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CARD EDGE CONNECTOR

BACKGROUND OF THE INVENTION

5 Field of the Invention

The present invention relates to a card edge connector mounted onto a mother board, to which a daughter board is detachably connected.

10 Description of the Prior Art

Conventionally, a card edge connector mounted onto a mother board, to which a daughter board such as SIMM (Single Inline Memory Module) and DIMM (Double Inline Memory Module) is detachably connected, has been used with a personal computer
15 or the like.

As this card edge connector, conventionally a card edge connector shown in, for example, FIG. 9 is known (See Japanese Patent Laid-Open No. 8-190967).

This card edge connector 101, as shown in FIG. 9A, has:
20 an insulated housing 110 mounted on a mother board (not shown) and having two-stage daughter board receiving recesses 111, 211 extending in the longitudinal direction; and a plurality of contacts 121, 221 attached in two upper and lower rows along the longitudinal direction of the daughter board receiving
25 recesses 111, 211, and connected to the mother board. Also, at both ends of the daughter board receiving recess 111 of the housing 110 in the longitudinal direction, there are

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provided a pair of latch portions 131 for holding a daughter board 300, which has been placed in a horizontal position by being rotated after obliquely inserted into the daughter board receiving recess 111, at its horizontal angle. Also at both
5 ends of the daughter board receiving recess 211 in the longitudinal direction, there are provided a pair of latch portions 231 for holding the daughter board 300, which has been placed at a horizontal angle by being rotated after obliquely inserted into the daughter board receiving recess
10 211, at its horizontal angle.

Each latch portion 131, 231 is formed integrally with the housing 110, and at the front end thereof (right end in FIG. 9B), there are provided restraining portions 132, 232 and daughter board coming-off preventing portions 133, 233.
15 Each of the restraining portions 132, 232 projects inwardly from the top part of the front end of the latch portion 131, 231. When rotating the daughter board 300 inserted into the daughter board receiving recess 111, 211 to a horizontal position from an oblique position, each of these restraining
20 portions 132, 232 once makes a displacement on the outer side, then returns to its original state by means of an elastic force of the latch portions 131, 231, comes into contact with the top surface of the edge portion of the daughter board 300 to prevent the daughter board 300 from lifting and the daughter
25 board 300 is adapted to be fixed. Also, each of the daughter board coming-off preventing portions 133, 233 projects, as shown in FIG. 9B (in FIG. 9B, only the daughter board coming-off

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preventing portion 133 is shown), inwardly from a site adjacent to the restraining portion 132, 232 of the latch portion 131, 231. When the daughter board 300 is placed in a horizontal position with respect to the mother board, each of the daughter board coming-off preventing portions 133, 233 enters a semicircular recess 301 formed at the edge portion of the daughter board 300, and when a force is applied to the daughter board 300 in the horizontal direction (direction indicated by an arrow in FIG. 9B), press surfaces 133A, 233A (only 133A is indicated) thereof act so as to press an abutting surface 301A formed on the inner wall of the semicircular recess 301, whereby the daughter board 300 is adapted to be prevented from coming off the connector 101 in the horizontal direction.

BRIEF SUMMARY OF THE INVENTION

In this conventional card edge connector 101, however, since a press surface 133A, 233A of the daughter board coming-off preventing portion 133, 233 and an abutting surface 301A formed on the inner wall of the semicircular recess 301 are in area-contact with each other, holding (coming-off preventing) pressure of the daughter board 300 is low, and the daughter board 300 may come off the card edge connector 101 in the horizontal direction because of an impact such as falling, leading to a problem that resistance to impact shock performance requested by the client cannot be obtained.

Accordingly, the present invention has been achieved in views of the above described problems, and an object of the

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present invention is to provide a card edge connector capable of effectively restraining the daughter board from coming off in the horizontal direction by increasing the holding pressure for the daughter board by the latch member.

According to one aspect of the present invention, there is provided a card edge connector, comprising an insulated housing mounted onto the mother board and a latch member attached to the housing, for holding the daughter board, the latch member having a daughter board coming-off preventing portion for restraining the daughter board from coming off in the horizontal direction by the latch member engaging with the inner wall of a semicircular recess formed at the edge portion of the daughter board, wherein the daughter board coming-off preventing portion has a pointed edge portion for enter in the inner wall of the semicircular recess; wherein said pointed edge portion inclines along an up-and-down direction perpendicular to said horizontal direction, and enters in the vicinity of a top end of the inner wall of said semicircular recess.

