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(54) **Title:** CARD CONNECTING APPARATUS FOR ELECTRONIC DEVICE AND MANUFACTURING METHOD OF THE SAME

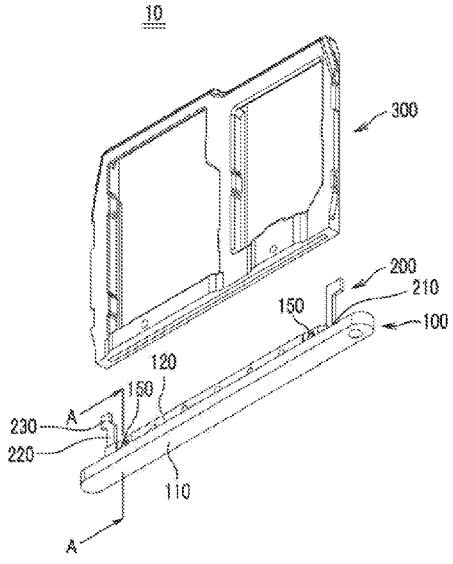


FIG. 4

(57) **Abstract:** This disclosure relates to a card connecting apparatus for use in an electronic device, for insertion into and withdrawal from a card socket of an electronic device with a card mounted thereon, and to a method of manufacturing the same, wherein the card connecting apparatus consists of: a cover part furnished with a cover section that covers the entrance of the card socket and a coupling part that extends protruding into the interior of the card socket at a thickness less than the cover section; a pair of reinforcing frames of a metal material, having a fixed length and consisting of a fastening section at a first end that is fastened to the coupling section of the cover part, and a reinforcing section at a second end that extends into the card socket interior from the fastening section, so as to be fastened to the coupling section at either end of the cover part in the length direction; and a tray part of a nonmetallic material whereon is formed a mounting hole or mounting recess whereon a card is mounted, and which accommodates the reinforcing frame therewithin and is welded integrally to the coupling part; and wherein the tray part is formed as a single unit with the cover part by insert-molding using the cover part, to which the reinforcing frame is fastened, as the insert.

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CARD CONNECTING APPARATUS FOR ELECTRONIC DEVICE AND MANUFACTURING METHOD OF THE SAME

RELATED APPLICATIONS

[0001] This application claims priority to Korean Application No. 10-2016-0082756, filed June 30, 2016, which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0002] This disclosure relates to a card connecting apparatus, and more specifically, to a card connecting apparatus for use in an electronic device, and specifically for inserting into and withdrawing from an electronic device a tray whereon a card is mounted, and to a method of manufacturing the same.

BACKGROUND ART

[0003] Generally, with regard to electronic devices such as smartphones in which various cards (memory cards or SIM cards) are mounted, for convenience of use the cards are loaded on a tray for insertion and extraction. The card trays of the prior art are classified as metal processed trays, such as CNC machined or metal powder injection molded trays, and plastic injection molded trays.

[Table 1]

Category	Processing method	Material	Price	Strength	Thickness	Size
Metal processed tray	CNC machining	Aluminum	High	Medium	Thin	Medium
	Metal injection molding	Stainless steel	High	Strong	Thin	Small

Plastic tray	Injection molding	Plastic	Low-cost	Weak	Thick	Large

[0004] As shown in Table 1 above, because metal machined trays use an expensive metal material such as aluminum, although they have superior strength, they are characterized by increased manufacturing costs; in contrast, plastic trays are comparatively inexpensive but have the drawback of inadequate strength.

[0005] In particular, electrical interference may be generated in metal machined trays due to contact or noncontact with the electronic device. Specifically, electronic devices such as smartphones are furnished with short-range wireless communication means or wireless charging means, etc., using noncontact magnetic induction; when a tray of a metallic material is inserted into a card socket, it interferes with this wireless communication, so that there is a risk that the communication quality will be impaired, or damage to the device will occur e.g. due to an electric short.

[0006] One proposal for preventing this is Korean Registered Patent 10-1554128 (Reference 1); therein, as shown in FIG. 1, a card connecting apparatus 1 is proposed wherein the cover part (handle) 11 for inserting and withdrawing the card connecting apparatus 1 is separated from the tray part (body) 12 whereon the card is mounted, so that the cover part 11 is made from a metal material and the tray part 12 is made from a plastic material, and then the two are coupled integrally together. The cover part 11 and tray part 11 [sic] of two different materials are then welded together as a single unit by injection molding.

[0007] The Reference 1 provides the effects that electrical interference may be minimized because the tray part 12 is made of a plastic material, and the strength may be maintained and a consistent metallic exterior of the smartphone case may be maintained because the cover part 11 is made of a metal material.

[0008] However, the card connecting apparatus 1 of the Reference 1 has the drawback that, because the cover part 11 and tray part 12 are made of different materials but are formed as a single unit, when the apparatus is subject to a strong outside force, the weld therebetween may readily break down, causing the cover part 11 and tray part 12 to separate. In other words, the cover part and tray part of the card connecting apparatus are problematically limited, both in the properties of the inter-material weld and in the strength of the bond at the weld surface.

[0009] In Korean Registered Patent 10-1596316 (Reference 2), as shown in FIG. 2, in order to maintain the strength of the contact apparatus while eliminating electrical interference arising in the card connecting apparatus made of a metal material, a card connecting apparatus 2 is proposed that has a structure wherein a metal frame 22 is coupled to a tray body 21 made of a nonmetallic material. In the card connecting apparatus 2 of the Reference 2, the nonmetallic tray body 21 consists of a cover part and a tray part, and the metallic frame 22 is inserted into the tray body 21 by insert molding. Accordingly, in the card connecting apparatus 2, there is no risk that the cover part and tray part will be separated, and the apparatus may show sufficient strength while also minimizing electrical interference through the use of a nonmetallic material.

