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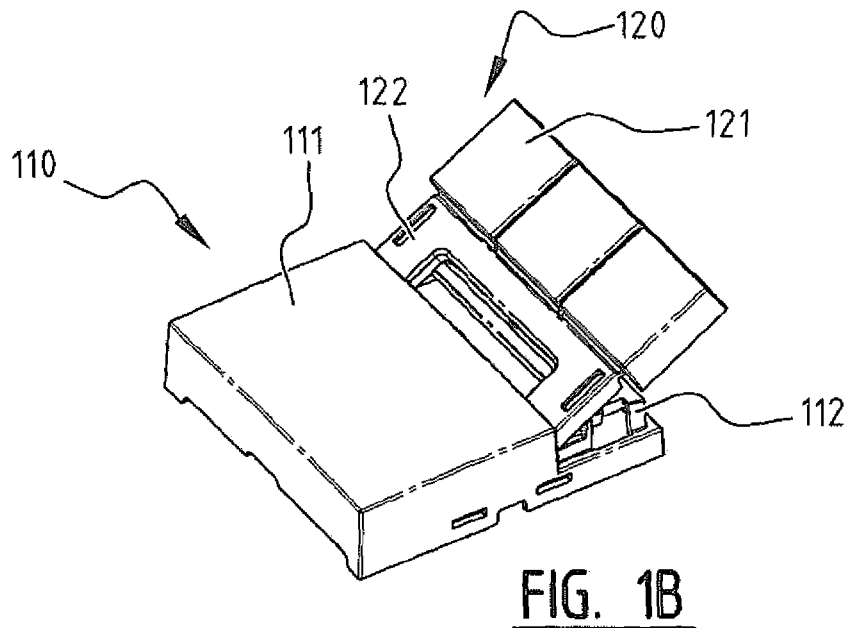
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(54) **Assembly for a housing of a display screen**

(57) Assembly for mounting a display screen operable with at least one button, comprising a first housing part formed with a translucent protective portion for protecting a display screen, which protection portion has a backside intended to be located in front of the display

screen; a supporting portion arranged to form a support for the at least one button; an opening between the protective portion and the supporting portion; a second housing part formed with the at least one button and with a connecting portion intended for attachment against the backside of the protective portion.



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Description

[0001] The present invention relates to an assembly for forming a housing of a display screen operable with at least one button, and to the housing components of said assembly. The invention also relates to an mounted assembly with display screen.

[0002] In known assemblies for housing a display screen operated with buttons, usually, use is made of individual buttons that extend outwardly through the actual housing. This usually makes mounting the assembly quite complex. Other known assemblies make us of a touch screen on which digital controls are provided. This has the disadvantage that the screen should be relatively large.

[0003] The present invention aims to provide a compact and easy to mount assembly in which a display screen is conveniently housed.

[0004] To this end, the assembly of the invention is characterized in that said assembly comprises a first housing part and a second housing part comprising at least one button. The first housing part is formed with a translucent protective portion arranged to at least extend over the display screen, a supporting portion arranged to form a support for the at least one button, and an opening between the protective portion and the supporting portion. The second housing part is formed with the at least one button and with a connecting portion designed for attachment against the backside of the protective portion. The opening and the connecting portion are arranged such to ensure that the connection part is able to be inserted through the opening to bring the connecting portion up to the backside of the protective portion and to bring the at least one button over the supporting portion.

[0005] In this way, an assembly is provided with a first and a second housing part which are easily connectable to one another and wherein the one or more buttons are formed as a part of the second housing part. During assembly, the second housing part is inserted with its connecting portion through the opening of the first housing part such that the one or more buttons are located above the supporting portion and the connecting portion can be attached to the backside of the protective portion. Hence, a combination is provided of a push button connected to the connecting portion and a protective portion which extends over the connecting portion and is secured thereon. This results in a very compact design.

[0006] According to a preferred embodiment, the first and/or the second housing parts are made in one piece. Preferably, the first housing part is made of a translucent material such that a screen display, mounted behind the protective portion, is clearly legible. Preferably, the translucent material is a semi-transparent material, but may also be a completely transparent material. The use of a semi-transparent material has the advantage that only those parts of the screen that light up, will be visible. Furthermore, preferably, the first and/or the second hous-

ing part is made of a plastics material. More specifically, preferably, the first and second housing parts are made from plastics materials suitable to be ultrasonically welded to one another.

[0007] According to a preferred embodiment, the at least one button is resiliently connected to the connecting portion. The connection may consist of a thin-walled bridging part between the connecting portion and each button. In this way, the connecting portion, the at least one button and the at least one bridging portion may be manufactured as an integral piece, typically from a plastics material.

[0008] According to a preferred embodiment, the connecting portion has a straight edge, and each button of the at least one button is provided at this edge.

[0009] According to a preferred embodiment, the connecting portion has substantially the shape of a frame intended to form a framing for the display screen and hence, to protect the peripheral edge of the display screen. In this way, a perfectly finished assembly can be obtained, wherein the edge of the display screen is invisibly mounted in the assembly, behind the framing, leaving only visible the display screen or part of the protective portion of the assembly. In that way, a compact design with a simple "frameless" design is obtained, in the sense that no separate frame should be provided around the display screen, but that the connecting portion serves as a frame. In the event multiple second housing parts would be used (see for example the embodiment of Figures 5 and 6) another design may be advantageous, see below. In the case of a connecting portion in the shape of a frame, each button is preferably provided on the same edge of the frame. In this way, the connection part will easily be inserted during assembly through the opening, wherein the second housing part is in a tilted position relative to the first housing part, see Figures 1B and 1C.

