CARD CONNECTOR

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a card connector, and particularly relates to a SIM (subscriber identity module) card connector.

2. Description of the Related Art

Mobile communication devices such as mobile phones and portable computers generally use a SIM (subscriber identity module or subscriber identification module) card to store network-specific information used to authenticate and identify subscribers on the network. Most important of the network-specific information are ICCID (integrated circuit card identifier), IMSI (international mobile subscriber identity), authentication key (Ki), local area identity (LAI), and operator-specific emergency number.

SIM cards are connected to mobile communication devices through SIM card connectors. FIG. 1 shows one type of conventional SIM card connector used in the industry. The SIM card connector 1, disclosed in U.S. Patent Publication No. 2010/0055985A1, includes an insulating housing 11, a terminal module 12 having a plurality of contacts 121, a metal shield 15, a switch element 13, and a card receiving mechanism 14. The metal shield 15 can be assembled on and partly cover the insulating housing 11. The metal shield 15 and the insulating housing 11 define a card receiving space. The card receiving mechanism 14 can carry a SIM card and is insertable into the card receiving space. The switch element 13 comprises a movable piece 131 and a stationary piece 132, wherein the stationary piece 132 contacts the movable piece 131 when the card receiving mechanism 14 is not inserted. The movable piece 131 has an arch portion, which protrudes into the card receiving space to contact an inserted card receiving mechanism 14. When a card receiving mechanism 14 is inserted, the movable piece 132 is pushed away from the stationary piece 131, triggering a card insertion

signal.

The SIM card connector 1 has a disadvantage. Because the movable piece 132 is moved by the card receiving mechanism 14, a card insertion signal is triggered even if no SIM card is placed in the card receiving mechanism 14, causing unnecessary read/write operations.

SUMMARY OF THE INVENTION

In view of the disadvantages of conventional connectors, a new card connector is proposed.

In one embodiment of the present invention, a card connector comprises a tray, a main body, a plurality of terminals, and a detective switch. The tray includes a side wall for defining a card-holding space and a breach region formed on the side wall. The main body includes a front opening for inserting the tray and a side portion defining a side of the front opening. The plurality of terminals are attached to the main body. The detective switch includes a spring member. The spring member is attached to the side portion of the main body and includes a press portion configured to extend into the card-holding space of the tray through the breach region of the tray when the tray is inserted in the main body. The breach region is configured to prevent interference between the press portion and the tray during the insertion of the tray.

In one embodiment of the present invention, a card connector comprises a tray, a main body, a plurality of terminals, and a detective switch. The tray includes a side wall for defining a card-holding space for receiving an electrical card and a breach region formed on the side wall. The main body includes a front opening for inserting the tray and a side portion defining a side of the front opening. The plurality of terminals are attached to the main body. The detective switch includes a spring member. The spring member is attached to the side portion of the main body and includes a press portion. The breach region is configured to prevent interference between the press portion and the tray during the insertion of

the tray. The breach region also reveals a corner portion of the electrical card to allow the corner portion of the electrical card to contact the press portion.

Other objects, advantages and novel features of the invention will become apparent from the following detailed description when read in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be described according to the appended drawings in which:

FIG. 1 shows a conventional SIM card connector;

FIG. 2 is a perspective view showing a card connector, an electrical card and a tray according to one embodiment of the present invention;

FIG. 3 is an exploded perspective view showing a card connector according to one embodiment of the present invention;

FIG. 4 is a perspective view showing the status of the levering member and the card ejecting mechanism of a card connector when no tray is inserted according to one embodiment of the present invention;

FIG. 5 is a top view of the embodiment of FIG. 4;

FIG. 6 is an exploded perspective view of the embodiment of FIG. 4 with the parts separated;

FIG. 7 is a perspective view showing a tray inserted into an electrical card connector according to one embodiment of the present invention;

FIG. 8 is a top view of the embodiment of FIG. 7;

