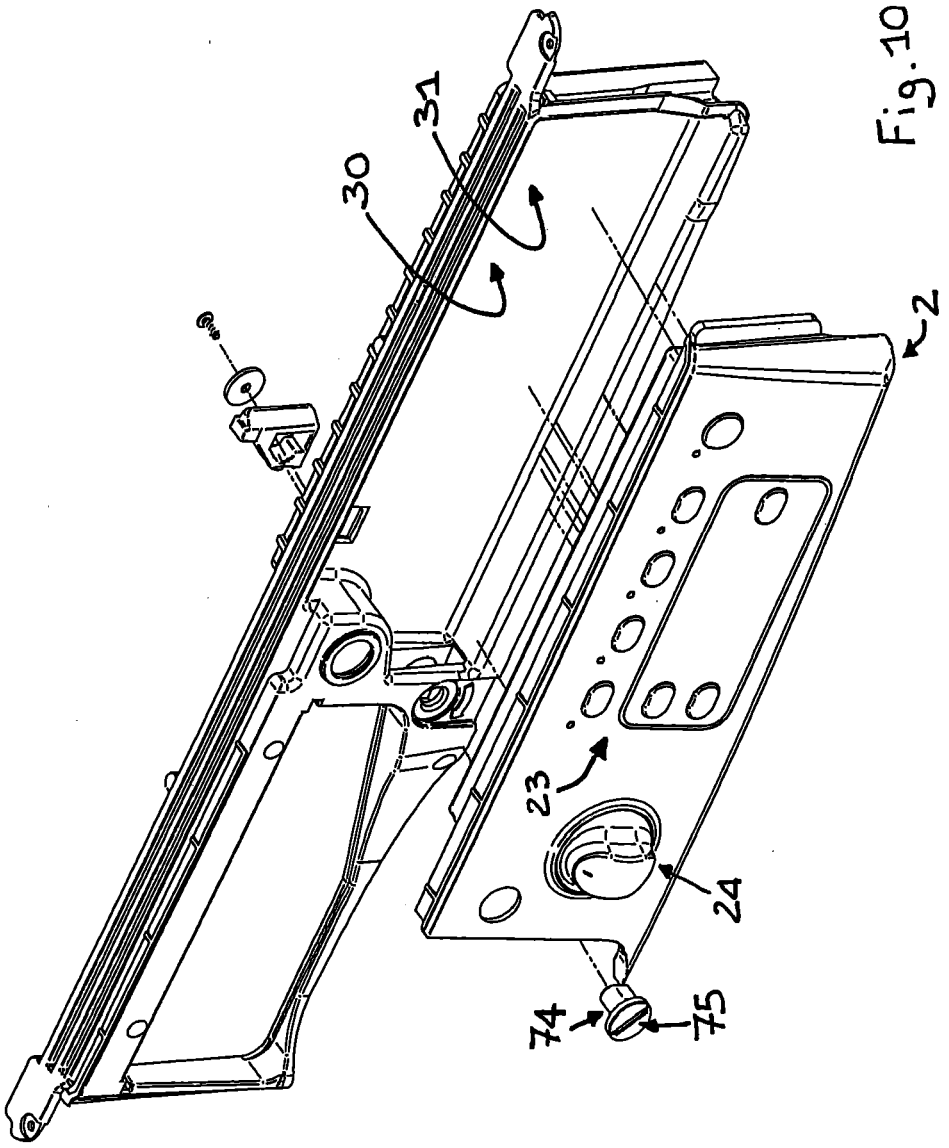


Fig. 10

Fig. 12

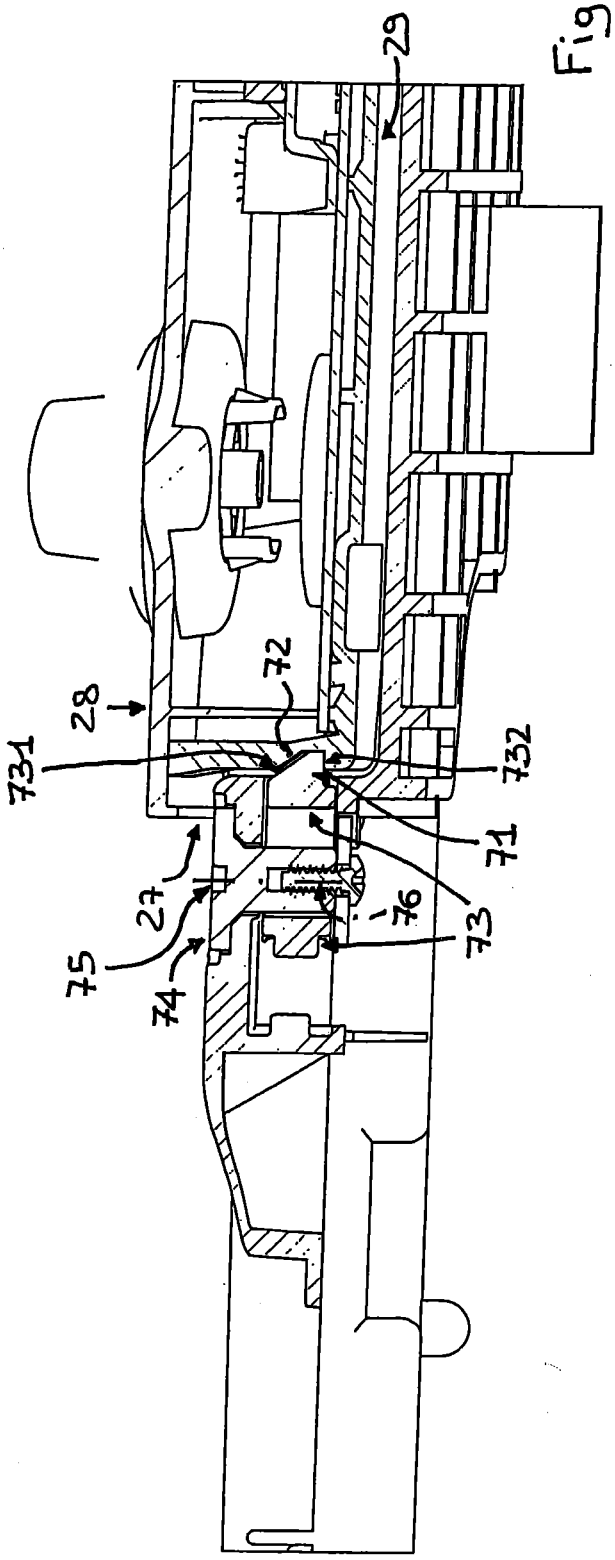
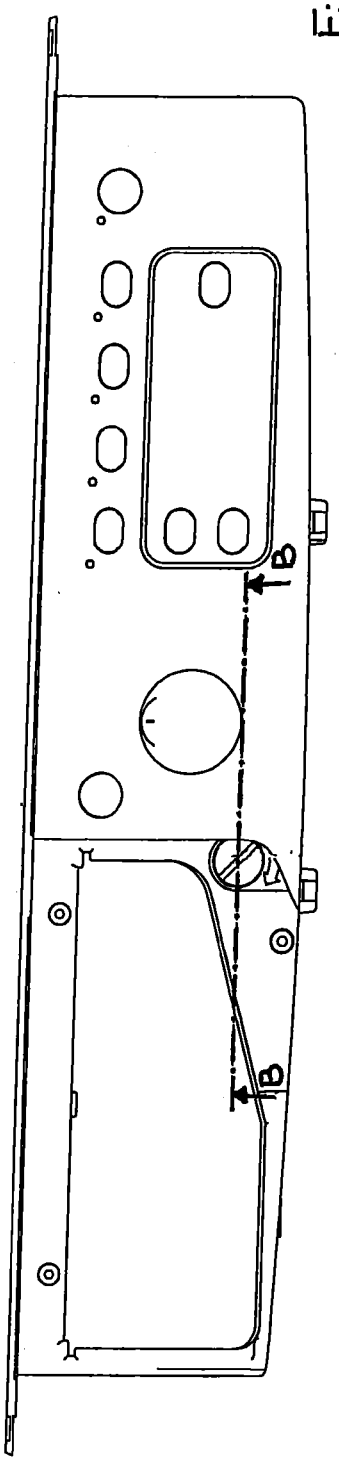


Fig. 11



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EUROPEAN SEARCH REPORT

Application Number
EP 11 17 6677

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	US 2005/178164 A1 (KIM JAE K [KR] ET AL KIM JAE KYUM [KR] ET AL) 18 August 2005 (2005-08-18)	1-6,8	INV. D06F39/00 D06F39/12
A	* paragraphs [0002], [0003], [0033], [0034], [0040] - [0053]; figures *	7,9-11	
A	EP 1 703 011 A2 (PRETTL APPLIANCE SYSTEMS GMBH [DE]) 20 September 2006 (2006-09-20) * paragraphs [0001], [0067] - [0079]; figures *	1-11	
A	US 2010/025214 A1 (ROOSE LEE A [US] ET AL) 4 February 2010 (2010-02-04) * paragraphs [0001], [0037] - [0045]; figures 1-6 *	1-11	
A	US 2004/154909 A1 (KIM JONG SEOK [KR] ET AL) 12 August 2004 (2004-08-12) * claims; figures *	1-11	

TECHNICAL FIELDS SEARCHED (IPC)

D06F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	13 December 2011	Clivio, Eugenio

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 11 17 6677

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