[0010] According to a preferred embodiment, the first housing part is formed as a mounting frame, wherein the protective portion is adjacent to a first edge of the mounting frame, wherein the supporting portion is adjacent to an opposite second edge thereof, and wherein the opening extends between opposite third and fourth edges thereof.

[0011] According to a preferred embodiment, each button at a base thereof is provided with a salient portion, and the supporting portion for each button is provided with an opening through which the salient portion of this button can be inserted. This salient portion may control a sensor to detect when a user pushes a button.

[0012] According to a preferred embodiment, the connecting portion is attached on the backside of the protective portion.

[0013] According to a preferred embodiment, the connecting part is attached to the backside of the protective portion by means of ultrasonic welding. Ultrasonic welding has the advantage that the welding joint is usually invisible or almost invisible from the outside.

[0014] The skilled person will understand that it is also possible to use a different connection technique, such as gluing, laser welding, vibration welding, mirror welding, providing a snap connection, providing a screw connection, etc.. Note that it is also possible to use a combination of these techniques. An advantageous gluing technique makes use of ultraviolet light such that the adhesive after curing is transparent and hence, invisible or nearly invisible from the outside.

[0015] According to a preferred embodiment, the protective portion is provided at its backside with a number of salientwelded joint structures and the connecting portion is provided at its front side with a number of recesses. The welded joint structures fit into the recesses and they are intended to be connected in these recesses with the connecting portion by ultrasonic welding. Preferably, said welded joint structure has a raised portion that is not intended to be part of the melt or melt pool and an end portion designed to form the melt or melt pool. Preferably, the raised portion has a height substantially corresponding to the depth of a recess. Using such welded joint structures and the recess, the melt pool is located further away from the front side of the protective portion and further recessed parts (sink marks) will not be visible from the front side. In particular in the case of polished translucent materials, such embodiment is very advantageous.

[0016] According to a preferred embodiment of the mounted assembly, the connecting portion is attached to the backside of the protective portion and a display screen is housed in the first housing part, facing the backside of the protective portion. In the case of a connecting portion having the shape of a frame, preferably, the display screen has dimensions that substantially match the dimensions of said frame.

[0017] The invention further comprises a first housing part for use in an embodiment of an assembly as described above. Also, the invention concerns a second housing part for use in an embodiment of an assembly as described above. These first and second housing parts may have one or more of the above properties.

[0018] Finally, the invention relates to a method for mounting an assembly comprising a first housing part formed with a transparent protective portion having a backside, a supporting portion, and an opening between the protective portion and the supporting portion; and a second housing part formed with the at least one button and with a connecting portion. The method comprises:

- inserting the connecting portion through the opening and bringing it against the backside of the protective portion thereof, while the at least one button is brought over the supporting portion;
- attaching the connecting portion against the backside of the protective portion.

[0019] According to a preferred embodiment of the method the connecting portion is attached to the back-

side of the protective portion by means of welding or gluing.

[0020] The present invention will be elucidated using a number of by no means limiting embodiments of an assembly according to the invention with reference to the drawings attached. The drawing shows in:

Figures 1A, 1B and 1C, a first embodiment of the assembly of the invention in an mounted state, during assembly, as seen from a top side of the assembly and during assembly, as seen from a bottom side of the assembly, respectively;

Figures 2A and 2B, a perspective view of the first housing part of the assembly of Figures 1A-1C, as seen from a top side and a bottom side, respectively;

Figures 3A and 3B, a perspective view of the second housing part of the assembly of Figures 1A-1C, as seen from a top side and a bottom side respectively;

Figures 4A and 4B, a cross section through the protective portion and the connecting portion of Figures 1A-1C near the welded joint, in the non-welded and welded state, respectively;

Figure 5, a perspective view of a first housing part of a second embodiment of the assembly according to the invention;

Figure 6, a perspective view of a second housing part of the second embodiment of the assembly according to the invention;

Figures 7A and 7B, a third embodiment of the assembly of the invention in an mounted state and dismounted state, respectively, and

Figures 8A and 8B, a fourth embodiment of the assembly of the invention in an mounted state and dismounted state, respectively.

[0021] Figure 1A illustrates a first embodiment of an assembly **100** according to the invention in the mounted state. Such an assembly **100** is typically intended for inclusion therein of a PCB **150** with a display screen **160** and a number of sensors **170** that are intended to cooperate with buttons **121** of the assembly **100**. The mounting of the assembly of Figure 1A is illustrated in Figures 1B and 1C. The assembly **100** comprises a first housing part **110** and a second housing part **120**. The first housing part **110** is formed with a translucent protective portion **111** and a supporting portion **112**. The protective portion **111** is arranged to at least extend over the display screen **160**, wherein the backside portion **113** of the protective portion **111** is intended to be positioned facing the display screen **160**. The supporting portion **112** is arranged to form a support for the buttons **121**. The second housing part **120** is formed with buttons **121** and a connecting portion **122**. The connecting portion **122** is intended to be attached to the backside **113** of the first housing part **110**, see in particular Figure 1C. The first housing part **110** is provided between the protective portion **111** and the supporting portion **112** with an opening with dimensions such that the connecting portion **122** may be in-

serted through the opening in order to be attached against the backside **113** of the protective portion **111**. The display screen **160**, for example an LCD screen, is typically provided with an edge **162** having the shape of a plastics frame and a flat flexible cable **163**. Here, the connecting portion **122** has the shape of a frame with dimensions adapted to hide the edge **162**.