FIG. 9 is a perspective view showing a card connector with an inserted tray according to one embodiment of the present invention;

FIG. 10 is a top view of the embodiment of FIG. 9;

FIG. 11 is a view showing a tray being ejected from a card connector by a rod member according to one embodiment of the present invention;

FIG. 12 is a top view of the embodiment of FIG. 11;

FIG. 13 is a perspective view showing a card connector and a tray carrying an electrical card according to one embodiment of the present invention; and

FIG. 14 shows an electrical card connector inserted with an empty tray according to one embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Hereinafter, embodiments of the present invention are described in detail with reference to the attached drawings.

FIG. 2 is a perspective view showing a card connector 3, an electrical card 4 and a tray 5 according to one embodiment of the present invention. FIG. 3 is an exploded perspective view showing a card connector 3 according to one embodiment of the present invention. Referring to FIGS. 2 and 3, the card connector 3 comprises a main body 32 having a front opening 36 and a side portion 330 defining a side of the front opening 36, a cover element 31 covering the main body 32, a plurality of terminals 33 attached to (for example, insert molded with) the main body 32, a detective switch 30 including a spring member 39 for detection of an inserted electrical card 4, and a tray 5 including a side wall 55 for defining a card-holding space 54 for receiving an electrical card 4 and a breach region 56 formed on the side wall 55 of the tray 5.

Referring to FIGS. 4 and 5, the spring member 39 of the detective switch 30 can be attached to the side portion 330, and can be elastically deflected toward or away from the receiving space 321 formed on the main body 32 for receiving an inserted tray 5. The spring member 39 includes a

press portion 392 configured to extend toward the receiving space 321 formed on the main body 32 and further into the card-holding space 54 of an inserted tray 5 through the breach region 56, such that the press portion 392 can engage the electrical card 4 received in the inserted tray 5. Further, the breach region 56 is additionally configured to prevent interference between the press portion 392 of spring member 39 and the tray 5 during the insertion of the tray 5.

Referring to FIG. 6, the spring member 39 may comprise a flexible arm portion 390, which can be in strip form. The press portion 392 connects to an edge of the flexible arm portion 390 and is bent toward the receiving space 321 formed on the main body 32. A contact member 40 can be provided in accordance with the spring member 39. The contact member 40 and the spring member 39 can cooperate for detection of the insertion of an electrical card 4.

Referring to FIGS. 4 to 6, the side portion 330 includes a slit 3301 formed on an upper surface of the side portion 330. The spring member 39 is inserted in a downward direction, and a portion of the flexible arm portion 390 is received in the slit 3301. The slit 3301 can include a tapered section 33011, which is configured to allow the flexible arm portion 390 to have sufficient space to elastically deflect.

Referring to FIG. 6, the spring member 39 may comprise a fixing portion 391 and a touching portion 393. The fixing portion 391 can be at an end of the spring member 39 and the touching portion 393 can be at another end of the spring member 39. The fixing portion is held by the slit 3301 so as to fasten the spring member 39. The bottom end 3911 of the fixing portion 391 can be soldered onto a printed circuit board for connecting a circuit of the printed circuit board. Another touching portion 393 is freely moved when the flexible arm portion 390 is deflected. In one embodiment, the press portion 392 is disposed close to the free touching portion 393.

The contact member 40 can be included in the detective switch 30.

The contact member 40 is disposed on the side portion 330, adjacent to the touching portion 393 of the flexible arm portion 390. The contact member 40 can have a soldering portion 401. In one embodiment, the contact member 40 can have a barb and be inserted into the main body 32 with the soldering portion 401 extending below the main body 32, as shown in FIG. 7, for being soldered onto a printed circuit board for connecting a circuit of the printed circuit board. The contact member 40 can be, in an alternative embodiment, insert-molded with the main body 32 with the soldering portion 401 extending below the main body 32, as shown in FIG. 7, for being soldered onto a printed circuit board for connecting a circuit of the printed circuit board. In the present embodiment, as shown in FIGS. 7 and 8, when the press portion 392 does not contact an electrical card 4, the touching portion 393 of the flexible arm portion 390 contacts the contact member 40.

