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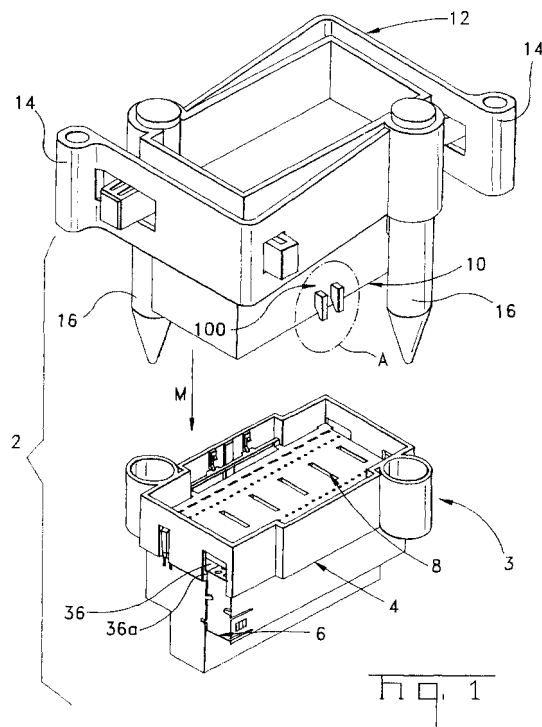
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### (54) Electrical connector having contact protection

(57) Mechanisms for protecting contacts of an electrical connector having electrical connector for mating with a complementary connector, where the connector incorporates: a travelling plate oriented to correspond with the face, the travelling plate including a plurality of openings positioned to correspond to the contacting portion of the contacts, the travelling plate being movable from a first position remote from the face to a second

position that is closer to the face such that the contacting portions would be exposed; or, a mounting frame having an internal frame for incorporating the electrical connector to the mounting frame with a first link and a second link where each link has an elastic beam with a first end for attachment to the substrate and a second end connected to the internal frame and a torsion limiting mechanism acting between the internal frame and the links to maintain stability.



EP 1 137 110 A2

## Description

**[0001]** The present invention relates to electrical connectors and in particular those electrical connectors having features to prevent damage to the contacts therein.

**[0002]** Connectors typically have pin or tab contacts, where due to the miniaturisation and high density required, the pins or tabs are susceptible to damage as a result of foreign objects entering the cavity of the connector housing or mismatching with a complementary connector. It has been well known to incorporate a travelling plate into these connectors to protect the contacts and provide guidance and stability. These covers may typically be displaced by whatever element comes in contact with them.

**[0003]** An example of such a cover is shown in U.S. 4,593,960 where a spring loaded cover is disposed about the end of a connector to protect the contacts therein and limit access to them. A disadvantage of a connector cover of this type is that the springs bias against the cover during the entire mounting process. The mating forces required for joining the complementary connectors not only include those associated with mating the contacts therein and any seal members that might be present but also those required for overcoming the opposing resistance provided by the springs. It would be desirable to provide a travelling cover such as incorporated herein that does not add to the required mating force of the connector. Additionally, while the connector illustrated here does provide the safety feature of preventing an inadvertent displacement of the cover, it would be desirable to have the safety feature actuated during mating.

**[0004]** Another example of a connector of this type is illustrated in JP 5-234641. In one embodiment illustrated, the travelling plate includes a pair of latches that engage in recesses of the mating connector such that the travelling plate is coupled thereto during mating and demating, thereby enabling the plate to be actuated by the mating connector. While this provides some improvements over that presented in the above-mentioned patent, the latches extend out of the connector housing and there is no indication that the plate is not to be displaced without insertion of the mating connector.

**[0005]** Therefore, it would be desirable to provide an electrical connector of the type incorporating a travelling plate to protect the contacts therein where during mating a spring bias upon the plate does not have to be overcome but where the travelling plate is returned to its protective position upon demating and the travelling plate is prevented from moving out of the protective position until mated with a complementary connector. Additionally, as connector assemblies are becoming more and more complicated with various connection components being incorporated into a single housing it is increasingly likely that a complete connector will actually incorporate a number of submodules each containing various con-

tacts. It would be desirable to have an electrical connector of the type mentioned above that would incorporate reliable protection to assure that the various modules are fully inserted before the travelling plate is allowed to be displaced, thereby protecting the contacts of the module from being damaged as a result of openings in the plate not corresponding to the contacts and a stubbing occurring.

**[0006]** Therefore, it is an object of the present invention to provide an electrical connector having a travelling plate that assures the contact modules are fully inserted before the plate is released and allowed to travel towards the contacts.

**[0007]** The afore-going objects are accomplished by providing a connector housing having a face transverse to the mating direction, the connector housing constructed to relieve a plurality of contacts therein with a contacting portion extending beyond the face along the mating direction, and a travelling plate oriented to correspond with the face, the travelling plate including a plurality of openings positioned to correspond to the contacting portion of the contacts, the travelling plate being movable from a first position remote from the face to a second position that is closer to the face such that the contacting portions would be exposed; the connector characterized in that; a module housing is provided for carrying at least some of the contacts, and the housing includes a module receiving passageway for receiving the module housing therein and a blocking element operatively associated with the passageway and extending therefrom to prevent movement of the travelling plate towards the second position unless the module is fully inserted.

**[0008]** An advantage of such a connector is that a locking element can be incorporated into the housing that establishes a contact loading position for the travelling plate that is spaced from the face a sufficient distance such that the module may be located into the connector housing without interference of the plate.

**[0009]** The further objects that are set out above may be accomplished by providing a connector housing having a face transverse to the mating direction, the connector housing constructed to receive a plurality of contacts therein with a contacting portion extending beyond the face along the mating direction; and a travelling plate oriented to correspond to the face, the travelling plate including a plurality of openings positioned to correspond to the contacting portions, the travelling plate being movable between a first position remote from the face and a second position that is closer to the face in response to the mating and demating with the complementary connector where the in the first position, the contact portions would be substantially located between the plate and the face and in the second position the contact portion would be significantly exposed beyond the plate for engaging a complementary connector, the electrical characterized in that the connector housing is adapted to prevent movement of the plate away from

the face beyond the first position in response to demating the complementary connector and towards the face without mating the complementary connector to release the plate from the housing during mating and withdraw the plate during de-mating.

**[0010]** It is an advantage that the plate can be constructed with a spring beam latch that co-operates with the main stopped on the housing to prevent insertion without deflecting the spring beam latch and where the resilience of the spring beam latch causes the plate to be coupled to the mating connector such that the plate travels with the connector and where the spring beam latch interferes with a withdrawal stop to prevent the plate from being removed from the connector during demating.

**[0011]** Furthermore, there are various situations when it is necessary to mate complementary electrical connectors where mating feedback related to alignment is difficult to obtain. This can also lead to damage to the electrical contacts within the connector housing. Examples of this are in some automated assembly applications or in situations where the connector is on the back end of a structure being plugged-in to a larger structure. The latter being known as drawer connectors.

**[0012]** One example of the automated assembly applications is found in the automotive industry where it is now becoming common place to create numerous sub-assemblies and during the assembly of the automobile, install the subassemblies using robotic techniques. In such a case, one of the mating connectors would be rigidly attached to say a bulkhead and the other mating connector would be mounted to float within the sub-assembly such that a certain degree of positional tolerances provided. This positional tolerance will accommodate either the tolerance in assembling the subassembly, the tolerance in the location of the mating connector upon the bulkhead or the tolerance in the actual positioning of the subassembly relative the rest of the automobile. One particular example is the creation of a dashboard subassembly where all the of the electronic devices incorporated into the dashboard need to be connected with their respective systems in the automobile. In this case, one of the connectors will be mounted to the bulkhead or firewall of the automobile while the other connector would be fixed to the dashboard module. It is not unusual that the tolerances relating to the positioning of these connectors could result in a deviation of plus or minus 5 mm. Therefore, in order to facilitate the robotic assembly techniques necessary to manufacture today's automobile, the electrical interconnection systems must accommodate this positional uncertainty.

**[0013]** An example of an electrical connection system of this type is set forth in US 5,263,871 where a connector having a generally rectangular shape is supported on the four sides thereof by four separate spring members. In one example, spring fingers are used and in the other example individual springs captured within a channel provide for some float of the connector housing.

While systems such as this address some of the problems referenced above, they are not altogether successful in meeting the needs of the industry.

**[0014]** One of the areas that is especially critical is the reduction of a sliding interface between several parts. Such a sliding interface presents the risk of the locking between the parts and thereby defeating the float necessary to assemble the mating components or to make such assembly more difficult. Another problem with such an interface is that such a configuration can result in audible noise as a result of the small movements between the parts at the interface.

**[0015]** The foregoing is accomplished by providing a mounting frame fixable to a substrate for supporting an electrical connector in a floatable manner relative the substrate where the mounting frame includes an internal frame for incorporating the electrical connector to the mounting frame, a first link and a second link where each link has an elastic beam with a first end for attachment to the substrate and a second link connected to the internal frame and a torsion limiting mechanism acting between the internal frame and the links to maintain stability.