Now, the first housing part will be described in detail with reference to Figures 2A and 2B. The first housing part **110** is a part made out of one piece of a translucent plastics material. The first housing part **110** may be made, for example, of a polycarbonate material which can be given a certain colour depending on the application. Preferably, the material is a UV-stabilized material of a grade suitable for applications requiring thin wall sections and high flow paths. The housing part **120** may also be made, for example, of a polycarbonate material. Preferably, this material should be suitable for forming parts with thin walls and long flow paths. The housing parts **110** and **120** may be, for example, manufactured by injection moulding. If the first and second housing parts are connected to one another by ultrasonic welding, both materials will typically be chosen from the same family in order to obtain a good connection.

[0022] The first housing part **110** is formed as a mounting frame with a protective portion **111** and a supporting portion **112**. The protective portion **111** is adjacent to a first edge **115** of the mounting frame and extends toward a second edge **116** of the mounting frame. The supporting portion **112** is adjacent to the second edge **116**. Between the protective portion **111** and the supporting portion **112**, an opening **114** is provided with dimensions suitable for inserting therein the connecting portion **122** of the second housing part. Note that this is only one possible embodiment, and that, for example, it would also be possible to provide on both sides of the protective portion **111** a supporting portion **112**, wherein two second housing parts could be provided on both sides of the protective portion, such that on both sides of the protective portion buttons could be provided. Depending on the number of buttons, the screen size, etc., the design and location of the protective portion **111** and the supporting portion **112** may vary.

[0023] The second housing part **120** is shown in detail in Figures 3A and 3B. In this embodiment, the second housing part **120** is formed as one piece from an opaque plastics material. The second housing part **120** comprises a connecting portion **122** and a number of buttons **121**. The buttons **121** are resiliently connected with the connecting portion **122**. In the embodiment shown, the buttons **121** directly abut the connecting portion **122**, wherein a short thin-walled bridging portion is provided between the buttons **121** and the connecting portion **122**. However, the skilled person will understand that the buttons **121** could also be resiliently connected using a differently shaped intermediary part. Here, the connecting portion **122** has the shape of a frame and is intended to be attached against the protective portion **111** of the first

housing part **110**. The buttons **121** are provided at a straight edge of the frame.

[0024] Each button **121** is at its bottom side provided with a salient portion **129** which fits into a corresponding opening **109** of the support portion **112**. These salient portions **129** are intended to make contact with sensors **170** (see Figure 1A) when a user pushes a button **121**. According to another non-illustrated embodiment, capacitive areas could be provided under the buttons instead of working with salient portions and sensors. Furthermore, the supporting portion **112** may be provided with openings **119** that are intended to cooperate with salient portions **139**. The button **121** includes a top wall **123** and a side wall **124** substantially perpendicular oriented thereon. The salient portions **139** are provided against the inner wall **124** of the button **121**. Also, the supporting portion **112** has an upper wall and a side wall substantially perpendicular oriented thereon and the openings **119** are provided in the side wall perpendicular oriented thereon. These salient portions **139**, which are inserted into the openings **119**, will ensure a locking on the first housing part, meaning that they prevent that the button can be moved up too much in the mounted state of the assembly.

[0025] The protective portion **111** is provided at its backside **113** with a number of welded joint structures **108** intended for ultrasonic welding of the connecting portion **122** to the protective portion **111**. Such welded joint constructions **108** have, according to the requirements of the prior art, typically a triangular cross section and entirely form the molten pool of the welded joint. According to the invention, however, the welded joint constructions are preferably provided with a raised extension with a height h , see Figure 4A, and preferably, in the connecting portion **122** recesses **138** are provided with a depth d essentially corresponding to the height h of the raised extension. In this way, the melt pool is located further away from the frontside of the protective portion **111**. After ultrasonic welding, the protective portion **111** is connected to the connecting portion **122**, as shown in Figure 4B. Here, the melt during ultrasonic welding is indicated in Figure 4B by the letter S. By using such an extended welded joint construction, the melt is situated further away from the plane of sight of a user and no recessed markings due to local heat produced in the plastics by the melt pool of the welded joint construction (sink marks) are produced on the typically polished surface of the translucent protective portion **111**. In particular, in case the protective portion is thin-walled, which is typically desirable, the use of such welded joint structures **108** and recesses **138** is very beneficial.

[0026] The skilled person will understand that the first housing part **110** and the second housing part **120** may also be connected to one another by any other suitable technique such as gluing, laser welding, vibration welding, mirror welding, providing a snap connection, providing a screw connection, etc.

[0027] Recesses **190**, **190'** are intended for mounting the first housing part **110** against a non-illustrated back-

side of a housing, and these recesses are less relevant for the concept of the present invention. The recess **191** is a tool for orienting the first housing part during mounting of the assembly. The same applies for recess **192**.

The PCB **150** can also be provided with positioning recesses **153** to a tool for placing the PCB against the (non-illustrated) backside of the housing.

Openings **193**, **194** are intended to allow an airflow inside the housing, for example, for an application wherein the display screen is used as a thermostat. In this case, a sensor unit **180** is provided which is located in the airflow that circulates through the housing. As is schematically shown in Figure 1A, for example, the measuring portion may be provided near opening **193**.