In an alternative embodiment, the cover element 31 is made of electrically conductive material, can connect to a circuit of a printed circuit board, and has a contact member extending adjacent to the touching portion 393 of the flexible arm portion 390. When the press portion 392 does not contact an electrical card 4, the touching portion 393 of the flexible arm portion 390 contacts the contact member of the cover element 31.

Referring to FIGS. 11 to 14, the breach region 56 on the side wall 55 of the tray 5 corresponds to the press portion 392 of the spring member 39. The breach region 56 is configured such that the tray 5 will not interfere with the press portion 392 of the spring member 39 either during the insertion of an empty tray 5 or when the empty tray 5 is completely inserted. As such, no signal is generated if an empty tray 5 is inserted.

The press portion 392 of the spring member 39 can be pushed by an electrical card 4 received in an inserted tray 5. In the present embodiment, the breach region 56 is formed on a rear corner of the tray 5 to reveal a corresponding corner portion of the electrical card 4 as shown in FIG. 13. As shown in FIGS. 9 and 10, when a tray 5 carrying an electrical card 4 is

inserted, the corner portion of the electrical card 4 can contact the leading edge of the press portion 392, pushing the press portion 392 outward, deflecting the flexible arm portion 390, and moving the touching portion 393 away from the contact member 40. After the touching portion 393 completely disengages from the contact member 40, a card inserted signal is generated.

In one embodiment, the press portion 392 of the spring member 39 may include a cut corner facing the front opening 36 such that the press portion 392 can be properly pushed by the corner portion of the electrical card 4.

Referring back to FIGS. 3 to 6, the card connector 3 can further comprise a card locking element 34 including a locking portion 341 configured to be located in the receiving space 321 when the card locking element 34 is in a locking position, and also including a card ejecting mechanism 35 including an actuator 351 movable in a back and forth direction and a levering member 352 mounted adjacent to the rear of the receiving space 321. The card connector 3 can be mountable on a printed circuit board 6.

In one embodiment, the card locking element 34 is rigid, not elastic, so that an inserted tray 5 can be firmly held.

Referring to FIGS. 3 to 6, the levering member 352, pivoted on a pivot 322, comprises a first arm part 3521 and a second arm part 3522. The first arm part 3521 extends transversely at the rear of the main body 32 and includes a first end portion 35211 having a push tab 35212 that extends upward and can be swung into the receiving space 321 to eject an inserted tray 5. The second arm part 3522 can extend beside the receiving space 321, including a second end section 35221 having a tab portion 35222.

As shown in FIGS. 5, 6, 8 and 12, the main body 32 includes a recessed area 323 transversely extending along the main body 32. A bottom portion of the recessed area 323 extends under the receiving space 321. The bottom of the locking portion 341 is received in the recessed area 323. As such, the

movement of the locking portion 341 between a locking position as shown in FIG. 5 and an unlocking position as shown in FIG. 8 or FIG. 12 is confined by the recessed area 323. In another embodiment, the main body 32 does not have a recessed area 323 for receiving the bottom of the locking portion 341.

In particular, the locking portion 341 includes a front corner and a rear corner both formed on the peripheral surface of the locking portion 341. The front corner is a cut corner or a round corner so that when the tray 5 engages the front corner of the locking portion 341, the tray 5 can easily move along the front corner. The rear corner is a cut corner or a round corner so that when the tray 5 is moved outward, the tray 5 can easily move along the rear corner.