In one embodiment, the card edge connector is characterized in that the latch member is a metal latch to be formed by stamping and forming a sheet metal, and a pointed edge portion is a burr edge provided at a tip end of the latch member, to be formed when the sheet metal is stamped.

According to another aspect of the present invention, there is provided a card edge connector, comprising an insulated housing mounted onto the mother board and a latch member provided integrally with the housing, for

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holding the daughter board, the latch member having a daughter board coming-off preventing portion for restraining the daughter board from coming off in the horizontal direction by the latch member engaging with the innerwall of the semicircular recess formed at the edge portion of the daughter board, wherein the daughter board coming-off preventing portion has a pointed edge portion for entering in the inner wall of the semicircular recess; wherein said pointed edge portion inclines along an up-and-down direction perpendicular to said horizontal direction, and enters in the vicinity of a top end of the inner wall of the semicircular recess.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1A to 1C show a card edge connector according to a first embodiment of the present invention, and FIG. 1A is a plan view, FIG. 1B is a front view, and FIG. 1C is a right side view. However, FIG. 1C shows both a mother board and a daughter board;

FIGS. 2A to 2C show a latch body constituting a left-side latch member to be used for the card edge connector shown in FIG. 1 and FIG. 2A is a front view showing a partial section, FIG. 2B is a right side view, and FIG. 2C is a left side view;

FIG. 3 is a plan view showing the latch body shown in FIG. 2;

FIGS. 4A and 4B are explanatory views for illustrating prevention of the daughter board from coming off by means of a daughter board coming-off preventing piece of the latch body shown in FIG. 2, and FIG. 4A is an explanatory view for
5 illustrating a state of the daughter board coming-off preventing piece entering in a semicircular recess as viewed from the plane side, and FIG. 4B is an explanatory view for illustrating a state of the daughter board coming-off preventing piece entering in a semicircular recess as viewed
10 from the right side. In FIG. 4B, the daughter board is indicated by an alternate long and short dash line;

FIGS. 5A to 5E show a fixing member constituting a left-side latch member to be used for the card edge connector shown in FIG. 1, FIG. 5A is a plan view, FIG. 5B is a front
15 view, FIG. 5C is a left side view, FIG. 5D is a bottom view, and FIG. 5E is a sectional view taken on line 5E-5E of FIG. 5A;

FIG. 6 is a front view showing a partial section of a state in which a fixing member of the left-side latch member
20 has been connected onto the mother board A by soldering;

FIG. 7A to FIG. 7C show a left-side latch member to be used for the second embodiment of the card edge connector according to the present invention, and FIG. 7A is a right side view, FIG. 7B is a plan view, and FIG. 7C is a partial
25 enlarged view when the daughter board holding portion is viewed from the bottom side;

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FIGS. 8A and 8B are explanatory views for illustrating prevention of the daughter board from coming off by means of a daughter board coming-off preventing piece of the latch member shown in FIG. 7 and FIG. 8A is an explanatory view for
5 illustrating a state of the daughter board coming-off preventing piece entering in a semicircular recess as viewed from the plane side, and FIG. 8B is an explanatory view for illustrating a state of the daughter board coming-off preventing piece entering in a semicircular recess as viewed
10 from the right side. In FIG. 8B, the daughter board is indicated by an alternate long and short dash line; and

FIGS. 9A and 9B show a card edge connector according to a conventional example, and FIG. 9A is a partial perspective view, and FIG. 9B is a partial perspective view showing detailed
15 structure of the upper portion of a side wall of the upper-stage housing portion. In this respect, in FIG. 9B, a part of the daughter board is shown together.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

20 Next, with reference to the drawings, the description will be made of embodiment according to the present invention. FIGS. 1A to 1C show a card edge connector according to a first embodiment of the present invention, and FIG. 1A is a plan view, FIG. 1B is a front view, and FIG. 1C is a right side
25 view. However, FIG. 1C shows both a mother board and a daughter board. FIGS. 2A to 2C show a latch body constituting a left-side latch member to be used for the card edge connector