[0010] However, in the card connecting apparatus 2, a metal frame 22 is formed over the total area comprising the cover part and tray part, so that there is a problematic increase in production costs due to the expense of the metallic material. In addition, although the card connecting apparatus 2 may prevent electrical interference due to direct contact, through the use of a nonmetallic material for the tray body, nonetheless there remains a risk of interference due to noncontact and consequent impairment of communication quality, because of the metal material located therewithin.

[0011] Patent Reference 1: Korean Registered Patent 10-1554128 (registered 2015.09.14, SIM Card tray for portable terminal)

[0012] Patent Reference 2: Korean Registered Patent 10-1596316 (registered 2016.02.16, card tray for electronic device and tray carrier assembly using same)

SUMMARY

[0013] This disclosure was devised in order to resolve the above problems of the prior art; it has the objective of providing a card connecting apparatus that can exhibit sufficient strength against external force, while also reducing production costs and not causing any electrical interference with the electronic device. In particular, this disclosure has the objective of further strengthening the bond between the cover part and the tray part.

[0014] To achieve the above objectives, this disclosure relates specifically to a card connecting apparatus for use in an electronic device, for insertion into and withdrawal from a card socket of an electronic device with a card mounted thereon, consisting of: a cover part furnished with a cover section that covers the entrance of the card socket and a coupling part

that extends protruding into the interior of the card socket at a thickness less than the cover section; a pair of reinforcing frames of a metal material, having a fixed length and consisting of a fastening section at a first end that is fastened to the coupling section of the cover part, and a reinforcing section at a second end that extends into the card socket interior from the fastening section, so as to be fastened to the coupling section at either end of the cover part in the length direction; and a tray part of a nonmetallic material whereon is formed a mounting hole or mounting recess whereon a card is mounted, and which accommodates the reinforcing frame therewithin and is welded integrally to the coupling part; and wherein the tray part is formed as a single unit with the cover part by insert-molding using the cover part, to which the reinforcing frame is fastened, as the insert.

[0015] Here, the reinforcing frame further comprises a catch section where the extension direction of the reinforcing section is changed.

[0016] In addition, the reinforcing frame further comprises a protruding section that extends protruding within the card socket from the connecting section.

[0017] Also, the coupling section of the cover part and the fastening section of the reinforcing frame form a stepped structure.

[0018] In addition, the cover part and the reinforcing frame may have a burr formed protruding on the fastening section and a burr hole formed on the coupling section, and may be fastened by spinning the burr into the burr hole; or alternatively may have a rivet hole formed on the fastening section and coupling section, and may be fastened by a rivet passing through the rivet holes; or may be fastened by bonding or welding of the coupling section to the fastening section.

[0019] Method of manufacturing a card connecting apparatus for use in an electronic device, for insertion into and withdrawal from a card socket of an electronic device with a card mounted thereon, consisting of:

[0020] (a) a step wherein a transfer frame of a metal material is prepared, having formed integrally a pair of fastening sections, a reinforcing section extending inward from the fastening sections, and a catch section bent at the end of the reinforcing section;

[0021] (b) a step wherein a cover part is prepared having a cover section that covers the entrance of the card socket and a coupling section that extends protruding into the interior of the cover section at a thickness less than that of the cover section;

[0022] (c) a step wherein the reinforcing frame and cover part, formed as a single unit, are used as the insert and resin is insert-molded so as to accommodate the reinforcing frame therewithin, so that the tray part is molded to the transfer frame; and

[0023] (d) a step wherein the reinforcing frame is cut from the transfer frame so as to separate the card connecting apparatus.

[0024] Here, the step (b) of fastening the cover part to the reinforcing frame consists of a process of molding the cover part of a plastic material using the reinforcing frame as the insert.

[0025] In addition, a plurality of the transfer frames are connected together in the forward direction of the process, so that the step (b) of fastening the cover part, the step (c) of molding the tray part, and the step (d) of separating the card connecting apparatus take place as part of a continuous process.

[0026] This disclosure may prevent electronic interference with an electronic device due to contact or noncontact, because the tray part that accommodates the card is formed of a nonmetallic material.

[0027] In addition, this disclosure may reduce manufacturing costs because it minimizes the use of expensive metal materials while having sufficient strength.

[0028] In addition, this disclosure may prevent the separation of the cover part from the tray part due to outside force, because the weld force between the cover part and the tray part is maximized.

BRIEF DESCRIPTION OF THE DRAWINGS

[0029] FIG. 1 is a perspective view showing one example of a card connecting apparatus according to the prior art;

[0030] FIG. 2 is a top view showing another example of a different card connecting apparatus according to the prior art;

[0031] FIG. 3 is a top view of a card connecting apparatus according to an embodiment of this disclosure;

[0032] FIG. 4 is an exploded perspective view showing the card connecting apparatus of FIG. 3;

[0033] FIG. 5 is an exploded perspective view showing the cover part and reinforcing

frame of FIG. 4;

[0034] FIGS. 6A and 6B are cross sections showing another example of a cover part according to an embodiment of this disclosure;

[0035] FIGS. 7A, 7B and 7C are perspective views showing diverse examples of a reinforcing frame according to embodiments of this disclosure;

[0036] FIGS. 8A, 8B, 9A, 9B, 10A and 10B show diverse fastening structures of cover parts and reinforcing frames according to embodiments of this disclosure;

[0037] FIGS. 11A, 11B, 11C and 11D are process diagrams showing the process of manufacturing the card connecting apparatus according to one embodiment of this disclosure;

[0038] FIG. 12 is a process diagram showing the process of manufacturing a card connecting apparatus according to another embodiment of this disclosure.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0039] The technical task accomplished by implementing this disclosure will be clarified by the preferred embodiments described hereinafter. Hereinbelow, preferred embodiments of the present disclosure will be reviewed in detail with reference to the attached diagrams. Please note that in describing this disclosure, the detailed explanation is omitted of functions and components which are common knowledge and would unnecessarily obscure the substance of the disclosure.