The card locking element 34 further comprises an operating portion 342 extending toward the second arm part 3522 and engaging with the second arm part 3522 for linked movement therewith. Specifically, the operating portion 342 includes a side 3421 opposite the receiving space 321, and the tab portion 35222 of the second arm part 3522 extends adjacent to the side 3421 of the operating portion 342 such that when the locking portion 341 is moved toward the unlocking position, the operating portion 342 can push the tab portion 35222 of the second arm part 3522 to rotate the levering member 352. In particular, the operating portion 342 has a rectangular cross section, and the tab portion 35222 of the second end section 35221 is bent downward to form an L shape such that the second end section 35221 extends around the outside upper corner of the operating portion 342.

In addition, a groove 3422 is formed on the bottom of the operating portion 342, and an elongated projection 327 is correspondingly formed on the main body 32, mated with the groove 3422 and extending along the recessed area 323. The elongated projection 327 passes through the groove 3422 when the card locking element 34 is assembled to the main body 32. The interaction between the groove 3422 and the elongated projection 327

can further constrain or guide the movement of the card locking element 34.

Furthermore, the card locking element 34 comprises a plate portion 344 movable within a space defined by a bottom surface of the main body 32 and the actuator 351. The plate portion 344 facilitates the proper movement of the card locking element 34.

Referring to FIGS. 6 to 10, the actuator 351 is movable between an outward position as shown in FIGS. 9 and 10 and an inward position as shown in FIGS. 7 and 8 along a direction parallel to the insertion direction of the tray 5. The actuator 351 can move the card locking element 34. The card locking element 34 comprises a first interacting portion 343, and the actuator 351 comprises a second interacting portion 3511. The first and second interacting portions 343 and 3551 are engaged for linked movement of the card locking element 34 and the actuator 351, allowing the movement of the card locking element 34 between the locking position and the unlocking position simultaneous with the movement of the actuator 351 between the outward position and the inward position. The interaction of the first and second interacting portions 343 and 3551 can cause the card locking element 34 and the actuator 351 to move in different directions, for example, two perpendicular directions.

As shown in FIG. 6, in one embodiment, the first interacting portion 343 of the card locking element 34 comprises a pin, and the second interacting portion 3511 of the actuator 351 comprises a slot inclined at an angle, such as 45 degrees, relative to the moving direction of the actuator 351. The slot has two elongated slot edges. When the actuator 351 is moved, one elongated slot edge contacts the pin, pushing the pin to move along the same elongated slot edge so as to move the card locking element 34. Alternatively, when the pin is moved, the pin pushes another elongated slot edge, moving along the same elongated slot edge so as to move the actuator 351. In one embodiment, the pin can have an elliptic cross section.

The actuator 351 can have a plate-like shape, confined in a concave

space 325, and moving over a platform 324. The actuator 351 can further have a bent end 3512 restrained in a recessed area 326 included in the main body 32 and disposed adjacent to the front of the main body 32 such that the movement of the actuator 351 can be restricted.

Referring to FIGS. 6 to 10, the card connector 3 further comprises an elastic member 37. The elastic member 37 provides an elastic force counteracting a force moving the actuator 351 inward, and moves the actuator 351 outward when the force is removed. In one embodiment, the elastic member 37 comprises a spring.

In particular, a channel 328 is formed on the platform 324, communicating with the recessed area 326. A supporting member 38 is provided at the end of the channel 328 for engaging with an end of the elastic member 37. The supporting member 38 can have a pin configured to protrude into the elastic member 37. Another end of the elastic member 37 engages the bent end 3512 of the actuator 351.

FIGS. 7 to 10 are used herein to demonstrate the operation of the card locking element 34 and the card ejecting mechanism 35 during the insertion of a tray 5 carrying an electrical card 4. The operation is similar when a single, different size of an electrical card is inserted. As shown in FIGS. 7 and 8, after the inserting tray 5 contacts the locking portion 341 of the card locking element 34, the locking portion 341 is pushed and the card locking element 34 is moved away from the receiving space 321 until the tip of the locking portion 341 is against the right edge of the tray 5. During the movement of the card locking element 34, the first interacting portion 343 of the card locking element 34, which is a pin in the present embodiment, pushes one elongated slot edge, close to the levering member 352, of the second interacting portion 3511, a slot in the present embodiment, and moves along the same slot edge such that the actuator 351 is moved inward and the elastic member 37 is compressed.