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shown in FIG. 1, FIG. 2A is a front view showing a partial section, FIG. 2B is a right side view and FIG. 2C is a left side view. FIG. 3 is a plan view showing the latch body shown in FIG. 2. FIGS. 4A and 4B are explanatory views for
5 illustrating prevention of the daughter board from coming off by means of a daughter board coming-off preventing piece of the latch body shown in FIG. 2. FIG. 4A is an explanatory view for illustrating a state of the daughter board coming-off preventing piece entering in a semicircular recess as viewed
10 from the plane side, and FIG. 4B is an explanatory view for illustrating a state of the daughter board coming-off preventing piece entering in a semicircular recess as viewed from the right side. In FIG. 4B, the daughter board is indicated by an alternate long and short dash line. FIGS.
15 5A to 5E show a fixing member constituting a left-side latch member to be used for the card edge connector shown in FIG. 1, FIG. 5A is a plan view, FIG. 5B is a front view, FIG. 5C is a left side view, FIG. 5D is a bottom view, and FIG. 5E is a sectional view taken on line 5E-5E of FIG. 5A. FIG. 6
20 is a front view showing a partial section of a state in which a fixing member of the left-side latch member has been connected onto the mother board A by soldering.

In FIG. 1, a card edge connector 1 has: an insulated housing
10 mounted on a mother board A, and having a daughter board
25 receiving recess 11 extending in the longitudinal direction (left and right direction in FIG. 1B); and a plurality of contacts 20 arranged in two-upper and lower rows along the

longitudinal direction of the daughter board receiving recesses 11. Each contact 20 has a soldering portion 21 to be surface mounting solder-joined on the mother board A. Thus, at both ends of the housing 10 in the longitudinal direction, there are provided a pair of latch members 30A, 30B for holding, at a second angle (horizontal angle with respect to the mother board A), a daughter board B, which has been placed at the second angle by being rotated after inserted at a first angle (an oblique angle with respect to the mother board A) within the daughter board receiving recess 11. When the daughter board B is received at the first angle within the daughter board receiving recess 11, the daughter board B enters between the plurality of contacts 20 arranged in two-upper and lower rows, and when it is rotated to be held at the second angle, the daughter board B comes into contact with the two upper and lower rows of contacts 20, whereby the daughter board B is to be electrically connected to the mother board A.

In this case, the housing 10 is an insulating member formed by a substantially rectangular body extending in the longitudinal direction, and is formed by molding synthetic resin such as PBT. On slightly the right side (right side in FIG. 1B) of the center of the housing 10 in the longitudinal direction, there is provided a rib 12 for preventing the daughter board B from being inserted conversely.

Also, a pair of latch members 30A, 30B are formed so as to be symmetrical in shape about the center of the housing 10 in the longitudinal direction, and consist of a left-side

latch member 30A arranged on the left side with respect to the center in the longitudinal direction and a right-side latch member 30B arranged on the right side with respect to the center. Since the left-side latch member 30A and the right-side latch member 30B are symmetrical in shape, only the structure of the left-side latch member 30A will be described hereinafter, and description of structure of the right-side latch member 30B will be omitted.

The left-side latch member 30A is, as shown in FIG. 1, composed of: a metallic latch body 40; and a metallic fixing member 50 separate from the latch body 40.

Of these, the latch body 40 is a metal latch formed by stamping and forming a sheet metal such as stainless steel, and has a press fitted plate portion 41 to be press fitted in the housing 10 as most clearly shown in FIGS. 2 and 3. At the front end (lower end in FIG. 3) of the press fitted plate portion 41, a transition portion 43a extends obliquely forward toward the outside, and from the tip end of the transition portion 43a, a first flat plate portion 43 extends forward. Also, at the upper edge of the front end of the press fitted plate portion 41, there is formed a folded piece 42 which is folded back downward inwardly after extending upwardly once. At the front edge of the folded piece 42, there is formed a second flat plate portion 46 which extends forward in substantially parallel to the first flat plate portion 43. On the outer surface of the folded piece 42, there are formed a plurality of projections 48 for projecting outwardly which

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maintains the distance between the first flat plate portion 43 and the second flat plate portion 46 at a predetermined distance.

At the front end of the second flat plate portion 46,
5 there is provided a daughter board holder 47 for holding the daughter board B at the second angle. The daughter board holder 47 has a daughter board coming-off preventing piece (daughter board coming-off preventing portion) 47a bent the second flat plate portion 46 from the front end thereof inward at a
10 predetermined angle, and a daughter board holding piece 47b bent the second flat plate portion 46 from the top edge thereof inwardly. In this case, when the daughter board B inserted within the daughter board receiving recess 11 at the first angle is rotated at the second angle, the daughter board holding
15 piece 47b returns to its original position after moving once in the outside by means of the elastic force of the second flat plate portion 46, and comes into contact with the top surface of the edge portion of the daughter board B to prevent it from lifting for fixing.