[0040] FIG. 3 is a top view of a card connecting apparatus according to an embodiment of this disclosure; FIG. 4 is an exploded perspective view showing the card connecting apparatus of FIG. 3; FIG. 5 is an exploded perspective view showing the cover part and reinforcing frame of FIG. 4.

[0041] As shown in these drawings, the card connecting apparatus 10 according to an embodiment of this disclosure consists of a cover part (handle) 100 that covers the entrance of the card socket while enabling the card connecting apparatus 10 to be grasped and pushed or pulled when inserting/withdrawing; a tray part (body) 300 that is inserted into or withdrawn from the interior of the card socket with a card mounted thereon; and a reinforcing frame 200 interposed between the cover part 100 and tray part 300 so as to connect them in order to reinforce the coupling between the cover part 100 and tray part 300. When the card connecting apparatus 10 having the above configuration is inserted into the card socket, the tray part 300

is inserted into the card socket along the tray insertion path and the cover part 100 is located at the entrance to the tray insertion path.

[0042] Specifically, on the outside, the cover part 100 forms the exterior of the electronic device case and is configured so that the user can readily grasp it by hand, and so as to assure firmness while maintaining a level of strength that is in balance with the electronic device case; on the inside, a coupling means if provided so that the tray part 300 may be firmly coupled. This cover part 100 consists of a metal substance such as aluminum, stainless steel, or aluminum alloy, etc.; it may be formed by CNC machining or by a process such as forging. In addition, the cover part 100 may also be made of a plastic material such as reinforced plastic, depending on the material of the electronic device case; the cover part 100 made of a plastic material may be formed by an injection process.

[0043] The cover part 100 consists of a cover section 110 that covers the card socket entrance while enabling the user to grasp it by hand, and a coupling section 120 that extends protruding to the interior of the cover section 110. Here, the cover section 110 is formed at a certain width and length corresponding to the card socket entrance, and the coupling section 120 protrudes a certain distance in the inward direction of the card socket while having a lesser thickness (or width) than the cover section 110. The reinforcing frame 200 and tray part 300 are coupled to the coupling section 120 that protrudes to the interior of the cover section 110.

[0044] A first side of the reinforcing frame 200 is fastened to the top or bottom surface of the coupling section 120 of the cover part 100; a second side is insert-molded to the tray part 300 so as to reinforce the bond therebetween. The reinforcing frame 200 consists of a metal substance having sufficient strength; by way of example, it may be made from aluminum, stainless steel, or aluminum alloy, etc. For the fastening between the cover part 100 and reinforcing frame 200, diverse types of fastening means 150 may be used.

[0045] The tray part 300 is configured for mounting a card, and is made of a nonmetallic material such as plastic so that electrical interference does not occur when it is inserted into a card socket. In the center of the tray part 300, a card mounting hole 300a is formed having the shape of a hole or recess, and having an overall rectangular shape. This tray part 300 accommodates part of the reinforcing frame 200 therewithin, and is welded to the coupling section 120 of the cover part 100. Specifically, the tray part 300 is welded to the reinforcing frame 200 and also to the coupling section 120 of the cover part 100, so that it is not easily separated from the cover part 100.

[0046] The card connecting apparatus 10 having the above configuration , in addition to having the tray part 300 directly soldered to the coupling section 120 of the cover part, further interposes a reinforcing frame 200 of a metal material between the card connecting apparatus 10 and the coupling section 120 of the cover part 100, so that the bond therebetween is reinforced, and even when external force is applied, the card connecting apparatus 10 will not readily be separated from the cover part 100.

[0047] FIGS. 6A and 6B are cross sections showing another example of a cover part according to an embodiment of this disclosure; the cross-section shown is along the A-A direction of FIG. 4. In the cover part 100 according to a different embodiment of this disclosure, the coupling section 120 has a stepped structure. Specifically, as shown, the coupling section 120 is divided into a 1st coupling section 121 that is thinner than the cover section 110, and a protruding 2nd coupling section 122 that is in turn thinner than the 1st coupling section 121. The coupling section 120 having this stepwise form increases the weld area so as to improve the bond with the tray part 300. The reinforcing frame 200 then may be configured so that the fastening section 210 is fastened to the 2nd coupling section 122 as in FIG. 6A, or the fastening section 210 of the reinforcing frame 200 may also have a stepped structure comprising a 1st fastening section 211 and a 2nd fastening section 212, so that these may respectively fasten to the 1st coupling section 121 and the 2nd coupling section 122, as in FIG. 6B.

[0048] FIGS. 7A, 7B and 7C are perspective views showing diverse examples of a reinforcing frame according to embodiments of this disclosure; FIG. 7A shows a separate-type reinforcing frame, while FIG. 7B and FIG. 7C show an integral-type reinforcing frame.

[0049] As shown in these drawings, the reinforcing frame 200 of this disclosure consists of a fastening section 210 at a first end that is fastened to the coupling section 120 of the cover part 100, a reinforcing section 220 that extends from the fastening section 210, and a catch section 230 where the end of the reinforcing section 220 is bent; either end of the cover part 100 in the length direction is fastened to the coupling section 120.

[0050] In detail, in order to fasten the fastening section 210 to the coupling section 120 of the cover part 100, a fastening means (see 150 in FIG. 4) is furnished for fastening to the coupling section 120. In addition, the reinforcing section 220 is extended a certain difference in the interior direction of the card socket from the fastening section 210, expanding the weld area within the tray part 300. The reinforcing section 220 expands the contact area with the mold resin during insert molding, so that the reinforcing frame 200 may further increase the

force of the bond with the tray part 300. In addition, the catch section 230 is bent extending from the end of the reinforcing section 220, in order to strengthen the bond with the insert-molded tray part 300. Separation of the tray part 300 from the reinforcing frame 200 after insert-molding is prevented, because the catch section 230 where the end of the reinforcing section 220 is bent (i.e. where the extension direction is changed) functions as a catch lip. The catch section 230 then may extend in diverse directions -- up, down, left, right, etc. -- from the end of the reinforcing section 220, but it is preferable that it be extended horizontally to the left or the right, in view of the thickness of the card connecting apparatus 10.