**[0016]** It is an advantage of the mounting frame that the links may be L-shaped and external of the internal frame such that they can be molded as one piece therewith such that a preload can be incorporated thereby stabilizing the internal frame in a neutral position.

**[0017]** It is yet another advantage that the displacement is mainly realized by deformation and not sliding between separate parts.

**[0018]** It is still yet another advantage that the mounting frame allows two substantial translations and one small torsional movement.

**[0019]** It is still yet another advantage that the displacement is fully effectuated by the frame such that no other component is necessary which could lead to quality deficiencies.

**[0020]** With reference now to the attached drawings, an exemplary embodiment of the present inventions will be described with reference to the figures wherein;

Figure 1 is a perspective view of an electrical connector assembly according to the present invention;

Figure 2 is a perspective view of a housing of the connector assembly of Figure 1;

Figure 3 is a detailed view taken from Figure 2;

Figure 4 is a perspective view of a travelling plate incorporated into the connector assembly of Figure 1 in a natural state;

Figure 5 is a perspective view of the travelling plate of figure 4 showing the resilient latches in a deflected condition;

Figure 6 is a perspective view of the connector housing of Figure 2 showing the travelling plate in a contact loading position and a contact module being inserted therein;

Figure 7 is a sectional view taken of Figure 6;

Figure 8 is a detailed view of Figure 7;

Figure 9 is a sectional view corresponding to Figure 7 wherein the module is fully inserted;

Figure 10 is a detailed view of Figure 9;

Figure 11 is a perspective view corresponding to Figure 6 with the travelling plate in a first operational position;

Figure 12 is a sectional view of Figure 11;

Figure 13 is a detailed view of Figure 12;

Figure 14 is a detailed view of Figure 1;

Figure 15 is a partial sectional view showing the connector assembly of Figure 1 being initially mated;

Figure 16 is a view corresponding to Figure 15 with the connectors being further mated;

Figure 17 is a detailed view corresponding to Figure 16 with the connectors being further mated;

Figure 18 is a detailed view corresponding to Figure 17 with the connectors being still further mated; and

Figure 19 is a detailed view corresponding to Figure 18 with the connectors being still further mated.

Figure 20 is a perspective view of a pair of mating connectors incorporating a mounting frame according to the present invention;

Figure 21 is a perspective view of the mounting frame of Figure 20 fixed to a substrate;

Figure 22 is a top view of the mounting frame of Figure 20 shown in an as-molded condition;

Figure 23 is a compilation of 9 views of the mounting frame of Figure 20 showing the neutral position at the center thereof and the relative deflective positions thereabout.

**[0021]** With reference first to Figure 1, an electrical connector assembly according to the present invention is shown generally at 2. This connector assembly 2 in-

cludes an electrical connector 3 having a housing 4 wherein a contact module 6 is disposed and a travelling plate 8 for protecting contacts 9 (Figure 7). A complementary connector is shown at 16. Within the complementary connector would be contacts that are complementary to the contact 9 referenced above. Additionally, the complementary connector 10 is shown incorporated into a floating frame 12 that would be anchored at two points 14 to provide translational float to the connector 10 as mating occurs. Guide pin 16 co-operate with the electrical connector 4 to align the connectors 3, 10.

**[0022]** With reference now to Figure 2, the connector housing 4 will be described in greater detail. The connector housing 4 includes a pair of module receiving cavities 18 for receiving modules 20 that carry contacts 9 as best seen in Figures 6 and 7. The module receiving passageway 18 including guiding elements 22 that co-operate with complementary guiding features 24 on the module 20 a latching member 26 is also disposed along the module receiving passageway 18 in order to maintain the module in a fully inserted position by cooperating with a latching tab 28 upon the module. The housing 4 also includes a shroud 30 for receiving the complementary connector 10 within a receiving region 32 that is defined by the shroud. At the base of the receiving region 32 a face 36 having contact passageways therein is disposed. In this embodiment, a portion 36a of the face 36 is included on the contact module 20, as seen in Figure 7. Additionally, a contact portion 38 of the contacts 9 extends outward beyond the face 36a.

**[0023]** The shroud 30 is defined by a continuous wall 40 having a blocking element 42 disposed therein that will be described in greater detail below. Disposed along an interior surface 44 of the shroud 30, are a pair of retention arms 46 and a main stop 48. Although not shown in this view, these elements would be reproduced along the inner wall 44 opposite to where they are shown in Figure 2.

**[0024]** With reference now to Figure 3, the retention latches 46 and the main stop 48 will be described in greater detail. The retention latches 46 each include a preload stop 50 and a withdrawal stop 52. The stops, 50, 52 co-operate with the travelling plate 8 to prevent the travelling plate 8 from separating from the connector housing 4 and hence are facing the face 36. The main stop 48 includes a shoulder 54 that faces away from the face 36 and is constructed to prevent the travelling plate 8 from being displaced towards the face 36. The retention latches 46 and the main stop 48 being constructed to captivate the retention plate 8 therebetween in the manner to be described below.

**[0025]** With reference now to Figures 4 and 5, the travelling plate will be described in detail. The travelling plate 8 includes a plurality of openings 56a, 56b, 56c that will correspond with the contact portions 38 of the contacts 9 within the connector housing 4. These openings 56a, b, c are disposed within a plate-like member 58 having guiding surfaces 60 about the perimeter thereof that

fit within shroud 30 and travel along for co-operating with the inner surface 44 of the wall 40 that defines the complementary connector receiving region 32. Additionally, the travelling plate 8 includes a pair of oppositely disposed resilient latch member 62. The resilient latch members 62 are made up of a beam 64 that is separated from the plate along a length thereof and supported at the ends by pylons 66. As best seen in Figure 5, a force F exerted upon the beam 64 results in deflection thereof. Each beam 64 carries a pair of latches 68 having an upper stop surface 70 and a lower camming surface 72. The stop 68 being positioned to correspond to the retention arms 46 of the housing 4. Additionally, the beam 64 includes a central latch 74 having a camming surface 76 and a blocking surface 78. The function of the beams 62 will be described in greater detail below.

**[0026]** With reference now to Figures 6,7 and 8, the electrical connector 4 is shown with the plate 8 set in a contact loading position where the module 20 may be inserted into the module receiving passageway 18. During assembly of the connector 4, the plate 8 will be inserted into the connector receiving region 32. The preload position is established when the beam 64 is disposed below the upper latches 50 of latch arms 46 such that the upper latches sit above the retention surfaces 70, thereby preventing the plate 8 from being withdrawn from the cavity 32.

**[0027]** With reference now to Figure 7, the contact module 20 with a plurality of contacts 9 therein having contact portions 38 extending from a portion of the face 36a is being inserted into the module receiving cavity 18 of the housing 4. Ultimately, the module 20 will be fully inserted, one an end wall 76 thereof abuts a locating surface 78 in the connector housing 4 with the travelling plate 8 inserted into the cavity 32 and prior to full insertion of the contact modules 20, blocking elements 80 act to prevent the plate from being displaced toward the face 36a such that the module 20 with the contacts 9 therein maybe inserted into the passageway 18 without interference between the plate 8 and the contact portion 38 of the contacts 9.

**[0028]** With reference now to Figure 8, the blocking element 42 will be described in greater detail. The blocking element 42 includes a resilient arm 80 having a blocking head 82 at an extreme end thereof which has a support surface 84 thereupon for interacting with the travelling plate 8 to prevent the travelling plate 8 from approaching the face 36. The arm 80 further includes a camming lug 86 having a camming surface 88 thereupon that extends into the module receiving passageway 18 beyond the positioning surface 78. With reference once again to Figure 6, the arm 80 is defined by a U-shaped cutout 90 such that the arm 80 is formed as a cantilever beam. Returning to Figure 7, it can be seen that as the module 20 is inserted into the terminal module receiving passageway 18, the end surface 76 of the module 20 will come into contact with the camming surface 88 prior to reaching the position defining surface

78, thereby deflecting the arm 80.

**[0029]** The foregoing being best seen in Figures 9 and 10. The Figure 9, the contact module 20 is shown in its fully inserted position with the plate 8 still located in the contact loading position. With reference to Figure 10, a detailed view of Figure 9 is shown illustrating the interaction between the module 20 and the blocking member 42. As can be seen, the end surface 76 of the module 20 abuts the lug 86 of the arm 80, thereby deflecting the arm 80. As a result of the arm 80 being deflected, the lug 82 and the associated blocking surface 84 are moved out from under the plate 8.

**[0030]** As a result of deflecting the locking member 84 out from beneath the plate 8, the plate 8 can be moved into a first operational position as shown in Figure 11. In this position, as a result of a force F' being exerted upon the plate along the mating direction, the resilient beam 64 is deflected and passed over the lower latches 52 and resiled back towards its natural position such that the stop surface 78 of the middle latch 74 rests upon main stop 50. As the spring beam latch 64 is now captive between the lower latches 50 and the main stop 54, the plate is prevented from being displaced closer to the face 36 or removed from the cavity 32.