Referring to FIGS. 9 and 10, when the rear edge of the tray 5 is close to

the rear of the main body 32, the rear edge touches the first arm part 3521 of the levering member 352 and rotates the levering member 352 until the tray 5 is completely inserted. At some moment during the insertion process, the notch 52 of the tray 5 encounters the locking portion 341 of the locking element 34. The locking element 34 is moved toward the notch 52 due to the elastic force produced by the compressed elastic member 37. Without the counterforce from the right edge of the tray 5 to the locking element 34, the elastic force produced by the compressed elastic member 37 moves the actuator 351, and the elongated slot edge close to the levering member 352 of the second interacting portion 3511 pushes the first interacting portion 343 of the card locking element 34, applying a force, a portion of which moves the locking element 34 toward the receiving space 321 until the locking portion 341 of the locking element 34 enters the notch 52. Because the locking portion 341 of the locking element 34 moves into and away from the receiving space 321 linearly, the notch 52 and the locking portion 341 can be fitted closely to each other so that the tray 5 can be securely held after it is inserted.

Referring to FIGS. 9, 11 and 12, the main body 32 has an opening 329 formed on a front side wall of the main body 32 to expose the bent end 3512 of the actuator 351. The tray 5 has a bar member 53 defining a side of the receiving space 321. A hole 51 is formed on the bar member 53, corresponding to the opening 329 of the main body 32. To eject the tray 5, a rod member 41 is inserted into the opening 329 and the hole 51, and pushes the actuator 351. The actuator 351 is moved inward, compressing the elastic member 37. Simultaneously, the elongated slot edge of the second interacting portion 3511 of the actuator 351 pushes the first interacting portion 343 of the card locking element 34 and moves the card locking element 34 away from the receiving space 321; meanwhile, the operating portion 342 of the card locking element 34 pushes the tab portion 35222 of the levering member 352, rotating the levering member 352. The push tab 35212 of the first arm part 3521 of the rotating levering member 352 pushes the rear edge of the tray 5 outward. As the locking portion 341

of the card locking element 34 disengages from the notch 52 of the tray 5, the tray 5 is moved outward until the first interacting portion 343 is moved to the end of the second interacting portion 3511, close to an external side wall of the main body 32.

Although the card locking element 34 and the card ejecting mechanism 35 are applied, in the above embodiments, in a card connector 3 receiving a tray, the same card locking element 34 and card ejecting mechanism 35 can also be employed in a card connector directly receiving a card according to another embodiment of the present invention.

An embodied card connector comprises a main body and a detective switch including a spring member for detection of an inserted electrical card, and can receive a tray including a side wall for defining a card-holding space. The spring member includes a press portion, and a breach is formed on the side wall of the tray. The press portion is formed to protrude toward a receiving space of the main body for receiving a tray, and can further protrude into the card-holding space of an inserted tray. The breach region is configured to avoid interference between the spring member and the tray during the insertion of the tray. Moreover, the breach region can reveal a corner portion of the electrical card. The corner portion of the electrical card can contact and push the press portion, deflecting the spring member, activating a card inserted signal.

The above-described embodiments of the present invention are intended to be illustrative only. Numerous alternative embodiments may be devised by persons skilled in the art without departing from the scope of the following claims.

What is claimed is:

1. A card connector, comprising:

a tray including a side wall for defining a card-holding space and a breach region formed on the side wall;

a main body having a front opening for inserting the tray and a side portion defining a side of the front opening;

a plurality of terminals attached to the main body; and

a detective switch including a spring member that is attached to the side portion of the main body and the spring member includes a press portion configured to extend into the card-holding space of the tray through the breach region of the tray when the tray is inserted in the main body, wherein the breach region is configured to avoid the interference between the press portion and the tray during the insertion of the tray.