[0051] The reinforcing frame 200 having the above configuration consists of a left-right symmetrical pair as shown in part FIG. 7A; this pair of reinforcing frames 200 are respectively fastened to the coupling section 120 at either end of the cover part 100. This reinforcing frame 200 is accommodated within either border of the tray part 300, so that the bond between the cover part 100 and tray part 300 is reinforced.

[0052] In addition, the reinforcing frame 200 configured as above may be configured as a single unit wherein a pair of fastening sections 210 are connected together by a connecting section 240, as shown in FIG. 7B and FIG. 7C. The connecting section 240 of the integral reinforcing frame 200 is fastened to the coupling section 120 of the cover part 100, so that the fastening of the cover part 100 to the reinforcing frame 200 may be further secured, and ultimately, the bond with the tray part 300 may be further strengthened. One or both sides of the connecting section 240 and coupling section 120 may have a resin injection hole or injection recess formed whereinto the molding resin of the tray part 300 is injected. The resin injection hole may form a hole or recess that penetrates vertically through the connecting section 240 and coupling section 120; when the cover part 100 and reinforcing frame 200 are used as the inserts for insert molding, the injection resin is filled into the injection hole; as a result, separation of the reinforcing frame 200 or cover part 100 from the tray part 300 formed by injection molding may be prevented, and the bond therebetween may be strengthened.

[0053] In addition, the integral reinforcing frame 200 whereon the connecting section 240 is formed may further be furnished with a protruding section 250 that protrudes inward from the connecting section 240. This protruding section 250 is located between the pair of reinforcing sections 220 so as to strengthen the bond with the tray part 300 in the central portion of the cover part 100 having a certain length. On the end of the protruding section 250, a catch section may be formed identically to the reinforcing section 220.

[0054] FIGS. 8A, 8B, 9A, 9B, 10A and 10B show diverse structures for fastening cover parts and reinforcing frames together, according to embodiments of this disclosure. In the card connecting apparatus according to an embodiment of this disclosure, the cover part 100 and the reinforcing frame 200 are fastened between the coupling section 120 and the fastening section 210, and diverse types of fastening means may be used therefor.

[0055] Specifically, as in FIGS. 8A and 8B, fastening may be accomplished using a burr 151 of the reinforcing frame 200. Specifically, on a first side of the fastening section 210 of the reinforcing frame 200, a burr 151 is formed protruding, and on the coupling section 120 of the cover part 100, a burr hole 152 is formed corresponding to the burr 151; fastening is accomplished by spinning the burr 151 with respect to the burr hole 152.

[0056] In addition, as in FIGS. 9A and 9B, the fastening may be accomplished by a rivet 153. Specifically, rivet holes 154 may be respectively formed on the coupling section 120 and fastening section 210, and the rivet 153 may be configured so as to pass through the rivet holes 154 and fasten the cover part 100 and reinforcing frame 200 together.

[0057] In addition, as shown in FIG. 10A, fastening may be accomplished using adhesive (bonding) tape 155. Specifically, adhesive tape 155 that is adhesive on both sides may be interposed between the coupling section 120 and the fastening section 210, so that the cover part 100 and reinforcing frame 200 may be fastened together. In addition, as in FIG. 10B, the fastening may be accomplished by welding 156. Specifically, the coupling section 120 and the fastening section 210 may be fastened together by welding or adhesive treatment, so that the cover part 100 and reinforcing frame 200 may be fastened together.

[0058] In addition, although not shown, if the cover part 100 is made of a plastic material, the cover part 100 and reinforcing frame 200 may be formed as a single unit by insert molding using the reinforcing frame 200, which is of a metal material, as the insert.

[0059] In an integrated-type reinforcing frame 200 further furnished with a connecting section 240, the above fastening means may also be used between the connection section 240 and the coupling section 120.

[0060] FIGS. 11A, 11B, 11C and 11D are process diagrams showing the process of manufacturing the card connecting apparatus according to one embodiment of this disclosure; FIG. 12 is a process diagram showing the process of manufacturing a card connecting apparatus according to another embodiment of this disclosure.

[0061] Reviewing the process of manufacturing the card connecting apparatus according

to one embodiment of this disclosure with reference to FIGS. 11A, 11B, 11C and 11D, the cover part 100 is prepared as shown in FIG. 11A. The cover part 100 then must have a cover section 110 and coupling section 120, and depending on the material, may be formed by CNC machining or by forging. In addition, as in FIG. 11B, the transfer frame 400 is manufactured separately from the manufacture of the cover part 100. In the center of the transfer frame 400, a space part 400a is formed for the injection molding of the tray part 300, having a rectangular shape, and on one side, a reinforcing frame 200 is formed as a single unit. The transfer frame 400 consists of a metal material, and may be formed by CNC, forging, etc.

[0062] In addition, as shown in FIG. 11C, a separately manufactured cover part 100 is fastened to the reinforcing frame 200 of the transfer frame 400. In order to fasten the cover part 100, fastening means 150 such as a burr and burr hole are formed in advance on the reinforcing frame 200 and cover part 100. After the cover part 100 has been fastened or insert-molded to the reinforcing frame, as shown in FIG. 11D, the cover part 100 and reinforcing frame 200 fastened together as a unit are used as the insert for molding the tray part 300, so that the card connecting apparatus 10 is manufactured from the transfer frame 400. Next, the reinforcing frame 200 is cut away from the transfer frame 400, so that the card connecting apparatus 10 is separated from the transfer frame 400, and as a result, the card connecting apparatus 10 is finally completed as shown in FIG. 3.

[0063] If the cover part 100 consists of a plastic material, the cover part 100 may also be formed integrally on the reinforcing frame by an insert-molding process. Specifically, as shown in FIG. 11B, on the reinforcing frame 200 is furnished a transfer frame 400 formed as a single unit; and as shown in FIG. 11C, a cover part 100 is initially insert-molded using the reinforcing frame as the insert. In addition, as shown in FIG. 11D, the tray part is secondarily insert-molded using the extruded cover part 100 and reinforcing frame 200 as the insert.