20 Also, in the case where daughter board coming-off preventing piece 47a enters, as shown in FIG. 4, a semicircular recess B1 formed at the edge portion of the daughter board B when the daughter board B is positioned at the second angle and a force is applied to the daughter board B in the horizontal
25 direction forward (direction indicated by an arrow X shown in FIGS. 4A and 4B), the daughter board coming-off preventing piece 47a engages with the inner wall of the semicircular recess

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B1 to prevent the daughter board B from coming off the connector 1 in the horizontal direction forward. A portion of this daughter board coming-off preventing piece 47a for engaging with the inner wall of the semicircular recess B1 is, as shown in FIGS. 4A and 4B, a top end of a pointed edge portion 47c formed on the inner part (upper side in FIG. 4A) of the tip end of the daughter board coming-off preventing piece 47a, which inclines along an up-and-down direction perpendicular to the horizontal direction. When a force is applied to the daughter board B in the horizontal direction forward, the top end of this pointed edge portion 47c comes into point-contact with the vicinity of the top end of the inner wall of the semicircular recess B1 to enter in as shown in FIG. 4B. For this reason, the holding pressure of the daughter board B due to the daughter board coming-off preventing piece 47a of the latch member 40 can be considerably increased, and coming-off of the daughter board B in the horizontal direction can be effectively restrained. Since the pointed edge portion 47c is inclined along the up-and-down direction perpendicular to the horizontal direction at this time, there is also an effect of pressing the daughter board B in downward, and the coming-off of the daughter board B in the horizontal direction can be more effectively restrained. In this respect, the pointed edge portion 47c is not limited to a case where it is formed in the inner part of the tip end of the daughter board coming-off preventing piece 47a, but may be formed by the edge of a tongue piece raised from the middle of the daughter board coming-off

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piece 47a. Also, the pointed edge portion 47c is preferably constituted by a burr edge to be formed when a sheet metal is stamped. The pointed edge portion 47c is constituted by the burr edge, whereby pressure for entering in the inner wall of the semicircular recess B1 is increased so that the holding pressure of the daughter board B due to the daughter board coming-off preventing piece 47a of the latch member 40 can be further increased. Further, the pointed edge portion 47c may be extendedly provided in parallel with the up-and-down direction instead of inclining along the up-and-down direction perpendicular to the horizontal direction. In this case, when a force is applied to the daughter board B in the horizontal direction, the pointed edge portion 47c comes into line-contact with the inner wall of the semicircular recess B1 to enter in, and the holding pressure of the daughter board B due to the daughter board coming-off preventing piece 47a of the latch member 40 can be increased as compared with a case where the holding pressure of the daughter board B is obtained by the conventional area-contact. In addition, the pointed edge portion 47c is extendedly provided in parallel with the up-and-down direction, whereby the latch body 40 can be simply manufactured.

In this respect, at both the lower edge of the front end and the lower edge of the rear end of the second flat plate portion 46, there are provided daughter board supporting portions 49a, 49b which extend to the inner part for supporting the daughter board B from the lower side when the daughter

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board B is positioned at the second angle. The daughter board supporting portions 49a, 49b are formed so as to be on different levels in such a manner that positions of their top surfaces in the direction of height do not coincide with each other.

5 This reason is that a warp of the daughter board B when the daughter board B is positioned at the second angle has been taken in consideration.

On the other hand, from the lower edge of the first flat plate portion 43 at the substantially central part in a

10 back-and-forth direction, a tab 44 with plate thickness t is bent inward. The tab 44 extends below the second flat plate portion 46. The tab 44 has a broad portion 44a having relatively broad width, bent inward from the first flat plate portion 43, and a narrow portion 44b extending inward from

15 the tip end of the broad portion 44a, having narrower width than the broad portion 44a. In FIG. 3, width W_2 of the narrow portion 44b is narrower than width W_1 of the broad portion 44a. Thus, as shown in FIGS. 3 and 6, on the tip end edge surface of the broad portion 44a located on both sides of the

20 narrow portion 44b, there are formed restraining shoulders 44c. Also, in the narrow portion 44b of the tab 44, there is formed a restraining aperture 44e penetrating in the vertical direction, and at the tip end of the narrow portion 44b, there is formed an inclined surface 44d with predetermined

25 width, which obliquely upwardly inclines from the tip end of the narrow portion 44b toward the restraining aperture 44e. Also, a excessive movement preventing piece 45 has a connecting

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portion 45a, which is bent inward from the lower edge of the front end of the first flat plate portion 43 and is located below the second flat plate portion 46, and a stand-up piece 45b, which stands up from the tip end of the connecting portion 45a. The second flat plate portion 46 is arranged so as to be located between the first flat plate portion 43 and the stand-up piece 45b, and any movement of the second flat plate portion 46 toward the outside is restricted by the first flat plate portion 43 while any movement of the second flat plate portion 46 toward the inside is restricted by the stand-up piece 45b of the excessive movement preventing piece 45.