**[0031]** As shown in Figures 12 and 13, in this first operational position of Figure 11, the travelling plate 8 has been moved closer to the face 36 such that the contacting portions 38 of the contacts 9 are received within their respective holes 56b of the travelling plate 8. Additionally, as can be seen the blocking member 42 remains deflected out of the way as a result of the insertion of the contact module 20. In this position, the contacts 9 are protected from damage from any extraneous insertion of an object into the receiving cavity 32 and the connector 3 has been assembled into a state shown in Figure 1 where it is to be mated with the complementary connector 10 by insertion along a mating direction M.

**[0032]** In this condition, the plate 8 is robustly held in position between the second latches 50 and the main stop 54. In order for the connector 3 to be functional, it is necessary during mating that the plate 8 travel toward face 36 such that the contact portion 38 of the contacts 9 are exposed to mating contacts within the mating connector 10. In order to accomplish this, the mating connector 10 is provided with a catch and biasing member 100.

**[0033]** With reference now to Figure 14, the catch and biasing member 100 will be described in greater detail. The catch and biasing member 100 includes two biasing members 102 spaced apart from one another. The biasing members 102 are fingers 104 attached to the connector 10. The biasing members 102 include camming surfaces 106 that are angled such that a receiving space 108 is defined thereunder. Located between the two biasing members 106 is a catch 110 that has a camming surface 112. The biasing member and catch 100 co-operate with the resilient latch 64 to release the travelling plate 8 from the first operational position during mating

such that it may be displaced closer to the face 36 and expose the contacting portions 38 of the contacts 9.

**[0034]** With reference now to Figures 15-19, the release of the resilient beam and its retention with mating connector 10 will be described in greater detail. With reference first to Figure 15, the travelling plate 8 is shown in the first operational position with the resilient beam 64 sitting upon the main stop 52 and below the lower latch 50. The mating connector 10 is travelling along the mating direction M as can be seen, the biasing member 102 will co-operate with surface 74 of the resilient beam 64 during mating.

**[0035]** With reference now to Figure 16, the mating connector 10 has been inserted such that the biasing member 102 is in contact with surface 74 of the resilient beam 64.

**[0036]** With reference now to Figure 17, the mating connector 10 is being further inserted along the mating direction M as a result of co-operation between the camming surface 106 and the angled surface 74, a resultant force F in the direction of that shown in Figure 5 also is produced that acts to deflect the beam 64 such that the beam begins to move off of the main stop 52. Further insertion of the mating connector 10 in the mating direction M results in the beam being still further deflected in coming into contact with the angled surface 112 of the catch 110. At this point the beam 64 has been captivated in region 108 and its resilience acting between the camming surfaces 106 and 112 act to retain the beam and hence the travelling plate with the mating connector 10 so that as the mating connector is further inserted, as shown in Figure 19, the plate 8 will travel with the mating connector.

**[0037]** On withdrawal of the mating connector 10 from the electrical connector 3, even with the resilient beam 64 being deflected, outer stop 68 and the abutting surfaces 70 thereof will come into contact with the lower latches 52 of latch arms 46. Upon this abutting contact further withdrawal of the complementary connector 10 will free the resilient arm 46 from the biasing member 100 such that the resilient latch arm 64 resiles back into its natural position above the main stop 50 and in a position ready for another cycle of mating.

**[0038]** With reference first to Figure 20, an electrical assembly incorporating the present invention is shown generally at 200. A connector assembly 200 includes a pin connector housing 204, a receptacle connector 206 and a mounting frame 208. The particulars of the receptacle housing 206 and the pin housing 204 are of only minor importance to the present invention. The pin housing 204 would be securely mounted to a bulkhead or other component. The pin housing 204 further includes a pair of mating silos 210 that are disposed about a shroud 212 wherein the receptacle connector 206 would be received. The mating silos 210 are ring-shaped and hollow in the center. These mating silos 210 are constructed to receive guide pins 214 that, in this embodiment, are incorporated into the connector frame

208. It is important to note that the mating silos 210 and the guide pins 214 could be reversed. The function of the mating silos 210 and the guide pins 214 is to establish alignment of the receptacle connector 206 relative the pin connector 204 and thereby initiate the float enabled by the mounting frame 208.

**[0039]** With reference to the mounting frame 208, the mounting frame is made up of an internal frame 216 and a first link 218 and a second link 220. The internal frame 216 in this embodiment is generally rectangular to correspond to the rectangular shape of the receptacle connector 216 mounted thereto. It would also be possible to create square, circular, or other configurations for the internal frame 216. The receptacle connector 206 may be integrally molded as part of the internal frame 216 or fitted thereto in any number of ways such as snap latches or ultrasonic welding, or epoxy bonding.

**[0040]** With reference now to Figure 21, the frame 208 will be described in greater detail. In this figure, the frame 208 is mounted to a substrate 222 above an opening 224. While the present invention is especially advantageous to such an application where the receptacle connector 206 would extend through the opening 224, such a configuration is not necessary to utilize the present invention. As stated above, the internal frame 216 is generally rectangular in shape. It consists of four side walls 26, 28, 30, 32. These side walls are interconnected. Incorporated into two of the side walls 26, 30 are receptacle sections 234 that are configured either to receive guide pins 214 or to hold and position the guide pins 214 as shown in Figure 20. The internal frame 216 will retain its basic shape and the walls thereof do not need any special elastic properties.

**[0041]** The first link 218 and the second link 220 each have elastic beams 236, 238 which have respectively first ends 240, 242 and second ends 244, 246. The first ends 240, 242 include a hole 248, 250 therethrough wherein a screw 252 is inserted to fix the mounting frame 208 to the substrate 222.

**[0042]** Advantageously, the elastic beams 236, 238 are formed in an L-shape. This results in the respective first ends 240, 242 being located across the inner frame 216 from their respective second ends 244, 246. Additionally, in the present embodiment, respective first ends 240, 242 of the first link 218 and the second link 220 are also disposed diagonally across the internal frame 216. In this situation, the L-shape of the link 218, 220 is especially advantageous however, the links 218, 220 could take on other shapes especially depending upon the configuration of the inner frame 216.

**[0043]** In addition, while it is apparent that the inner frame 216 would be able to float within the links 218, 220, it is also desired to prevent torsional distortion of the mounting frame 208. Excessive torsional distortion of the mounting frame 208 is prevented by a torsion limiting mechanism which, in this embodiment, comprises a plurality of posts 254, 256, 258, 260 that are incorporated into the inner frame 216 and extend through re-

spective windows 262, 264, 266 (the fourth window not being shown). The windows 262, 264, 266 are sized such that the posts may be displaced therein in a mount necessary to allow for the desired translational float of the inner housing 16 relative the substrate 22. Additionally, in order to prevent excessive torsional deformation, the height of the windows relative the size of the posts is selected so that limited displacement is allowed. In order to provide a certain amount of torsional accommodation, flexible ribs 268 are incorporated onto the posts.

[0044] With reference now to Figure 22, the mounting frame is shown in the form that it would be molded. This configuration allows for the mold to be simply constructed and further enables a preload to be incorporated into the mounting frame 208 when it is attached to a substrate 222 with the posts 254, 256, 258, 260 extending through their respective windows as shown in Figure 21.

[0045] With reference now to Figure 23, multiple views are shown depicting the mounting frame in the neutral position as set out in the center view. Disposed about the center view are numerous other views illustrating an extreme translation of the inner frame 216 which corresponds to the receptacle connector 6 in whichever direction the view is relative the center view. As the guide pins 214 are received within respective guiding silos 210 of the pin connector 204 which is fixed to a bulkhead, the cooperation to the guide pins 214 will cause the inner frame 216 which is incorporating the electrical connector 206 to be displaced relative the substrate 222 through the elasticity of the respective beams 236, 238 of links 218, 220.

## Claims

1. An electrical connector for mating with a complementary connector in a mating direction, the electrical connector comprising:

a connector housing having a face transverse to the mating direction, the connector housing constructed to receive a plurality of contacts therein with a contacting portion extending beyond the face along the mating direction, and

a travelling plate oriented to correspond with the face, the travelling plate including a plurality of openings positioned to correspond to the contacting portion of the contacts, the travelling plate being movable from a first position remote from the face to a second position that is closer to the face such that the contacting portions would be exposed; the connector **characterized in that**;

a module housing is provided for carrying at least some of the contacts, and

the housing includes a module receiving passageway for receiving the module housing therein and a blocking element operatively associated with the passageway and extending therefrom to prevent movement of the travelling plate towards the second position unless the module is fully inserted.