2. The card connector of Claim 1, wherein the spring member comprises a flexible arm portion and the main body comprises a receiving space for receiving the tray, wherein the press portion connects to an edge of the flexible arm portion and is bent toward the receiving space.

3. The card connector of Claim 2, further comprising a contact member corresponding to the spring member, wherein the contact member and the spring member cooperate for detection of the insertion of an electrical card.

4. The card connector of Claim 3, wherein the spring member comprises a fixing portion attached to the side portion and a touching portion contactable with the contact member, wherein the press portion is adjacent to the touching portion.

5. The card connector of Claim 4, further comprising a cover element having a contact member extending adjacent to the touching portion, wherein the touching portion contacts the contact member when the

tray that is inserted carries no electrical card.

6. The card connector of Claim 4, wherein the detective switch further comprises a contact member having a soldering portion solderable to a printed circuit board, disposed adjacent to the touching portion, wherein the touching portion contacts the contact member when the tray that is inserted carries no electrical card.

7. The card connector of Claim 5 or 6, wherein the side portion includes a slit for receiving a portion of the flexible arm portion.

8. The card connector of Claim 7, wherein the slit includes a tapered section configured to allow the flexible arm portion to deflect.

9. The card connector of Claim 5 or 6, further comprising:

a card locking element including a locking portion configured to be in the notch when the card locking element is in a locking position, an operating portion, and a first interacting portion; and

a card ejecting mechanism comprising:

an actuator movable between an outward position and an inward position, having a second interacting portion configured to engage with the first interacting portion for linked movement of the card locking element and the actuator; and

a levering member pivoted adjacent to the rear of the receiving space, including a first arm part and a second arm part, the second arm part having a second end section extending adjacent to the operating portion of the card locking element, the first arm part having a first end portion that can be swung into the receiving space when the second end section is pushed by the operating portion of the card locking element;

wherein the first and second interacting portions allow the linear movement of the card locking element between the locking position and an

unlocking position simultaneous with the movement of the actuator between the outward position and the inward position.

10. The card connector of Claim 9, further comprising an elastic member providing an elastic force counteracting a force moving the actuator inward, and moving the actuator outward when the inward force is removed.

11. The card connector of Claim 10, wherein the card locking element and the actuator respectively move in two perpendicular directions.

12. The card connector of Claim 11, wherein the card locking element is rigid.

13. The card connector of Claim 12, wherein the second interacting portion comprises a slot inclined at an angle of 45 degrees relative to the moving direction of the actuator, and the first interacting portion comprises a pin movable in the slot.

14. The card connector of Claim 13, wherein the card locking element further comprises a plate portion movable within a space defined by a bottom surface of the main body and the actuator.

15. The card connector of Claim 14, wherein the operating portion of the card locking element comprises a groove and the main body comprises a projection passing through the groove.

16. The card connector of Claim 15, wherein the main body comprises a concave space, wherein the actuator moves in the concave space.

17. The card connector of Claim 16, wherein the main body comprises a channel formed in the concave space, and the elastic member is in the channel.

18. The card connector of Claim 17, wherein the operating portion of the card locking element includes a side opposite the receiving space, and the second end section of the levering member includes a tab portion disposed adjacent to the side.

19. The card connector of Claim 18, wherein the main body includes a recessed area, and the actuator includes a bent end restrictedly moved in the recessed area.

20. The card connector of Claim 19, wherein the main body includes an opening formed on a front side wall of the main body to expose the bent end of the actuator, and the tray includes a bar member and a hole formed on the bar member, corresponding to the opening, wherein the actuator is moved inward by pushing the bent end of the actuator through the opening and the hole.