[0028] Figures 5 and 6 illustrate a second embodiment of an assembly according to the invention. Figure 5 schematically shows a first housing part **210** and Figure 6 schematically shows two second housing parts **220**, **220'** which are intended to be mounted together in a manner analogous to the one described for the first embodiment. The first housing part **210** is formed with a translucent protective portion **211** and two supporting portions **212**, **212'**. Each supporting section **212**, **212'** is intended to work with a number of buttons **221**, **221'**. The second housing part **220** has a connection frame **222** which may be provided with (not shown) recesses for incorporating therein of (not shown) welded joint structures on the bottom side of the protective portion **211**. The other second housing part **220'** is formed with an L-shaped connecting portion **222'** and a number of buttons **221**. The connecting portion **222'** may also be provided with a number of recesses designed to cooperate with (not shown) welded joint structures provided at the bottom side of the protective portion **211**.

[0029] Figure 7A illustrates a third embodiment of an assembly **300** according to the invention. Figure 7B schematically shows a first housing part **310** and two second housing parts **320** which are intended to be mounted together in a way analogous to the one described for the first and second embodiment. Figure 8A illustrates a fourth embodiment of an assembly **400** according to the invention. Figure 8B schematically shows a first housing part **410** and the second housing part **420** which are intended to be mounted together in a way analogous to the one described for the first, second and third embodiment.

[0030] The skilled person will understand that numerous other embodiments are conceivable within the scope of the present invention wherein a different shape is given to the connecting portion and/or the protective portion. The one or more connecting portions preferably form a frame around the display screen. In the case of multiple second housing parts, the various connecting parts thereof may be aligned to jointly form a frame around the display screen. The scope of the present invention is therefore in no way limited by the aforementioned embodiments and the scope is solely determined by the appended claims.

Claims

1. Assembly for mounting a display screen operable with at least one button, comprising:
 - a first housing part formed with a translucent protective portion for protecting a display screen, which protection portion has a backside intended to be located in front of the display screen;
 - a supporting portion arranged to form a support for the at least one button;
 - an opening between the protective portion and the supporting portion;
 - a second housing part formed with the at least one button and with a connecting portion intended for attachment against the backside of the protective portion; which opening and connecting portion are arranged such to ensure that the connection part is able to be inserted through the opening to bring the connecting portion up to the backside of the protective portion and to bring the at least one button over the supporting portion.
2. Assembly according to any one of the preceding claims, **characterized in that** the first and/or second housing part is made in one piece.
3. Assembly according to any one of the preceding claims, **characterized in that** the first housing part is made of a translucent material.
4. Assembly according to any one of the preceding claims, **characterized in that** the first and second housing part are rigidly connected to one another after mounting.
5. Assembly according to any one of the preceding claims, **characterized in that** the first and second housing part are made of plastics materials suitable to be ultrasonically welded.
6. Assembly according to any one of the preceding claims, **characterized in that** each button of the at least one button is resiliently connected to the connecting portion.
7. Assembly according to any one of the preceding claims, **characterized in that** the connecting portion has substantially the shape of a frame intended to form a framing for the display screen, wherein each button of the at least one button is preferably provided at an edge of the frame.
8. Assembly according to any one of the preceding claims, **characterized in that** the first housing part is formed as a mounting frame, wherein the protec-

tive portion is adjacent to a first edge of the mounting frame, wherein the supporting portion is adjacent to an opposite second edge thereof, and wherein the opening extends between opposite third and fourth edges thereof.

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9. Assembly according to any one of the preceding claims, **characterized in that** each button at a base thereof is provided with a salient portion, and the supporting portion for each button is provided with an opening through which the salient portion of this button can be inserted.
10. Assembly according to any one of the preceding claims, **characterized in that** the protective portion is provided at its backside with a number of protruding welded joint structures and that the connecting portion is provided at its front side with a number of recesses, in which the welded joint structures can be positioned for ultrasonic welding thereof against the connecting portion.
11. Assembly according to any one of the preceding claims, **characterized in that** the connecting portion is attached on the backside of the protective portion and that a display screen is mounted in the first housing part, facing the backside of the protective portion.
12. First housing part for use in an assembly according to any one of the preceding claims formed with a transparent protective portion for protecting a display screen, which protective portion has a backside intended to be located opposite the display screen; a supporting portion arranged to form a support for the at least one button; and an opening between the protective portion and the supporting portion.
13. Second housing part for use in an assembly according to any one of the preceding claims, formed with the at least one button and with a connecting portion intended for attachment against the backside of the protective portion.
14. Method for mounting an assembly comprising a first housing part formed with a transparent protective portion having a backside, a supporting portion, and an opening between the protective portion and the supporting portion, and a second housing part formed with at least one button and with a connecting portion, which method comprises:
- inserting the connecting portion through the opening and bringing it against the backside of the protective portion thereof, while the at least one button is brought over the supporting portion;
 - attaching the connecting portion against the backside of the protective portion.

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15. Method according to claim 14, **characterized in that** the connecting portion is attached to the backside of the protective portion by means of welding or gluing.