2. The electrical connector of claim 1, wherein the blocking element established a contact loading position spaced from the face beyond an end of the contact portion when loaded into the connector.
3. An electrical connector for mating with a complementary connector in a mating direction, the electrical connector comprising:

a connector housing having a face transverse to the mating direction, the connector housing constructed to receive a plurality of contacts therein with a contacting portion extending beyond the face along the mating direction; and

a travelling plate oriented to correspond to the face, the travelling plate including a plurality of openings positioned to correspond to the contacting portions, the travelling plate being movable between a first position remote from the face and a second position that is closer to the face in response to the mating and demating with the complementary connector where the in the first position, the contact portions would be substantially located between the plate and the face and in the second position the contact portion would be significantly exposed beyond the plate for engaging a complementary connector, the electrical **characterized in that**:

the connector housing is adapted to prevent movement of the plate away from the face beyond the first position in response to demating the complementary connector and towards the face without mating the complementary connector to release the plate from the housing during mating and withdraw the plate during demating.

4. The electrical connector of claim 5 wherein the plate includes a spring beam latch and the housing includes a main stop facing away from the face and a withdrawal stop facing the face the spring beam latch being deflectable off the main stop in response to mating and then engaging the mating connector to travel therewith as a result of the resilience thereof and catching upon the withdrawal stop during demating to disengage the plate from the mating connector.
5. A mounting frame fixable to a substrate for support

for supporting an electrical connector in a floatable manner relative the substrate, the mounting frame comprising:

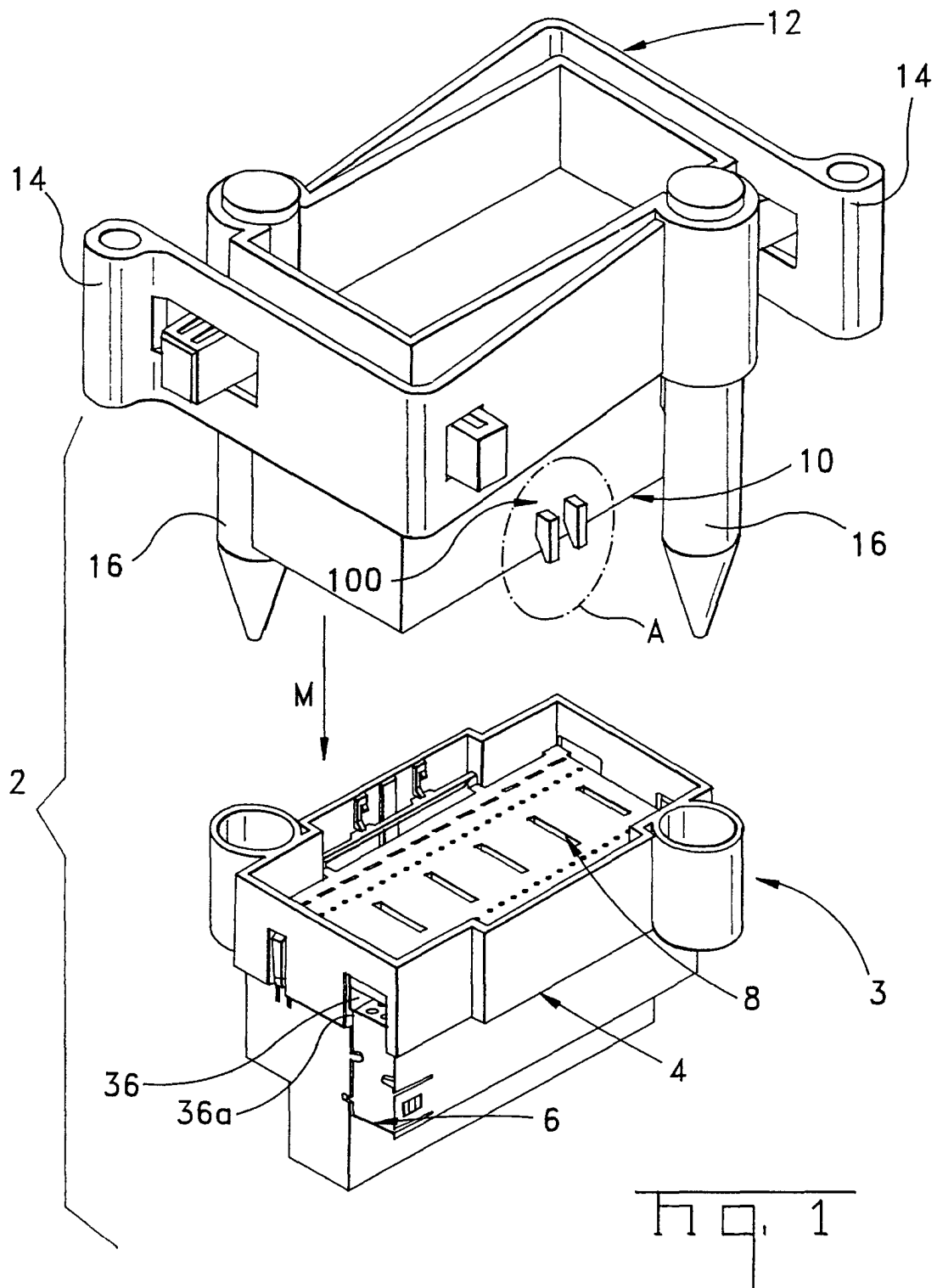
an internal frame for incorporating the electrical connector to the mounting frame; 5  
 a first link and a second link where each link has an elastic beam with a first end for attachment to the substrate and a second end connected to the internal frame; and 10  
 a torsion limiting mechanism acting between the internal frame and the links to maintain stability.

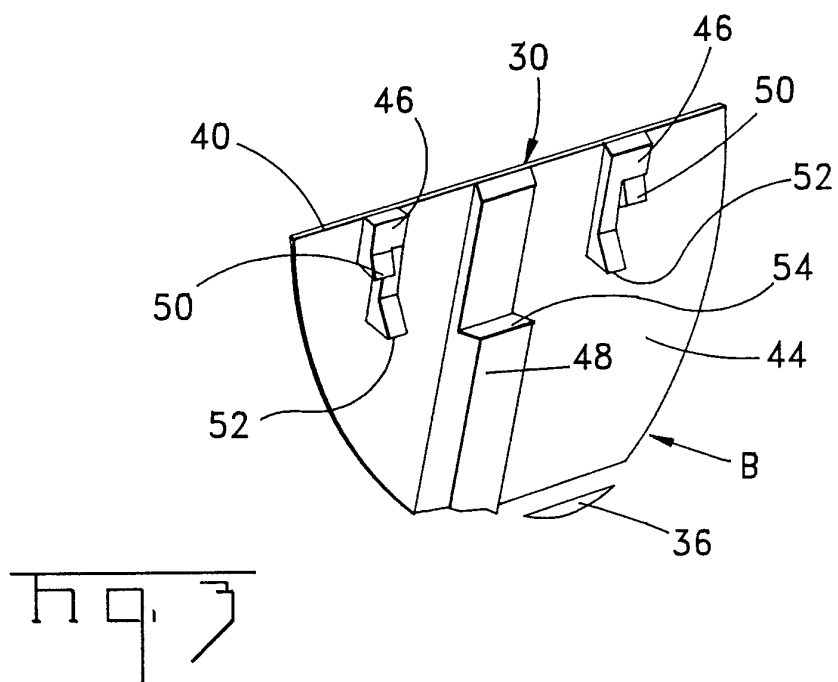
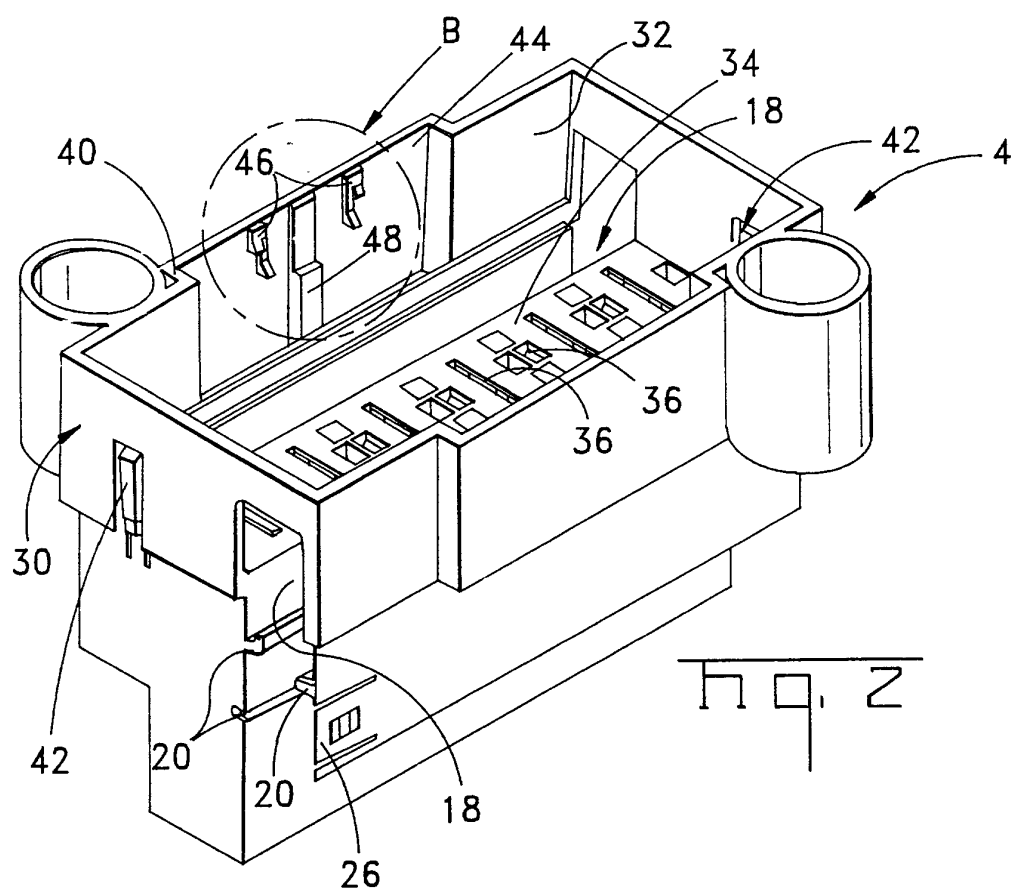
6. The mounting frame of claim 5 wherein each link is formed so that respective first ends and second ends are positioned across the internal frame from one another. 15
7. The mounting frame of claim 5, wherein the torsion limiting mechanism comprises posts fixed to the internal frame that extend through corresponding windows in the elastic beams. 20
8. The mounting frames of claim 7, wherein the links are disposed outside the internal frame and the torsion limiting mechanism includes two posts for each link extending outward from the internal frame and in different directions and being relieved in corresponding windows formed on the links. 25 30
9. The mounting frame of claim 8, wherein the mounting frame is molded as one piece with the links being formed such that when the first ends are attached to the substrate and a preload exists in the links to bias the internal frame towards the neutral position. 35
10. The mounting frame of claim 7, wherein the posts include flexible ribs therealong to stabilize the posts within the windows while allowing some limited torsion. 40