21. A card connector, comprising:

a tray including a side wall for defining a card-holding space for receiving an electrical card and a breach region formed on the side wall;

a main body having a front opening for inserting the tray and a side portion defining a side of the front opening;

a plurality of terminals attached to the main body; and

a detective switch including a spring member that is attached to the side portion of the main body and the spring member includes a press portion, wherein the breach region is configured to prevent interference between the press portion and the tray during the insertion of the tray and reveals a corner portion of the electrical card to allow the corner portion of the electrical card to contact the press portion.

22. The card connector of Claim 21, wherein the spring member comprises a flexible arm portion and the main body comprises a receiving space for receiving the tray, wherein the press portion connects to an edge

of the flexible arm portion and is bent toward the receiving space.

23. The card connector of Claim 22, further comprising a contact member corresponding to the spring member, wherein the contact member and the spring member cooperate for detection of the insertion of the electrical card.

24. The card connector of Claim 23, wherein the spring member comprises a fixing portion attached to the side portion and a touching portion contactable with the contact member, wherein the press portion is adjacent to the touching portion.

25. The card connector of Claim 24, further comprising a cover element having a contact member extending adjacent to the touching portion, wherein the touching portion contacts the contact member when a tray carrying no electrical card is inserted.

26. The card connector of Claim 24, wherein the detective switch further comprises a contact member having a soldering portion solderable to a printed circuit board, disposed adjacent to the touching portion, wherein the touching portion contacts the contact member when a tray carrying no electrical card is inserted.

27. The card connector of Claim 25 or 26, wherein the side portion includes a slit for receiving a portion of the flexible arm portion.

28. The card connector of Claim 27, wherein the slit includes a tapered section configured to allow the flexible arm portion to deflect.

29. The card connector of Claim 25 or 26, further comprising:

a card locking element including a locking portion configured to be in the notch when the card locking element is in a locking position, an operating portion, and a first interacting portion; and

a card ejecting mechanism comprising:

an actuator movable between an outward position and an inward position, having a second interacting portion configured to engage with the first interacting portion for linked movement of the card locking element and the actuator; and

a levering member pivoted adjacent to the rear of the receiving space, including a first arm part and a second arm part, the second arm part having a second end section extending adjacent to the operating portion of the card locking element, the first arm part having a first end portion that can be swung into the receiving space when the second end section is pushed by the operating portion of the card locking element;

wherein the first and second interacting portions allow the linear movement of the card locking element between the locking position and an unlocking position simultaneous with the movement of the actuator between the outward position and the inward position.

30. The card connector of Claim 29, further comprising an elastic member providing an elastic force counteracting a force moving the actuator inward, and moving the actuator outward when the inward force is removed.

31. The card connector of Claim 30, wherein the card locking element and the actuator respectively move in two perpendicular directions.

32. The card connector of Claim 31, wherein the card locking element is rigid.

33. The card connector of Claim 32, wherein the second interacting portion comprises a slot inclined at an angle of 45 degrees relative to the moving direction of the actuator, and the first interacting portion comprises a pin movable in the slot.

34. The card connector of Claim 33, wherein the card locking element further comprises a plate portion movable within a space defined by a bottom surface of the main body and the actuator.

35. The card connector of Claim 34, wherein the operating portion of the card locking element comprises a groove and the main body comprises a projection passing through the groove.

36. The card connector of Claim 35, wherein the main body comprises a concave space, wherein the actuator moves in the concave space.

37. The card connector of Claim 36, wherein the main body comprises a channel formed in the concave space, and the elastic member is in the channel.

38. The card connector of Claim 37, wherein the operating portion of the card locking element includes a side opposite the receiving space, and the second end section of the levering member includes a tab portion disposed adjacent to the side.

39. The card connector of Claim 38, wherein the main body includes a recessed area, and the actuator includes a bent end restrictedly moved in the recessed area.

40. The card connector of Claim 39, wherein the main body includes an opening formed on a front side wall of the main body to expose the bent end of the actuator, and the tray includes a bar member and a hole formed on the bar member, corresponding to the opening, wherein the actuator is moved inward by pushing the bent end of the actuator through the opening and the hole.