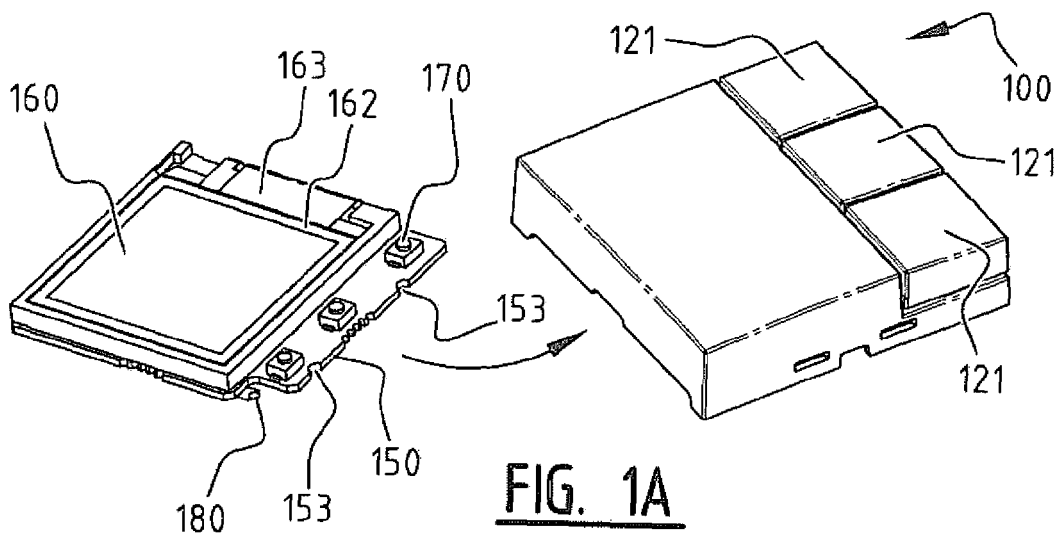


FIG. 1A

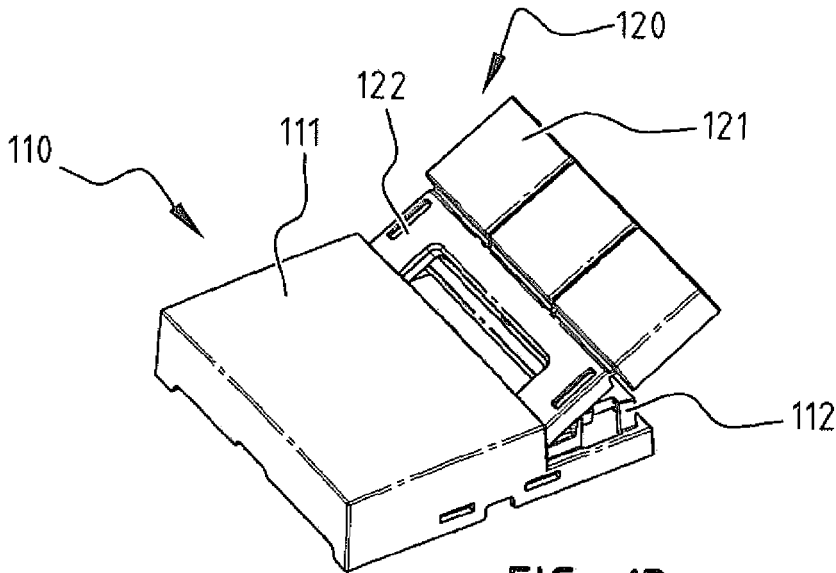


FIG. 1B

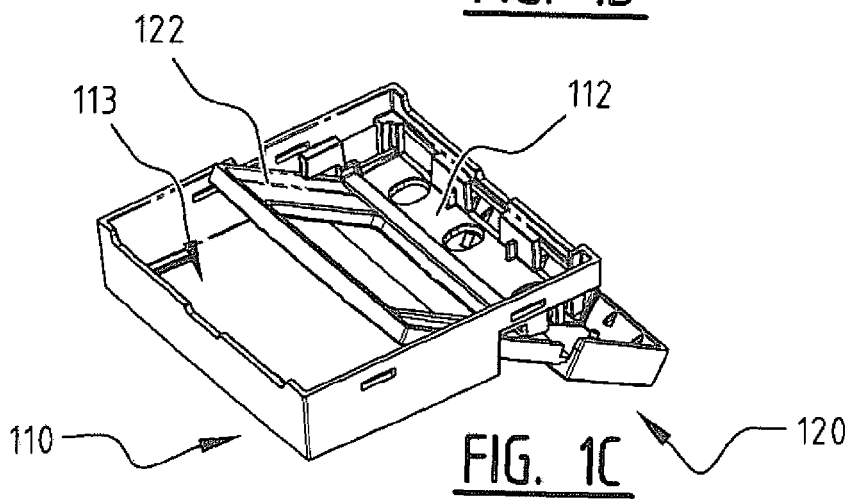


FIG. 1C

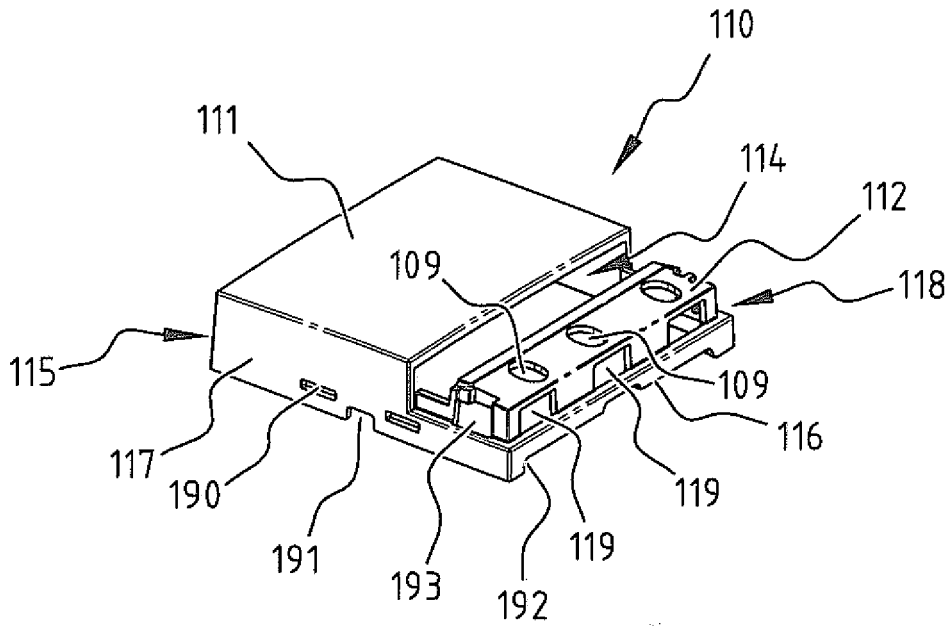