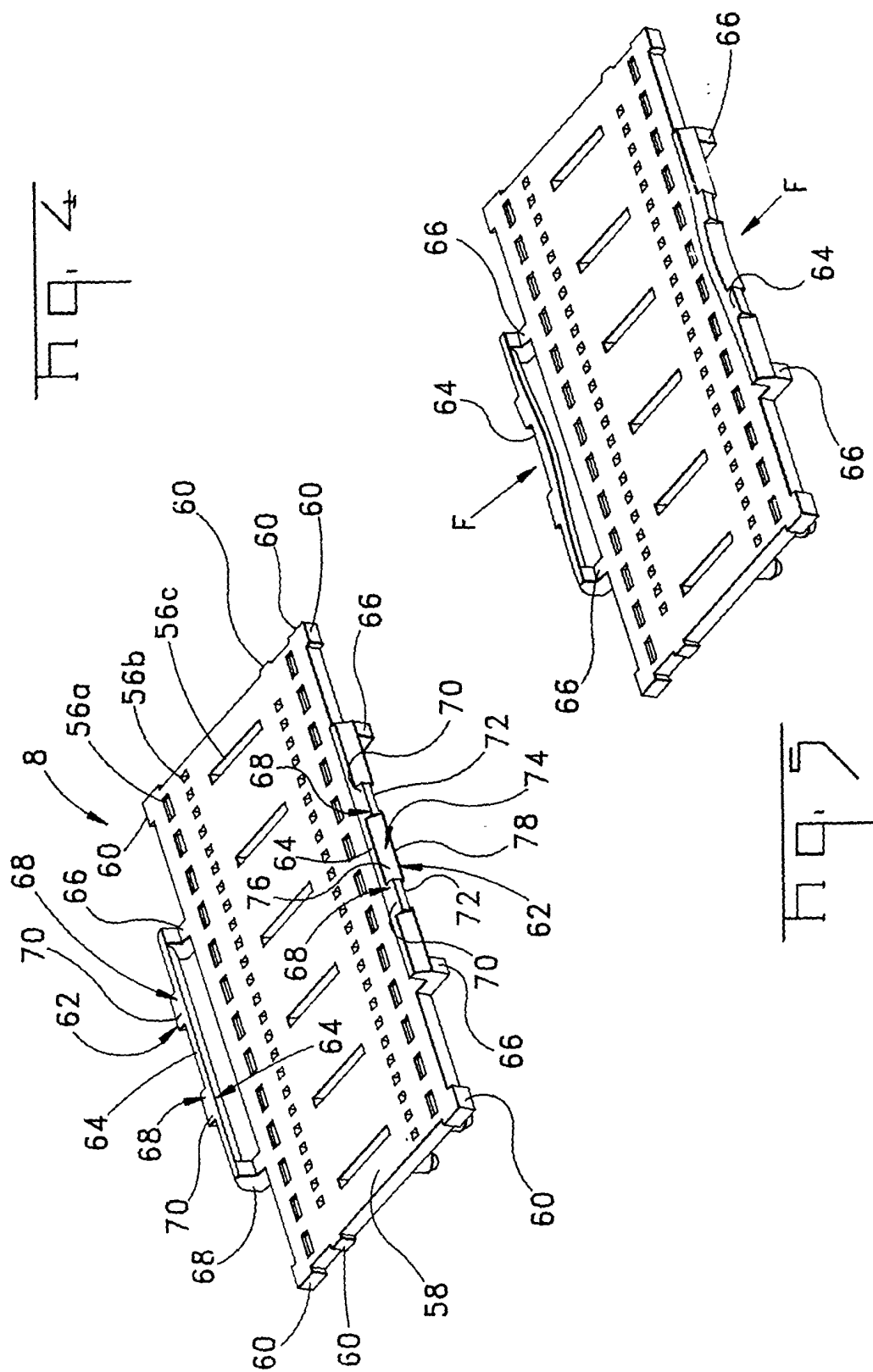
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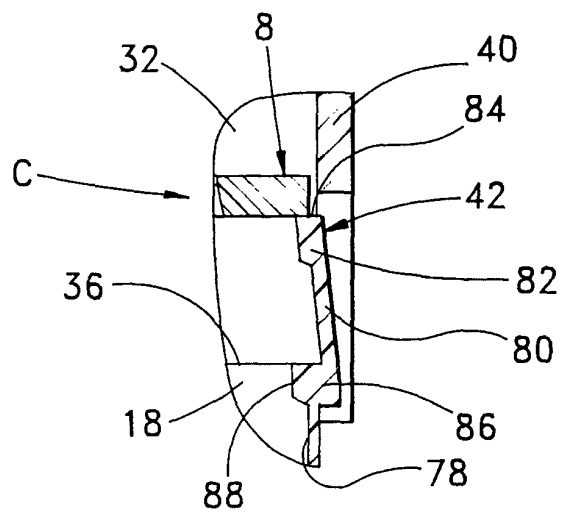
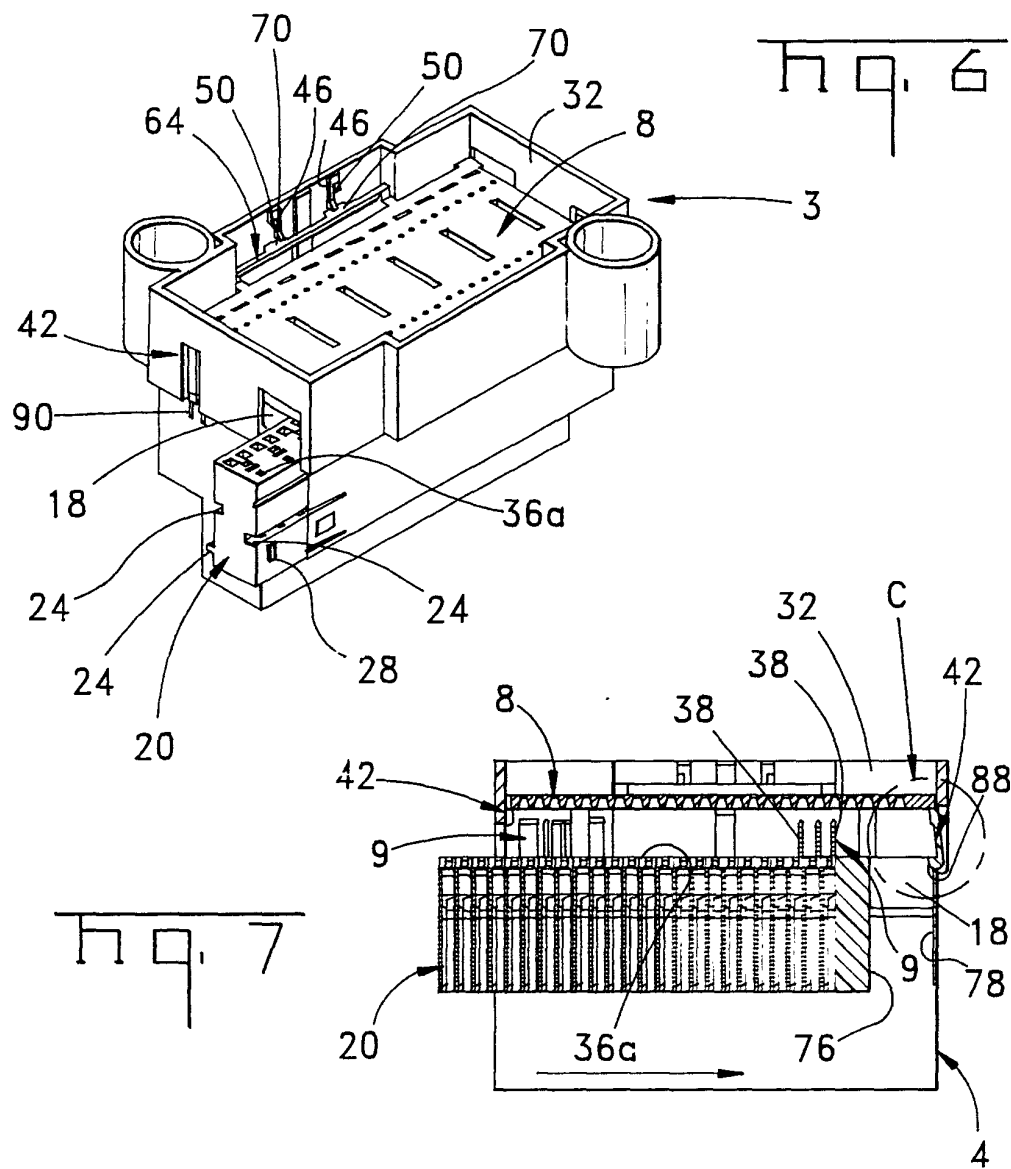
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