[0064] In other words, the card connecting apparatus 10 according to an embodiment of this disclosure may readily be manufacturing using a transfer frame 400.

[0065] In addition, referring to FIG. 12, a plurality of transfer frames 400 may be connected in sequence. The process of manufacturing the card connecting apparatus 10 using a transfer frame 400 typically proceeds by the transfer frame 400 moving in the lateral direction (X direction); as shown, a plurality of transfer frames are connected together in the lateral direction. This plurality of transfer frames 400 undergoes sequential processes of cover part fastening (or cover part molding), tray molding, and card connecting apparatus separation, as

the transfer frames proceed in the lateral direction. To transfer the transfer frames 400, a frame transfer hole may be formed on the second end.

[0066] If multiple connected transfer frames are used in this fashion, the card connecting apparatus manufacturing process may be automated, and productivity may be enhanced through mass production.

[0067] Although this disclosure has been described hereinabove with reference to the embodiments, a person of ordinary skill in the present art will understand that diverse alterations hereof and other equivalent embodiments are possible.

CLAIMS

1. A card connecting apparatus for use in an electronic device, for insertion into and withdrawal from a card socket of an electronic device with a card mounted thereon, the card connecting apparatus comprising:

a cover part furnished with a cover section that covers the entrance of the card socket and a coupling part that extends protruding into the interior of the card socket at a thickness less than the cover section;

a pair of reinforcing frames of a metal material, having a fixed length and consisting of a fastening section at a first end that is fastened to the coupling section of the cover part, and a reinforcing section at a second end that extends into the card socket interior from the fastening section, so as to be fastened to the coupling section at either end of the cover part in the length direction; and

a tray part of a nonmetallic material whereon is formed a mounting hole or mounting recess whereon a card is mounted, and which accommodates the reinforcing frame therewithin and is welded integrally to the coupling part,

wherein the tray part is formed as a single unit with the cover part by insert-molding using the cover part, to which the reinforcing frame is fastened, as the insert.

2. The card connecting apparatus of Claim 1, wherein the reinforcing frame further comprises a catch section where the extension direction of the reinforcing section is changed.

3. The card connecting apparatus of Claim 1, wherein the reinforcing frame further comprises a connecting section that connects the pair of fastening sections, and is formed as a single unit.

4. The card connecting apparatus of Claim 3, wherein the reinforcing frame further comprises a protruding section that extends protruding within the card socket from the connecting section.

5. The card connecting apparatus of Claim 1, wherein the coupling section of the cover part and the fastening section of the reinforcing frame form a stepped structure.

6. The card connecting apparatus of Claim 1, wherein the cover part and the reinforcing frame have a burr formed protruding on the fastening section and a burr hole formed on the coupling section, and are fastened by spinning the burr into the burr hole.

7. The card connecting apparatus of Claim 1, wherein the cover part and the reinforcing frame have a rivet hole formed on the fastening section and coupling section, and are fastened together by a rivet that passes through the rivet holes.

8. The card connecting apparatus of Claim 1, wherein the cover part and the reinforcing frame are fastened together by bonding or welding the coupling section and the fastening section.

9. A method of manufacturing a card connecting apparatus for use in an electronic device, for insertion into and withdrawal from a card socket of an electronic device with a card mounted thereon, the method comprising:

(a) a step wherein a transfer frame of a metal material is prepared, having formed integrally a pair of fastening sections, a reinforcing section extending inward from the fastening sections, and a catch section bent at the end of the reinforcing section;

(b) a step wherein a cover part is prepared having a cover section that covers the entrance of the card socket and a coupling section that extends protruding into the interior of the cover section at a thickness less than that of the cover section;

(c) a step wherein the reinforcing frame and cover part, formed as a single unit, are used as the insert and resin is insert-molded so as to accommodate the reinforcing frame therewithin, so that the tray part is molded to the transfer frame; and

(d) a step wherein the reinforcing frame is cut from the transfer frame so as to separate the card connecting apparatus.

10. The method of Claim 9, wherein the step (b) of fastening the cover part to the reinforcing frame consists of a process of molding the cover part of a plastic material using the reinforcing frame as the insert.

11. The method of Claim 9, wherein a plurality of the transfer frames are connected together in the forward direction of the process, so that the step (b) of fastening the

cover part, the step (c) of molding the tray part, and the step (d) of separating the card connecting apparatus take place in a continuous process.