Next, a fixing member 50 is formed by stamping and forming a sheet metal such as stainless steel and copper alloy, and has, as most clearly shown in FIG. 5, a flat plate top portion 51, which extends in a bending direction of the tab 44, a pair of side plate portions 52, which extend downward from both sides of the flat plate top portion 51, and a pair of flat plate bottom portion portions 53, which extend from each of the lower ends of the pair of side plate portions 52 toward the other party to each other. The fixing member 50 is solder-plated or tinned in order to solder-connect.

In this case, at the flat plate top portion 51 of the fixing member 50, there are provided a guide plate 51a provided at the left end of the flat plate top portion 51, and a cantilever-shaped elastic restraining piece 54 which extends from the left end side of the flat plate top portion 51 toward the right end side (along a bending direction of the tab 44).

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The elastic restraining piece 54 has slightly smaller width than the width of the inclined surface 44d formed at the tap 44, and the tip end thereof is bent downward until it reaches a surface substantially flush with the top surface of the flat plate bottom portion 53 in a free state. Also, width W_A between a pair of side plate portions 52 is slightly larger than width W_2 of the narrow portion 44b of the tab 44, and is such width as to allow the narrow portion 44b to be inserted. Further, width W_B between the pair of flat plate bottom portion portions 53 and the flat plate top portion 51 is larger than the plate thickness t of the tab 44.

Thus, this fixing member 50 is, as shown in FIG. 6, pressed toward the first flat plate portion 43 of the latch body 40 while the guide plate 51a of the flat plate top portion 51 is caused to run along the top surface of the narrow portion 44b of the tab 44, whereby the fixing member 50 is mounted to the tab 44 of the latch body 40. At the time of this mounting, within space of the fixing member 50 to be enclosed with the flat plate top portion 51, the pair of side plate portions 52 and the pair of flat plate bottom portions 53, the narrow portion 44b of the tab 44 is inserted from the tip end. At this time, the guide plate 51a runs along the top surface of the narrow portion 44b of the tab 44, whereby the narrow portion 44b can be easily inserted. When the narrow portion 44b of the tab 44 is inserted within the space of the fixing member 50 from the tip end thereof, the tip end of the elastic restraining piece 54 of the fixing member 50 slides on an

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inclined surface 44d formed at the tip end of the narrow portion 44b to bend the elastic restraining piece 54 upwardly. Thus, when the tip end of the elastic restraining piece 54 reaches the restraining aperture 44e, the elastic restraining piece 54 returns to its original position to enter the restraining aperture 44e, and engages with the edge of the restraining aperture 44e. Also, the left edge surface of the side plate portions 52 in the tab bending direction abuts against a restraining shoulder 44c formed at the tab 44. Since the tip end of the elastic restraining piece 54 is adapted to slide on the inclined surface 44d when the elastic restraining piece 54 engages with the restraining aperture 44e, the tip end of the elastic restraining piece 54 is smoothly guided into the restraining aperture 44e. The elastic restraining piece 54 is engaged with the restraining aperture 44e, and the left edge surface of the side plate portions 52 in the tab bending direction abuts against a restraining shoulder 44c formed at the tab 44, whereby any movement of the fixing member 50 in the tab bending direction is restricted. Also at this time, the inner surfaces of the pair of side plate portions 52 abut against the side edge of the narrow portion 44b of the tab 44, whereby any movement of the fixing member 50 in a direction perpendicular to the tab bending direction is restricted at the same time. Thus, after the fixing member 50 is mounted onto the tab 44, the fixing member 50 is capable of moving in the up-and-down direction (z-direction in FIG. 5), but the lower surface of the flat plate top portion 51 of the fixing

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member 50 abuts against the top surface of the narrow portion 44b, whereby the movement of the fixing member 50 in the lower direction is restricted, and the top surface of the flat plate bottom portion 53 abuts against the lower surface of the narrow portion 44b, whereby the movement of the fixing member 50 in the upper direction is restricted.