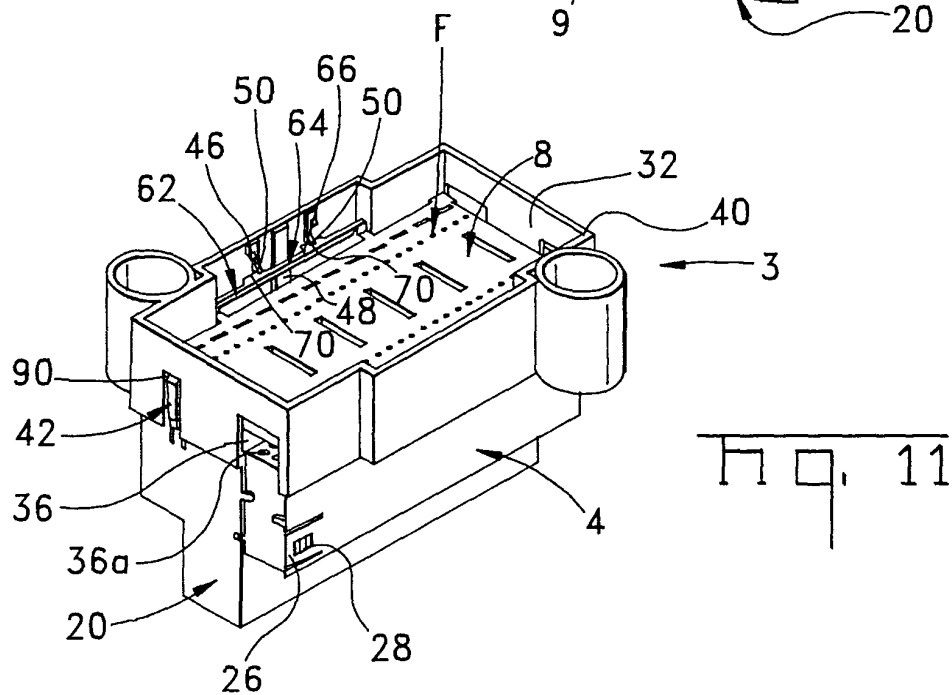
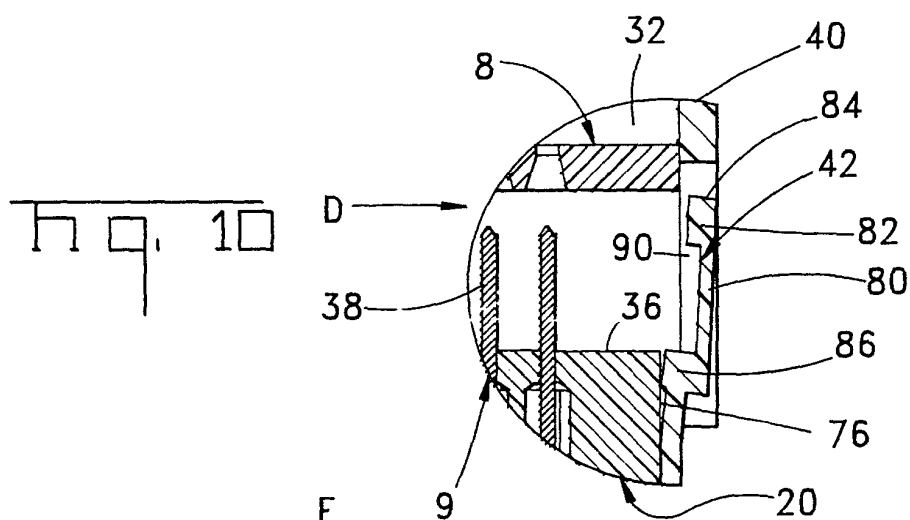
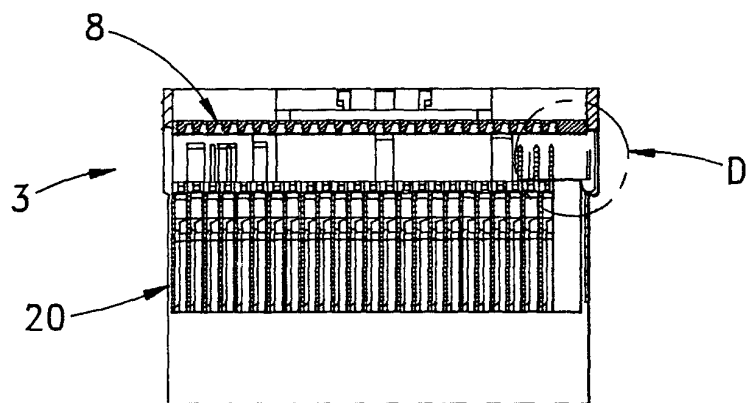
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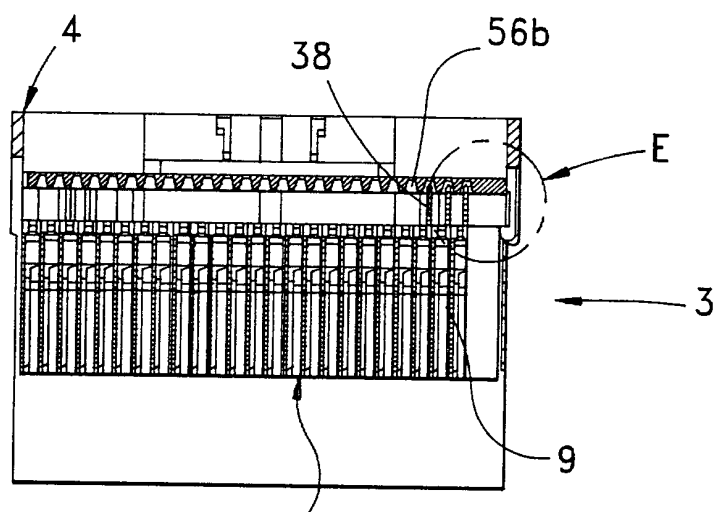