FIG. 2A

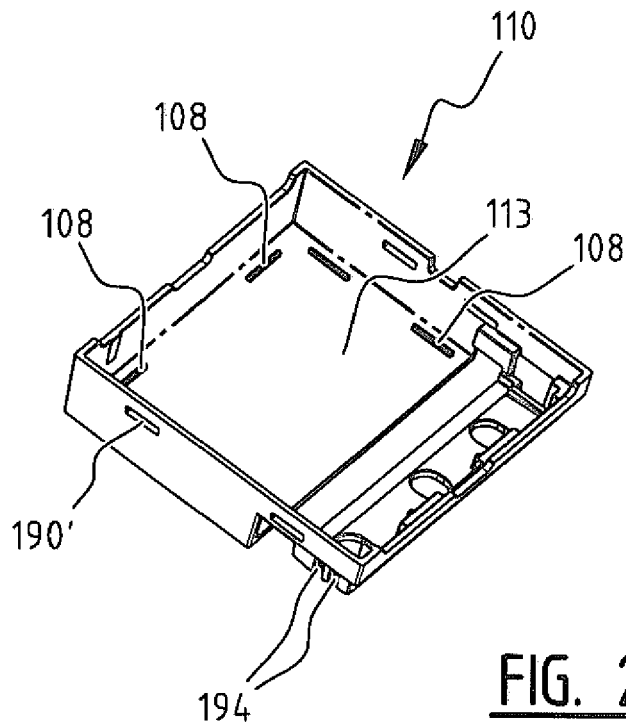


FIG. 2B

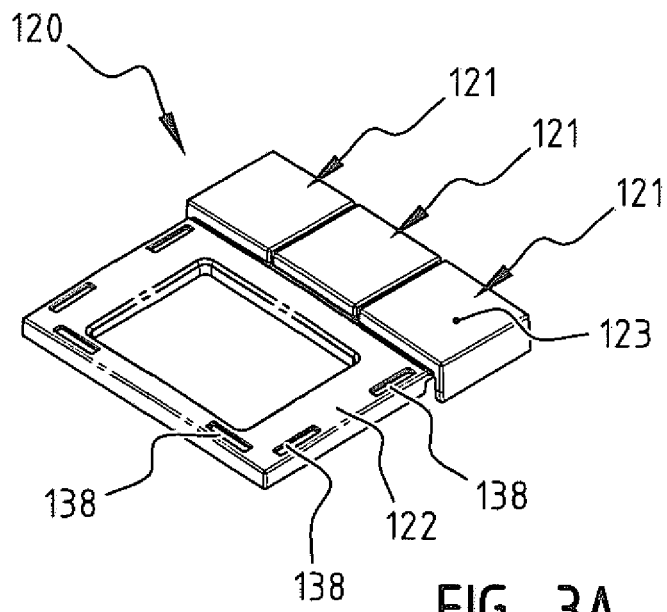


FIG. 3A

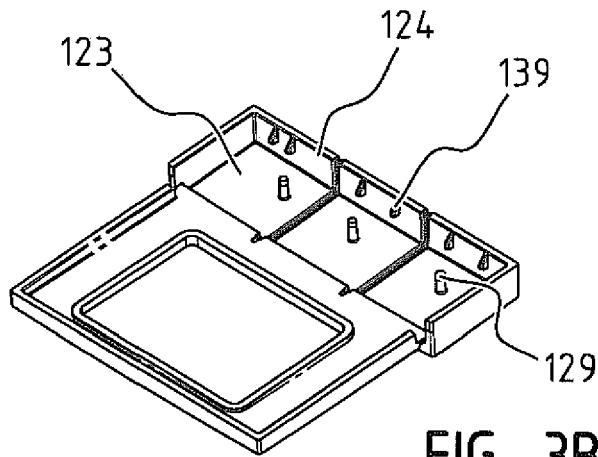


FIG. 3B