By attaching a pair of left and right latch members 30A, 30B to both ends of the housing 10, to which a plurality of contacts 20 have been attached, in the longitudinal direction, the card edge connector 1 is completed. Thereafter, this card edge connector 1 is surface mounted onto the mother board A, and is arranged in the interior of a personal computer or the like.

On mounting this card edge connector 1 onto the mother board A, after a soldering portion 21 of the contact 20 and a flat plate bottom portion 53 of the fixing members 50, 50 of the latch members 30A, 30B are arranged at the predetermined positions on the mother board A as shown in FIGS. 1C and 6, reflow soldering will be performed. Thereby, the card edge connector 1 is mounted onto the mother board A.

Since at this time, the fixing member 50 is movable within a certain range in the up-and-down direction (direction z in FIG. 6) with respect to the tab 44 of the latch body 40, even if the mother board A has been warped, the warp can be absorbed by moving the fixing member 50 up and down, and the soldering portion 21 of the contact 20 and the fixing member 50 can be favorably solder-joined onto the mother board A.

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Next, with reference to FIGS. 7 and 8, the description will be made of a second embodiment according to the present invention. FIG. 7 shows a left-side latch member to be used for the second embodiment of the card edge connector according to the present invention, and FIG. 7A is a right side view, FIG. 7B is a plan view, and FIG. 7C is a partial enlarged view when the daughter board holding portion is viewed from the bottom side. FIG. 8 is an explanatory view for illustrating prevention of the daughter board from coming off by means of a daughter board coming-off preventing piece of the latch member shown in FIG. 7 and FIG. 8A is an explanatory view for illustrating a state of the daughter board coming-off preventing piece entering in a semicircular recess as viewed from the plane side, and FIG. 8B is an explanatory view for illustrating a state of the daughter board coming-off preventing piece entering in a semicircular recess as viewed from the right side.

The second embodiment of a card edge connector according to the present invention has substantially similar structure to the card edge connector 1 of the first embodiment shown in FIG. 1, but is different in the structure of a pair of left-side and right-side latch members for holding the daughter board B.

Since the left-side latch member and the right-side latch member, which constitute the pair of latch members, are symmetrical in shape, only the structure of the left-side latch

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member will be described hereinafter, and description of the right-side latch member will be omitted.

As shown in FIG. 7, the left-side latch member 60 is a metal latch formed by stamping and forming a sheet metal such as stainless steel, and has two flat plate portions 61, 62 placed on top of each other. Of these flat plate portions 61, 62, the flat plate portion 61 on the outside (left side in FIG. 7B) is provided with a press fitted plate portion 63 located at the rear end (top end in FIG. 7B), a fixing portion 64 bent outward from the lower end, a daughter board holder 65 located at the front end, and an anti-over stress piece 66 bent inward from the lower end. In this case, the press fitted plate portion 63 is press fitted into the both ends of the housing (not shown) in the longitudinal direction, and the fixing portion 64 is solder-jointed to a grounding pattern on the mother board A. On the other hand, of the flat plate portions 61, 62, the flat plate portion 62 on the inside is provided with an elastic contact piece 67 bent inward from the lower end, for extending forward. When the daughter board B has been rotated and placed at the second angle (horizontal angle with respect to the mother board A) after inserted at the first angle (an oblique angle with respect to the mother board A), this elastic contact piece 67 has a function to come into contact with a grounding pattern formed on the lower surface of the daughter board B, and to cause the daughter board B to ground the mother board A through the fixing portion 64.

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Thus, the daughter board holder 65 provided at the flat plate portion 61 on the outside has a function to hold the daughter board B at the second angle, and has a daughter board coming-off preventing piece (daughter board coming-off preventing portion) 65a bent the flat plate portion 61 inward from the front end at a larger angle than the daughter board coming-off preventing piece 47a, a daughter board holding piece 65b bent the flat plate portion 61 inward from the top edge, and an excessive movement preventing piece 65c.

10 In this case, when the daughter board B inserted into the daughter board receiving recess (not shown) of the housing at the first angle is rotated to the second angle, the daughter board holding piece 65b once moves to the outside and then returns to its original position due to an elastic force of the flat plate portion 61 on the outside, and comes into contact with the top surface of the edge portion of the daughter board B to prevent the daughter board B from lifting for fixing the daughter board B.