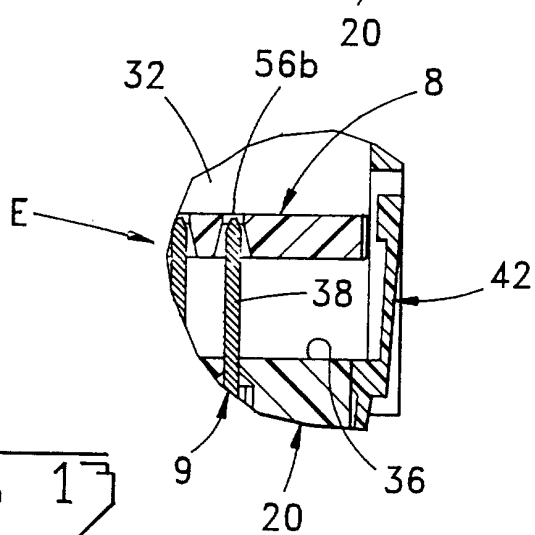




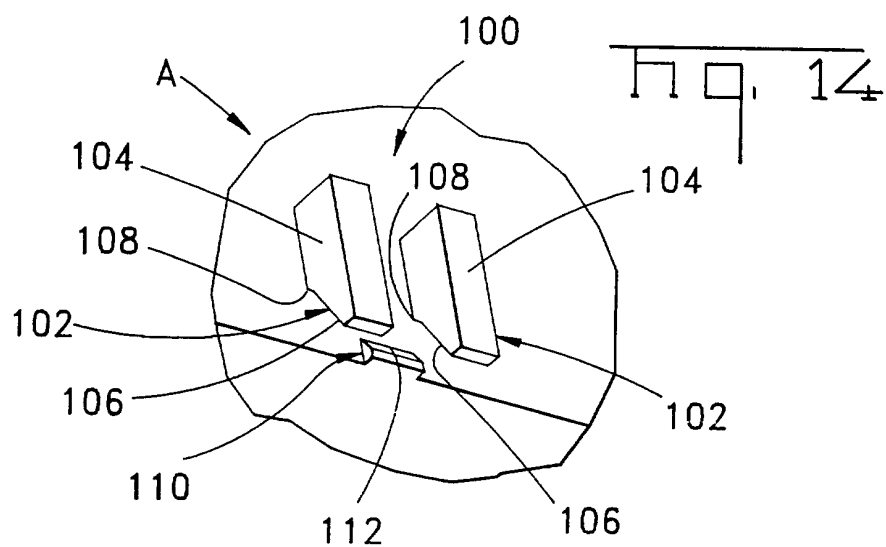




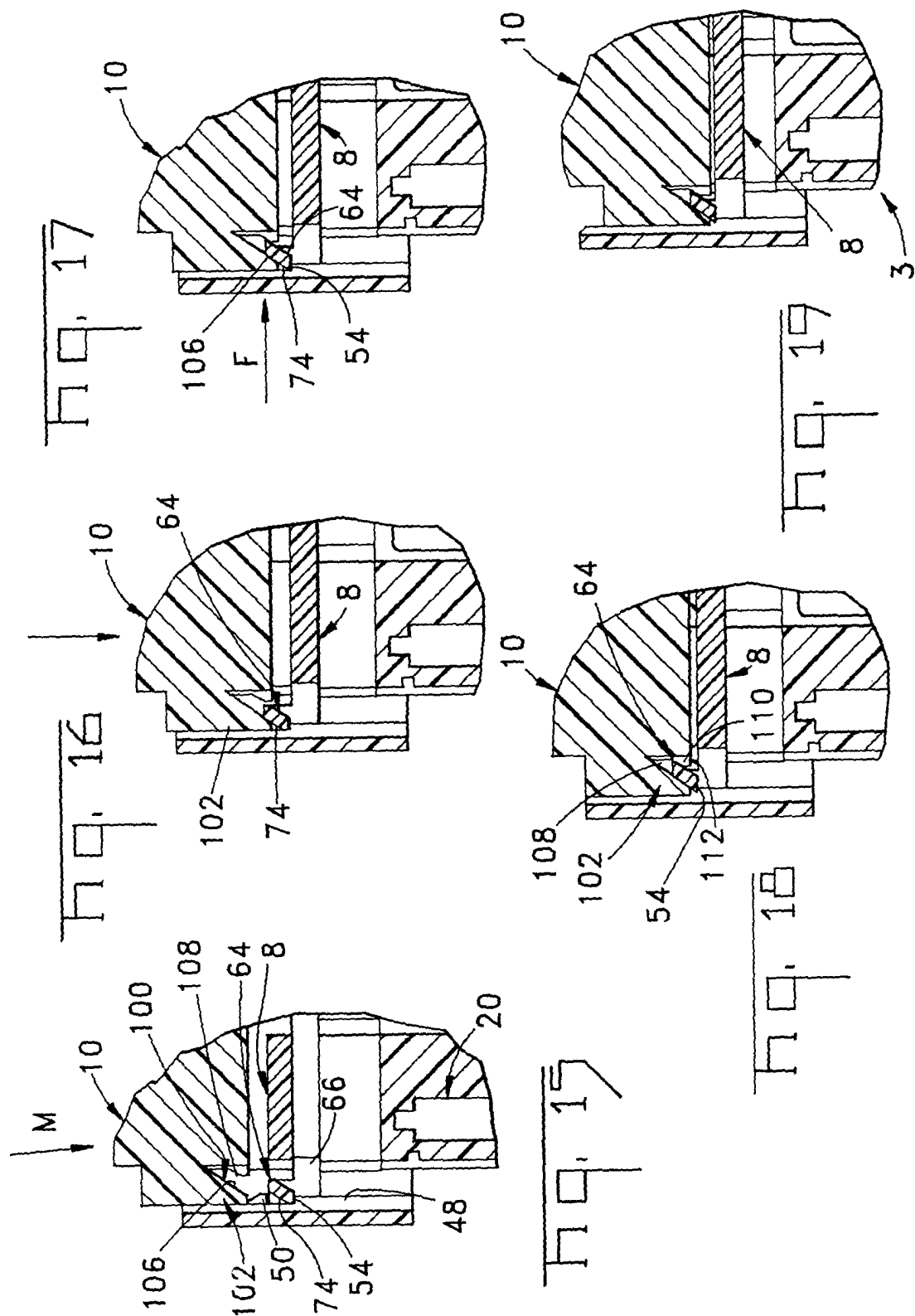
Hq. 12

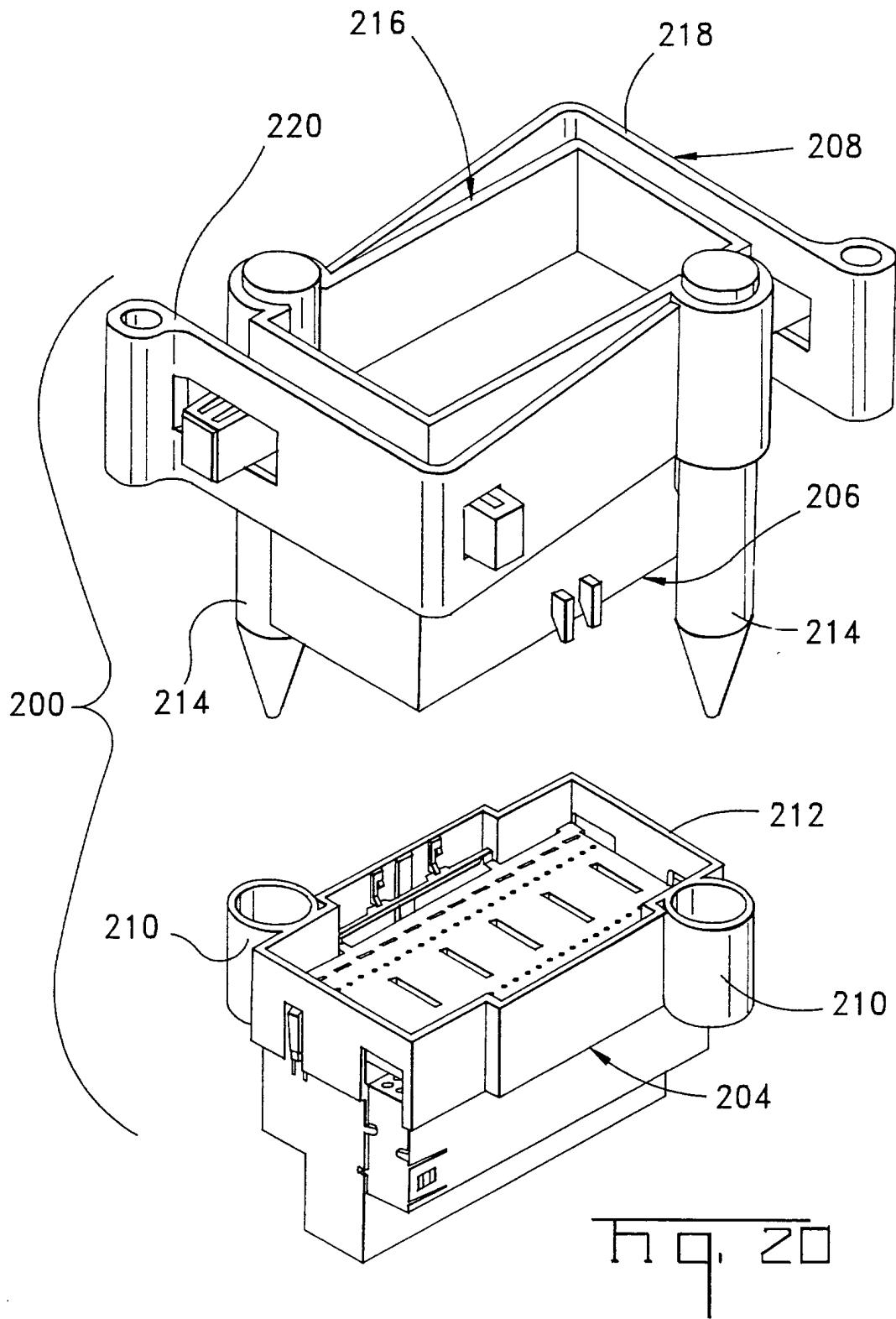