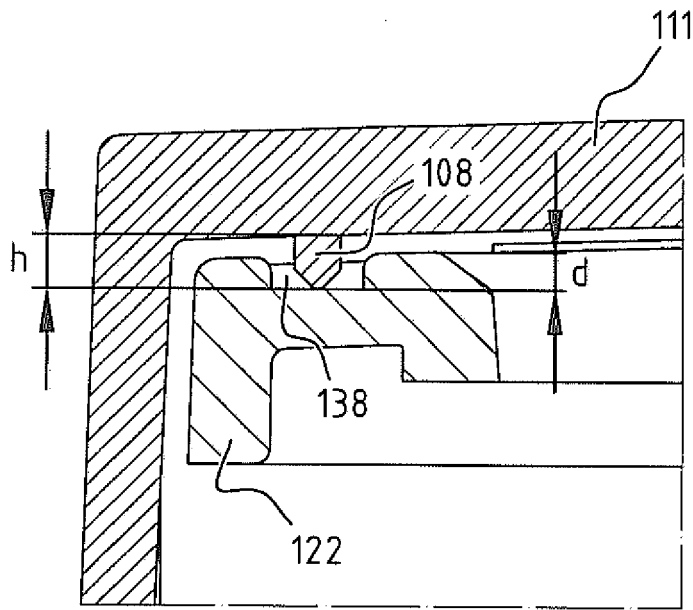


FIG. 4A

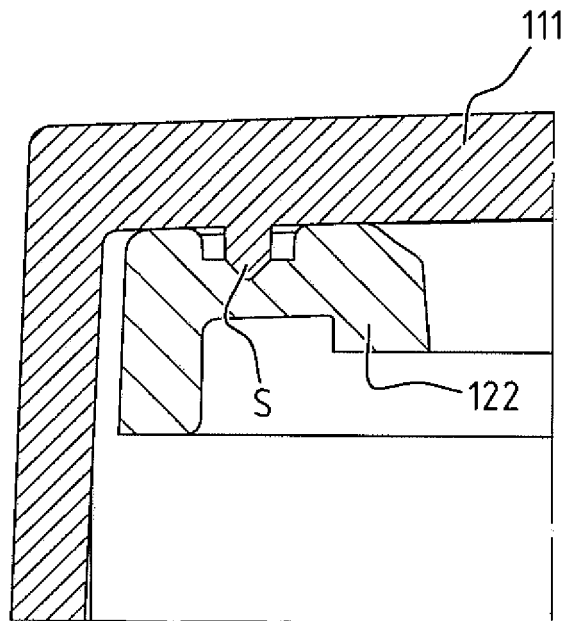
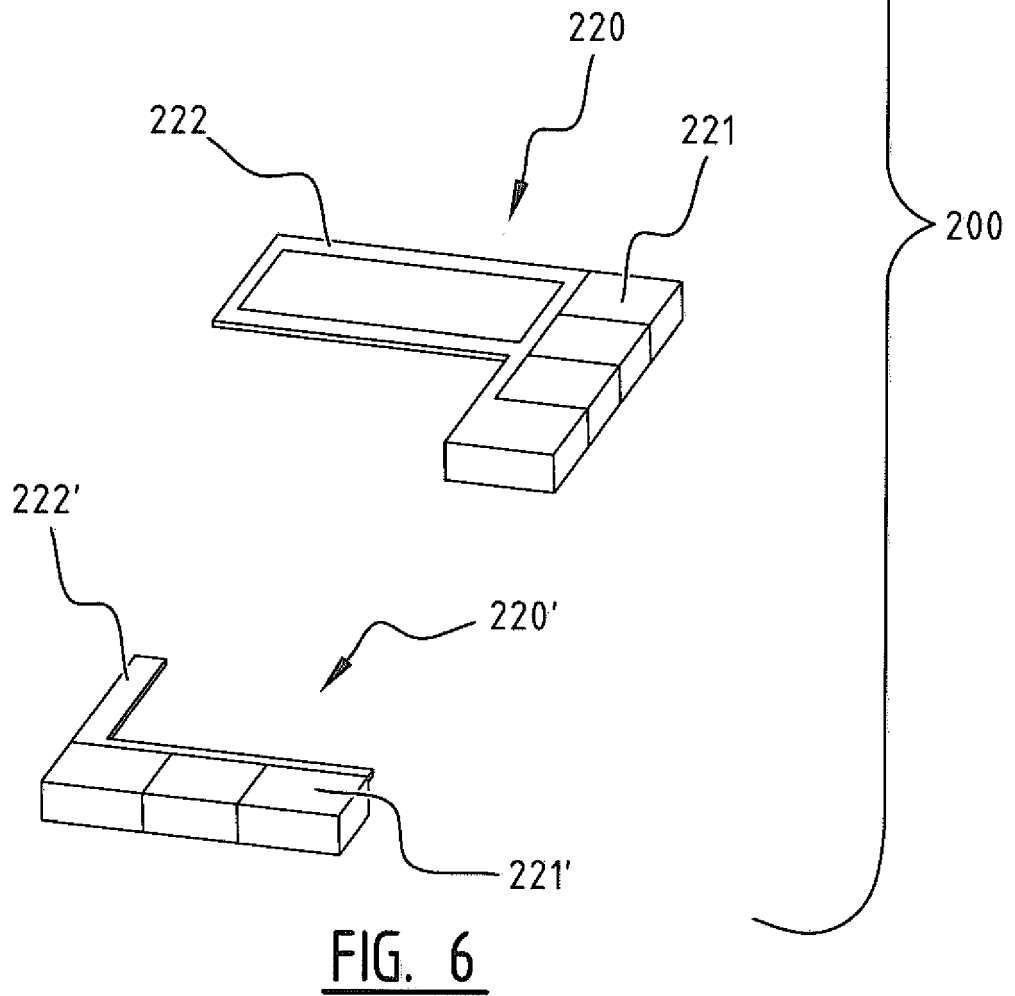
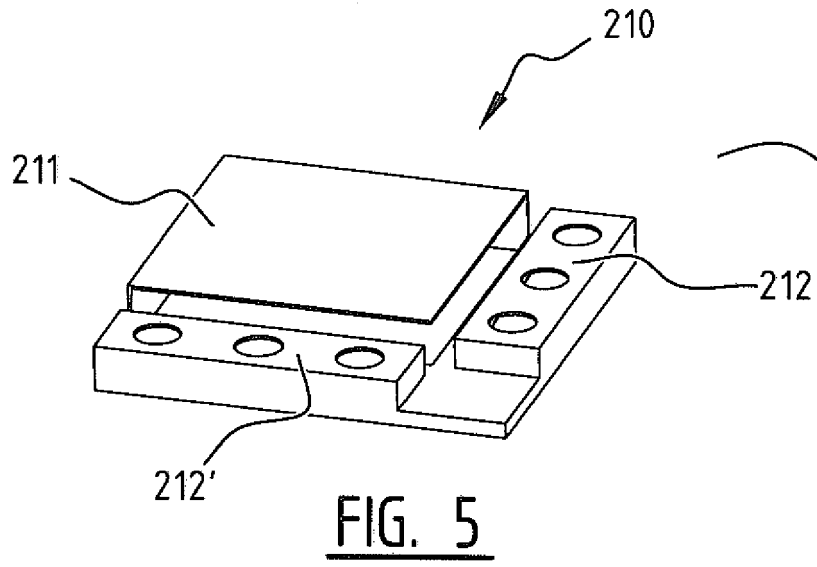