Also, when the daughter board B is positioned at the second angle, the daughter board coming-off preventing piece 65a enters, as shown in FIG. 8, the semicircular recess B1 formed at the edge portion of the daughter board B, and when a force is applied to the daughter board B in the horizontal direction (a direction indicated by an arrow X in FIGS. 8A and 8B) forward, the daughter board coming-off preventing piece 65a engages with the inner wall of the semicircular recess B1 to prevent the daughter board B from coming off the connector in the

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horizontal direction forward. A portion of this daughter board coming-off preventing piece 65a for engaging with the inner wall of the semicircular recess B1 is, as shown in FIGS. 8A and 8B, a pointed edge portion 65d formed on the outer part
5 (right side in FIG. 8A) of the tip end of the daughter board coming-off preventing piece 65a unlike the daughter board coming-off preventing piece 47a, which inclines along an up-and-down direction perpendicular to the horizontal direction. Since the daughter board coming-off preventing
10 piece 65a has been bent inward from the front end of the flat plate portion 61 at a larger angle than the daughter board coming-off preventing piece 47a, it becomes possible to cause a pointed edge portion 65d formed on the outside of the tip end of the daughter board coming-off preventing piece 65a to
15 engage with the inner wall of the semicircular recess B1. When a force is applied to the daughter board B in the horizontal direction forward, this pointed edge portion 65d comes into point-contact with the top end of the inner wall of the semicircular recess B1 to enter in. For this reason, the
20 holding pressure of the daughter board B due to the daughter board coming-off preventing piece 65a of the latch member 60 can be considerably increased, and coming-off of the daughter board B in the horizontal direction can be effectively restrained. Since the pointed edge portion 65d has been
25 inclined along the up-and-down direction perpendicular to the horizontal direction at this time, there is also an effect of pressing the daughter board B in downward, and the coming-off

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of the daughter board B in the horizontal direction can be more effectively restrained. In this respect, the pointed edge portion 65d is constituted by a burr edge to be formed when a sheet metal is stamped, and on the opposite side of the pointed edge portion 65d, there is a shear droop edge to be formed when the sheet metal is stamped. For this reason, entering-in pressure when the pointed edge portion 65d enters in the inner wall of the semicircular recess B1 is increased, and the holding pressure of the daughter board B due to the daughter board coming-off preventing piece 65a of the latch member 60 can be further increased. Further, the pointed edge portion 65d may be extendedly provided in parallel with the up-and-down direction instead of inclining along the up-and-down direction perpendicular to the horizontal direction. In this case, when a force is applied to the daughter board B in the horizontal direction, the pointed edge portion 65d comes into line-contact with the inner wall of the semicircular recess B1 to enter in, and the holding pressure of the daughter board B due to the daughter board coming-off preventing piece 65a of the latch member 60 can be increased as compared with a case where the holding pressure of the daughter board is obtained by the conventional area-contact. In addition, the pointed edge portion 65d is extendedly provided in parallel with the up-and-down direction, whereby the latch member 60 can be simply manufactured. Further, the daughter board coming-off piece 65a extends in a substantially opposite direction to the force in the horizontal direction

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forward for causing the daughter board B to come off. For this reason, a force to oppose to the force is great.

Also, the excessive movement preventing piece 65c is formed by bending the flat plate portion 61 on the outside inward from the lower end , and has a function to prevent the daughter board B from excessively moving below when the daughter board B comes into contact with an elastic contact piece 67. Also, when the daughter board holding piece 65b is caused to make a displacement on the outside to thereby release the daughter board B held, the excessive movement preventing piece 65c has a function to abut against the inner side surface of the flat plate portion 62 on the inside to thereby prevent the flat plate portion 61 on the outside from making an excessive displacement on the outside.

In this respect, an anti-over stress piece 66 provided on the flat plate portion 61 on the outside is located below the elastic contact piece 67, and has a function to prevent the elastic contact piece 67 from being excessively warped below. Also, the anti-over stress piece 66 is located below the flat plate portion 62 on the inside, and has a function to abut against the lower edge of the flat plate portion 62 on the inside for preventing the flat plate portion 61 on the outside from lifting when the daughter board B held by the daughter board holder 65 is forced to be biased upwardly.

In the foregoing, the description has been made of embodiments of the present invention, but the present invention is not limited thereto, but is capable of making various changes

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and alterations as occasion arises. For example, the latch members 30A, 30B and 60 may be made of resin in place of metal. Also, when the latch members 30A, 30B and 60 are made of resin, they may be constituted separately from the housing, or may
5 be constituted integrally with the housing as described in Japanese Patent Laid-Open No. 8-190967.