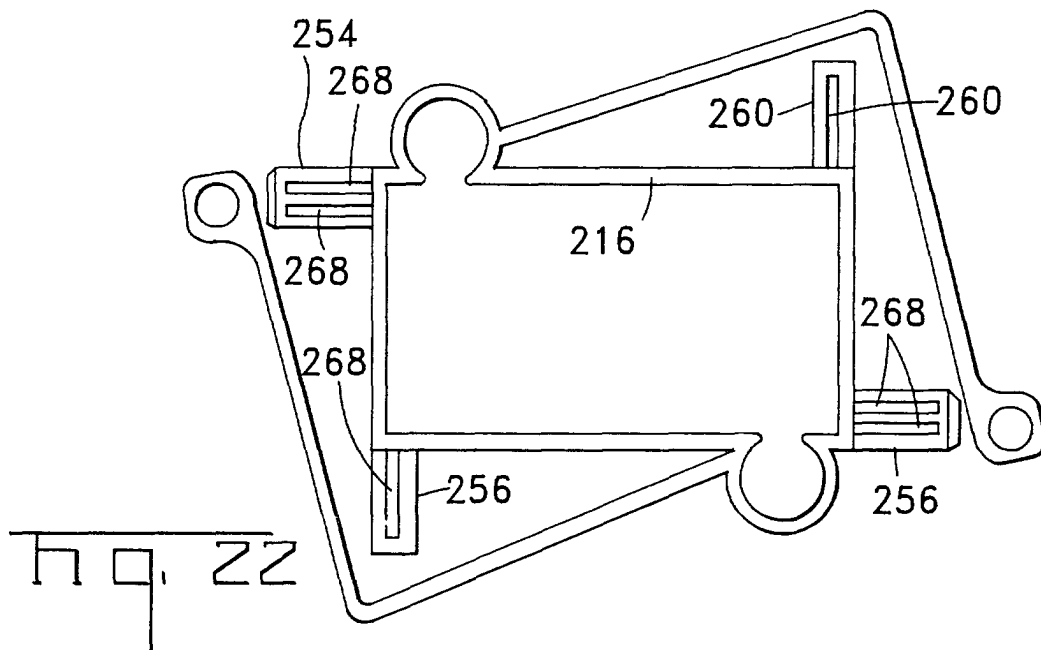
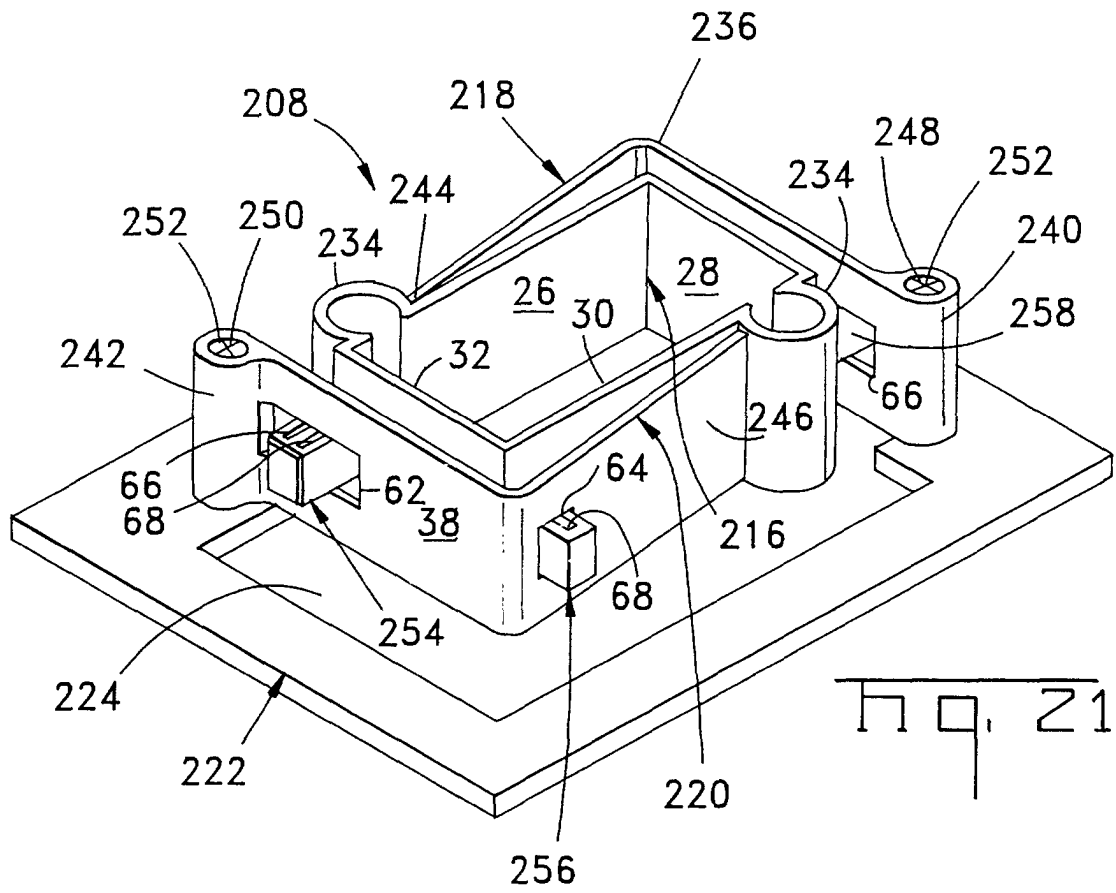
Hq. 13



Hq. 14







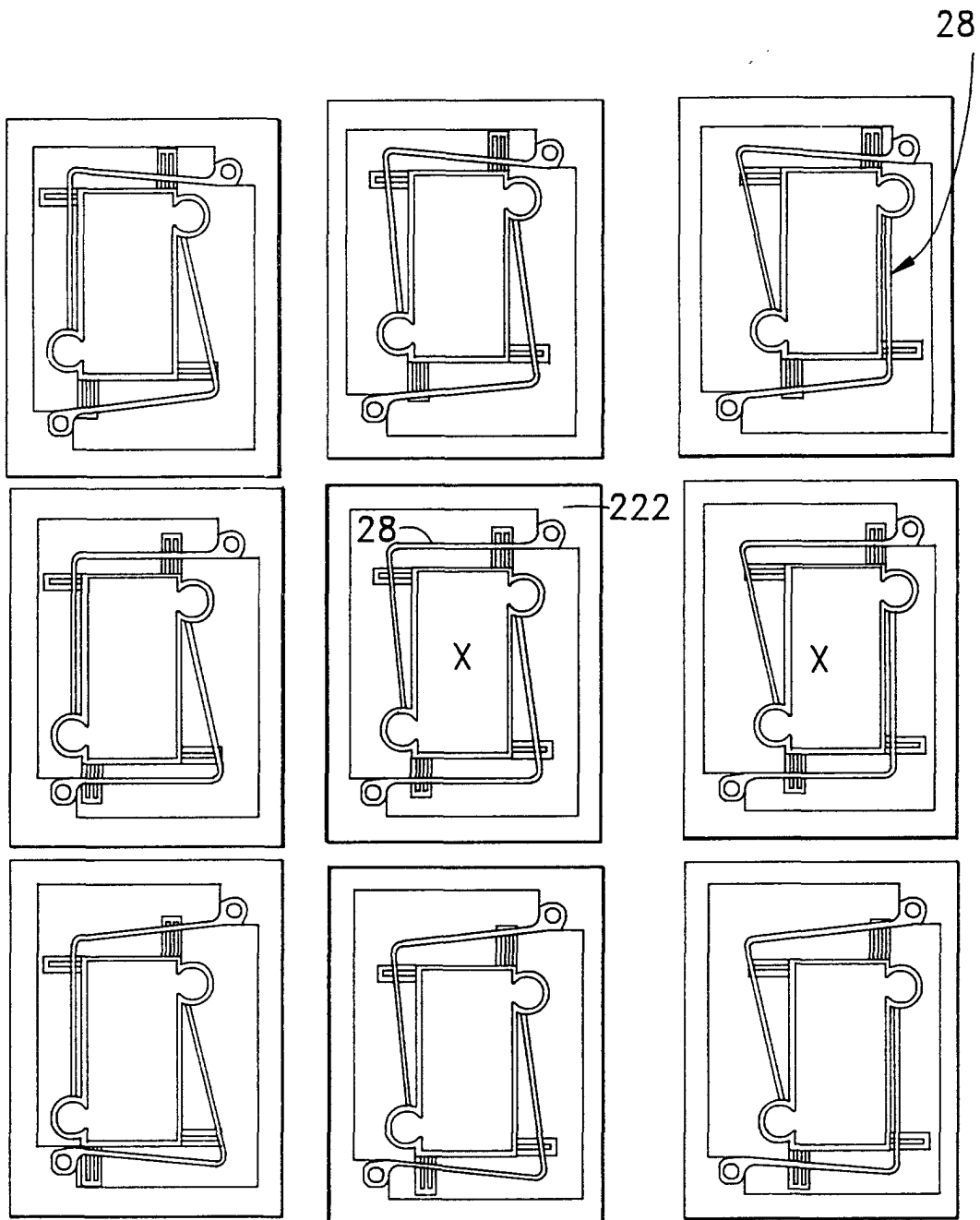


Fig. 23