FIG. 4B



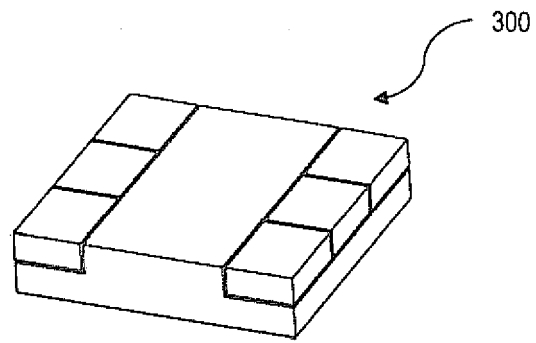


FIG. 7A

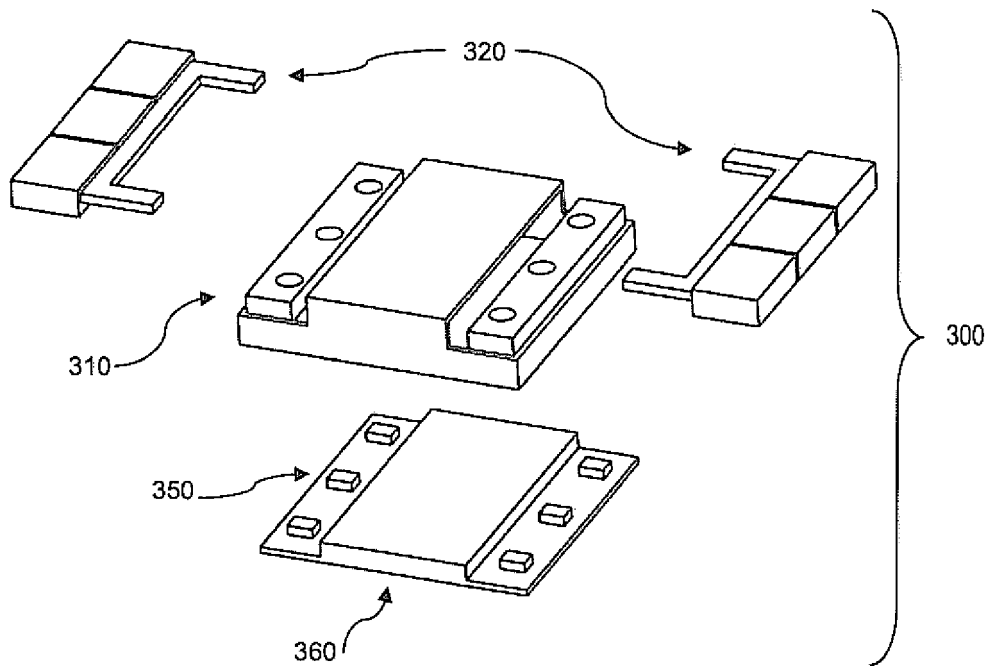


FIG. 7B



EUROPEAN SEARCH REPORT

Application Number
EP 12 15 2101

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	WO 2009/101241 A1 (KONE CORP [FI]; RUSANEN NIKO [FI]; TAINEN TIMO [FI]; PURSIAINEN MAIJA) 20 August 2009 (2009-08-20) * the whole document * -----	1-15	INV. H01H21/24 B66B1/46
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
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Place of search		Date of completion of the search	Examiner
The Hague		22 May 2012	Toussaint, François
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
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EPO FORM 1503 03 82 (P04C01)

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

EP 12 15 2101

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