Also, when for the latch members 30A, 30B and 60, a metal latch made of metal is used, at least daughter board coming-off preventing piece 47a, 65a of the latch members 30A, 30B and
10 60 may be coated with a resin member integral with or separate from the housing, and a square edge made of a resin member may be arranged so as to enter in the inner wall of the semicircular recess B1 formed on the daughter board B. Thereby, the holding pressure of the daughter board B due to the daughter
15 board coming-off preventing piece 47a, 65a can be increased as compared with the conventional case, and coming-off of the daughter board B in the horizontal direction can be effectively restrained.

As described above, according to the card edge connector
20 of claims 1 and 4 of the present invention, the daughter board coming-off preventing portion has the pointed edge portion for entering in the inner wall of the semicircular recess formed on the edge portion of the daughter board, and therefore, the holding pressure of the daughter board due to the daughter
25 board coming-off preventing portion of the latch member can be increased, and coming-off of the daughter board in the horizontal direction can be effectively restrained.

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Also, according to the card edge connector of claim 2 of the present invention, in the invention specified in claim 1, the latch member is a metal latch to be formed by stamping and forming a sheet metal, and the pointed edge portion is
5 a burr edge provided at the tip end of the latch member, to be formed when the sheet metal is stamped. Therefore, the entering-in pressure when the pointed edge portion enters in the inner wall of the semicircular recess is increased, and the holding pressure of the daughter board due to the daughter
10 board coming-off preventing piece of the latch member can be further increased.

Further, according to the card edge connector of claim 3 of the present invention, in the invention specified in claim 1 or 2, the pointed edge portion inclines along an up-and-down
15 direction perpendicular to the horizontal direction, and enters in the vicinity of the top end of the semicircular recess. Therefore, when a force is applied to the daughter board in the horizontal direction, the pointed edge portion comes into point-contact with the vicinity of the top end of the inner
20 wall of the semicircular recess to enter in so that the holding pressure of the daughter board due to the daughter board coming-off preventing piece of the latch member can be further increased, and coming-off of the daughter board in the horizontal direction can be effectively restrained.

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CLAIMS:

1. A card edge connector, comprising an insulated housing mounted onto a mother board and a latch member attached to said housing, for holding a daughter board, the latch member having a daughter board coming-off preventing portion for restraining said daughter board from coming off in a horizontal direction by said latch member engaging with an inner wall of a semicircular recess formed at an edge portion of said daughter board, wherein

said daughter board coming-off preventing portion has a pointed edge portion for entering in the inner wall of said semicircular recess;

wherein said pointed edge portion inclines along an up-and-down direction perpendicular to said horizontal direction, and enters in the vicinity of a top end of the inner wall of said semicircular recess.

2. The card edge connector according to claim 1, wherein said latch member is a metal latch to be formed by stamping and forming a sheet metal, and said pointed edge portion is a burr edge provided at a tip end of said latch member, to be formed when said sheet metal is stamped.

3. A card edge connector, comprising an insulated housing mounted onto a mother board and a latch member provided integrally with said housing, for holding a daughter board, the latch member having a daughter board coming-off preventing portion for restraining said daughter board from coming off in a horizontal direction by said latch member engaging with an

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inner wall of a semicircular recess formed at an edge portion of said daughter board, wherein

said daughter board coming-off preventing portion has a pointed edge portion for entering in the inner wall of said semicircular recess;

wherein said pointed edge portion inclines along an up-and-down direction perpendicular to said horizontal direction, and enters in the vicinity of a top end of the inner wall of said semicircular recess.

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ABSTRACT

CARD EDGE CONNECTOR

By increasing the holding pressure of the daughter board due to the latch member, there will be provided a card edge
5 connector capable of effectively restraining the daughter board from coming off in the horizontal direction.

The card edge connector 1 comprises an insulated housing
10 mounted onto the mother board A and a latch member 30A, 30B attached to the housing 10, for holding the daughter board
10 B. The latch member 30A, 30B has a daughter board coming-off preventing portion 47a for restraining the daughter board B from coming off in the horizontal direction (direction indicated by an arrow X) by engaging with the inner wall of the semicircular recess B1 formed at the edge portion of the
15 daughter board B. This daughter board coming-off preventing portion 47a has a pointed edge portion 47c for entering the inner wall of the semicircular recess B1.

Figure 4