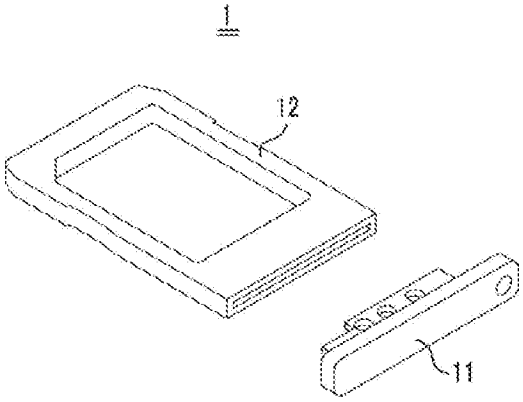


FIG. 1

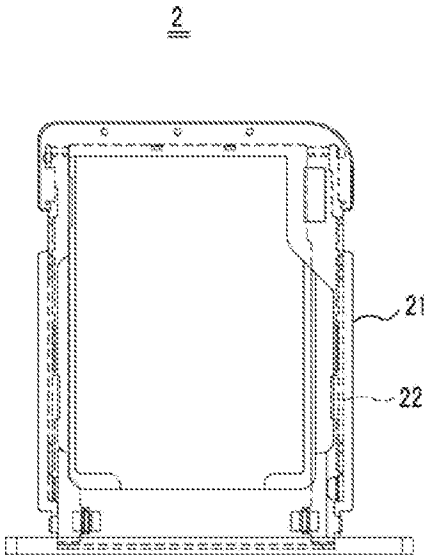


FIG. 2

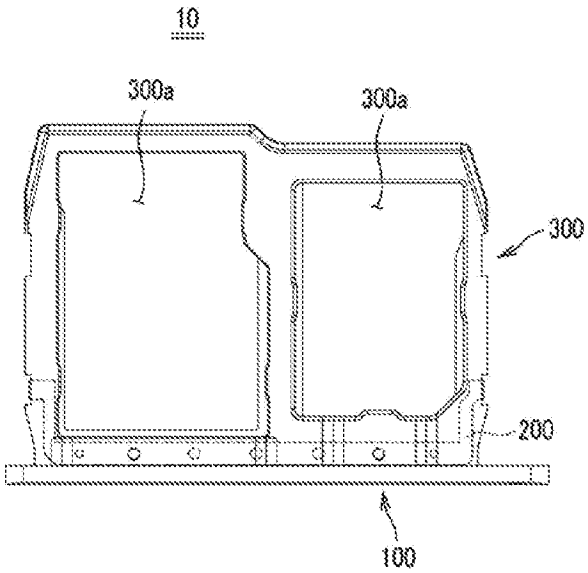

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300a
300a
300
200
100

FIG. 3

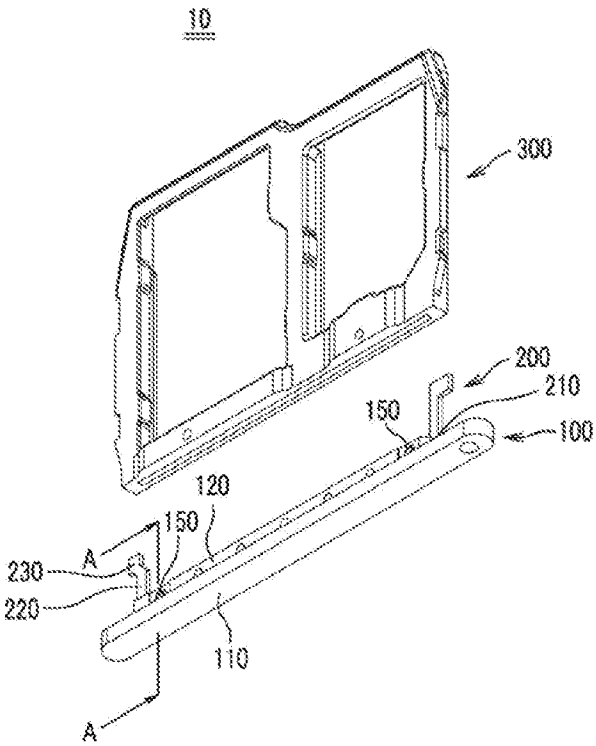

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FIG. 4

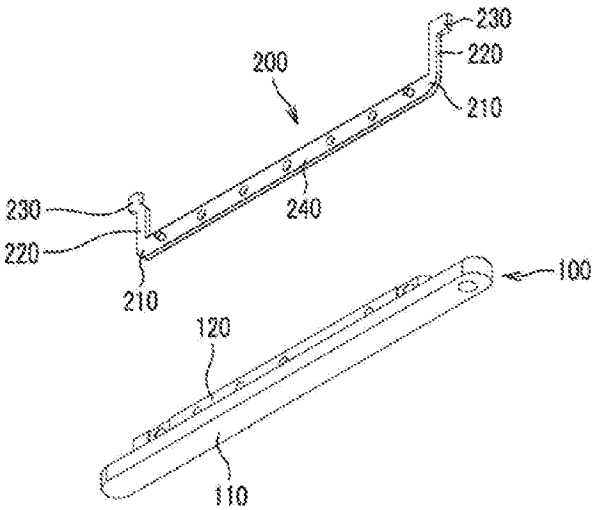


FIG. 5

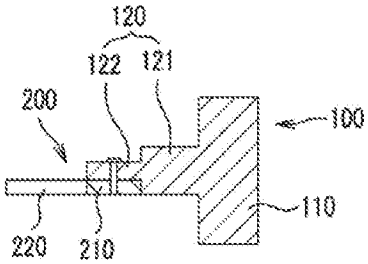


FIG. 6A

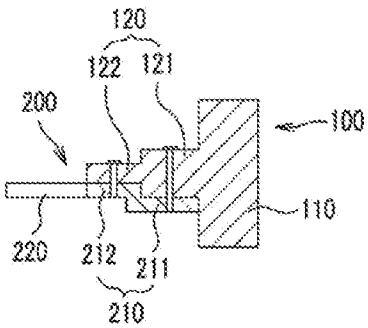


FIG. 6B

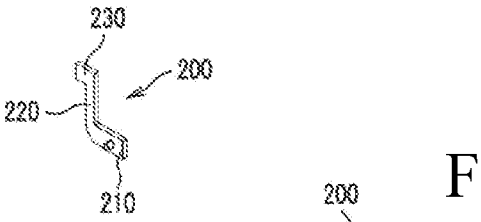


FIG. 7A

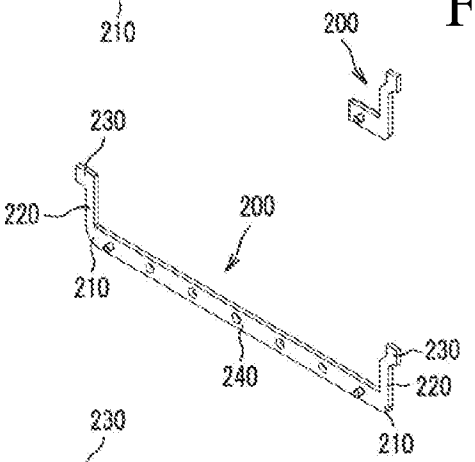


FIG. 7B

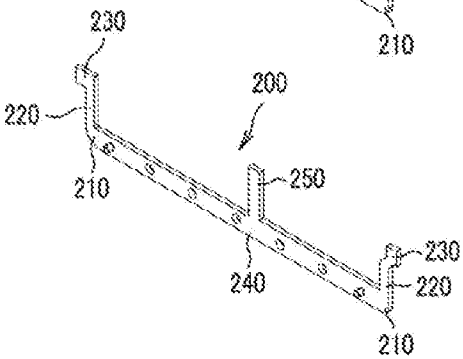


FIG. 7C

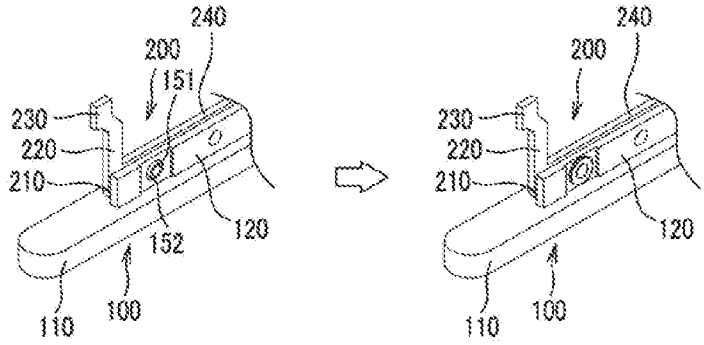

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FIG. 8A

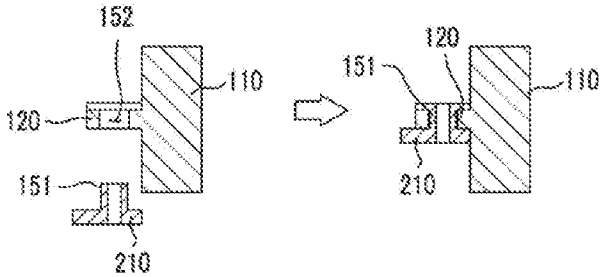

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FIG. 8B

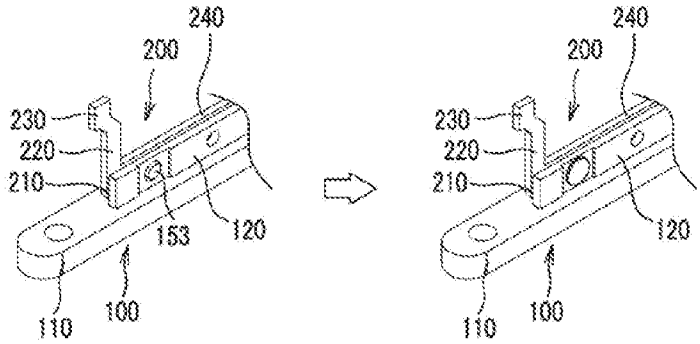

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FIG. 9A

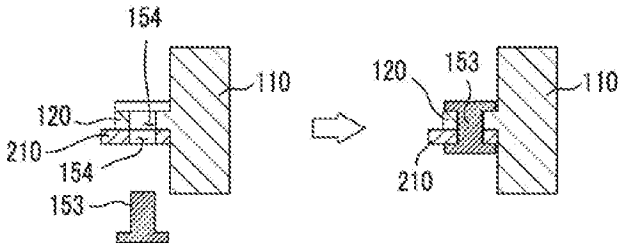

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FIG. 9B

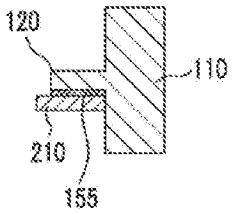


FIG. 10A

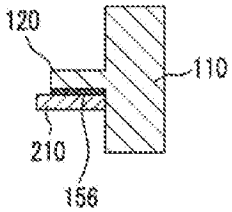


FIG. 10B

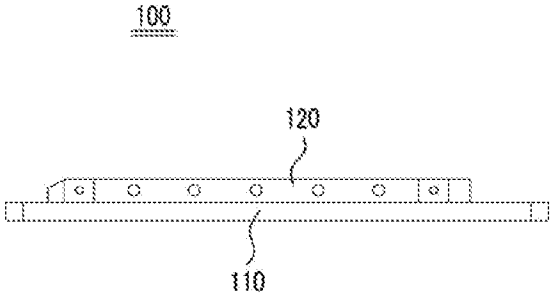


FIG. 11A

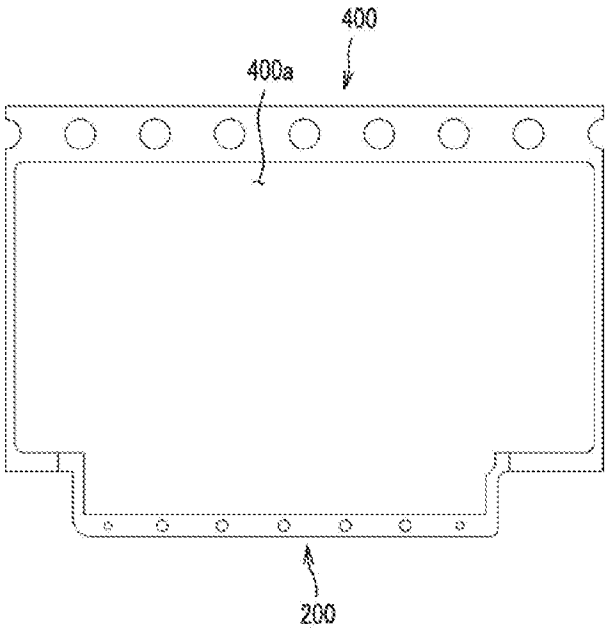


FIG. 11B

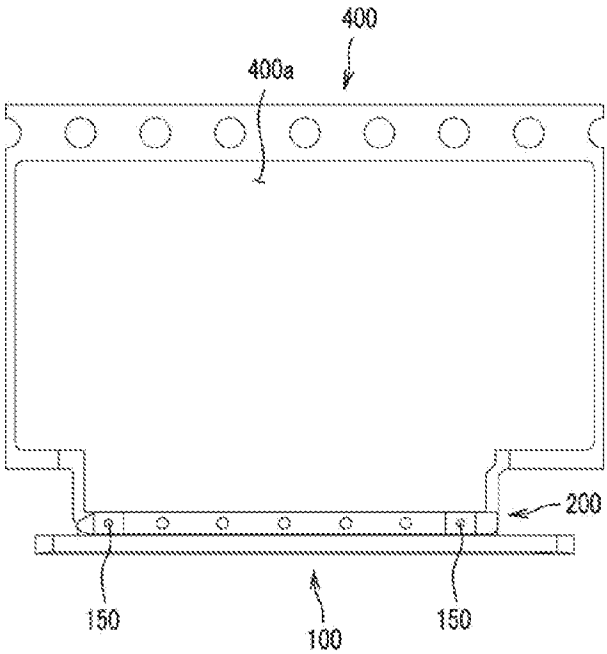


FIG. 11C

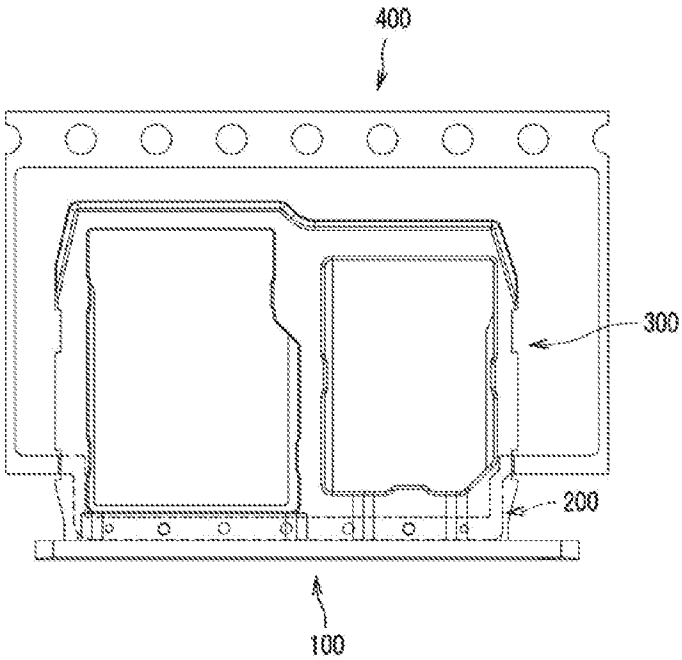


FIG. 11D

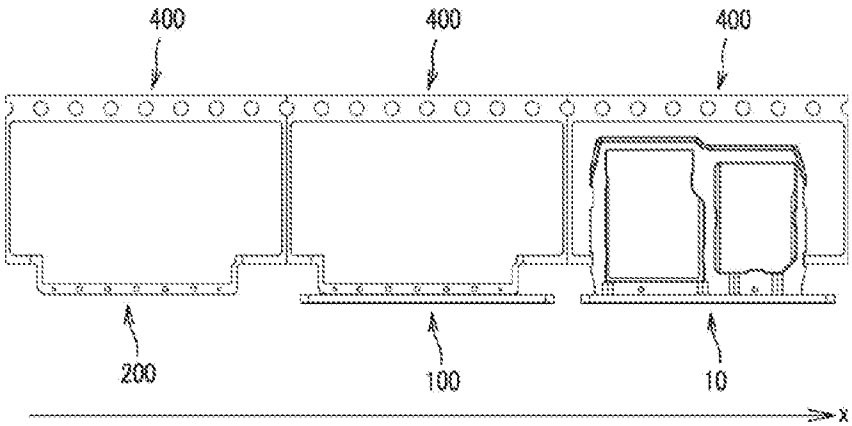


FIG. 12

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2017/037477

A. CLASSIFICATION OF SUBJECT MATTER

H01R 13/6598(2011.01)i, H01R 13/514(2006.01)i, H01R 43/26(2006.01)i, G06K 13/08(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H01R 13/6598; H01R 13/629; H05K 7/14; H01R 24/00; H04B 1/3818; H01R 12/71; H04B 1/38; H01R 13/514; H01R 43/26; G06K 13/08

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean utility models and applications for utility models
Japanese utility models and applications for utility models

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
eKOMPASS(KIPO internal) & keywords: card connecting apparatus, cover, reinforcing frame, tray, insert-molding

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	KR 10-1554128 B1 (DK UIL CO., LTD.) 21 September 2015 See paragraphs [0036]-[0047] and figures 2-3.	1-11
A	US 2016-0113142 A1 (SAMSUNG ELECTRONICS CO., LTD.) 21 April 2016 See paragraphs [0036]-[0047] and figures 2-3.	1-11
A	CN 203166221 U (AMPHENOL TUCHEL ELECTRONIC GMBH CHINA OPERATION) 28 August 2013 See claims 1-4 and figure 3.	1-11
A	CN 105449450 A (HUIZHOU TCL MOBILE COMMUNICATION CO., LTD.) 30 March 2016 See claims 1-10 and figure 5.	1-11
A	US 2009-0047835 A1 (KENG-LIANG LIN) 19 February 2009 See claims 1-7 and figure 5.	1-11

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
"O" document referring to an oral disclosure, use, exhibition or other means
"P" document published prior to the international filing date but later than the priority date claimed
"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents,such combination being obvious to a person skilled in the art
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
31 August 2017 (31.08.2017)	**31 August 2017 (31.08.2017)**

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Authorized officer
KIM, Sung Gon
Telephone No. +82-42-481-8746

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/US2017/037477

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CN 105449450 A	30/03/2016	None	
US 2009-0047835 A1	19/02/2009	JP 3145897 U	23/10/2008
		TW M328115 U	01/03/2008
		US 7503806 B2	17/03/2009