(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 293 314 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
09.03.2011 Bulletin 2011/10

(51) Int Cl.:
H01H 71/02 *(2006.01)*

(21) Application number: **10354044.9**

(22) Date of filing: **07.09.2010**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO SE SI SK SM TR
Designated Extension States:
BA ME RS

(30) Priority: **08.09.2009 SG 200905967**

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(54) **Mounting device**

(57) The present invention is directed to a device (100) and a method for removably coupling a sub-system (120) to a system (135). An exemplary system of the present invention comprises a base bracket (212) for housing the system and sub-system, said base bracket includes at least 2 resilient handles (215,218), each handle includes an elongated bar (240). A channel and a ledge are formed along each top and bottom lateral extensions of said sub-system (120), wherein the handles are exerted inward relative to the sub-system (120) to dispose the elongated bar (240) of each handle (215,218) within the channel for engaging the sub-system (120) to the system in a clamping engagement.

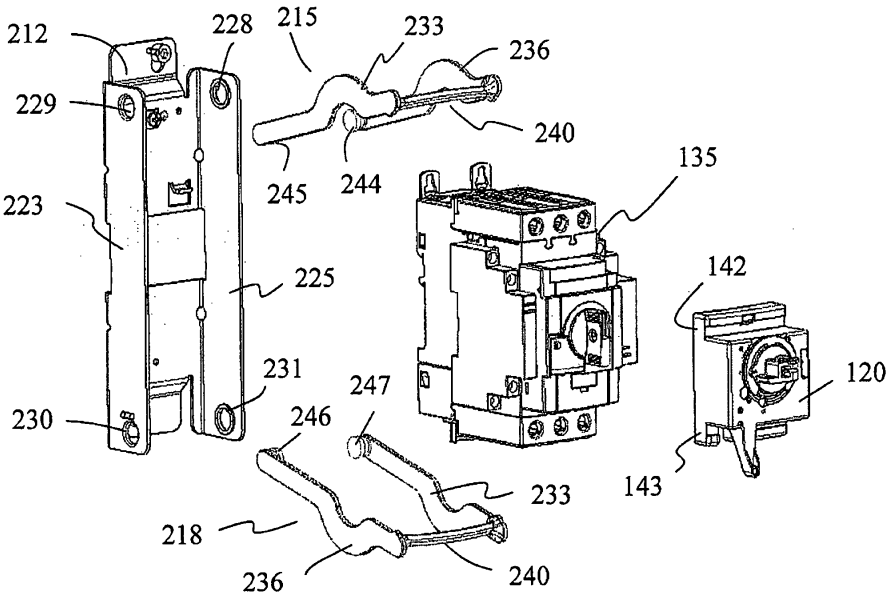

Fig. 2

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Description

Field of the Invention

[0001] The present invention relates generally to a mounting device for removably coupling a system to a sub-system.

Background of the Invention

[0002] In controller systems, it is typical to require a system to be mechanically coupled to a sub-system in the form of an adapter for mechanical actuation or to establish electrical connectivity. In many instances, the adapter may be operated within a vibratory environment and would necessitate firm and secured coupling. However, as the adapter is required to be changed and /or serviced from time to time, permanent means of coupling is not desirable.

[0003] Presently, there are various means in which detachable coupling may be achieved. One of such is through surface adhesion means. The reliability of surface adhesion however, is greatly reduced when coupled components are operated within a vibratory environment. Other mechanical fastening means such as spring clips, sliding fit connectors or screws have also been commonly used. However, these methods are cumbersome particularly within a space constraint controller unit and would also necessitate the use of specialized tools during mounting or dismounting.

[0004] As evidenced from the above discussion, it is desirable to provide an alternative to ameliorate one or more of the abovementioned problems.

Summary of Invention

[0005] In accordance to one aspect of the present invention, there is provided a mounting device for removably coupling a sub-system to a system. The mounting device comprises a base bracket for housing the system and sub-system, said base bracket includes at least 2 resilient handles, each handle includes an elongated bar.

[0006] The mounting device further comprises a channel and a ledge formed along each top and bottom lateral extensions of the sub-system. Each handle is exerted inward relative to the sub-system to dispose the elongated bar within the channel.

[0007] The elongated bar is thereby abutted against the corner of ledge by a tension acting from the handles relative to the base bracket to provide clamping engagement between the system and sub-system.

[0008] In a preferred embodiment, the elongated bar is instantly snapped within the channel once the bar traverses beyond the ledge's corner.

[0009] In a preferred embodiment, the handles are disposed substantially at opposite corners of the base bracket.

[0010] In accordance to another aspect of the present invention, there is provided a method for removably coupling a sub-system to a system. The method comprises the steps of housing the system and sub-system within a base bracket comprising at least 2 resilient handles, each handle includes an elongated bar.

[0011] The method includes providing a sub-system with a channel and a ledge formed along each top and bottom lateral extensions of said sub-system.

[0012] The method also includes exerting each handle inward relative to the sub-system to dispose the elongated bar within the channel and thereby abutting the disposed elongated bar against the ledge's corner by a tension acting from the handles relative to the base bracket to provide clamping engagement between the system and sub-system.

[0013] In a preferred embodiment, the step of exerting the handles inward further includes the step of traversing the elongated bar along the ledge and past the ledge's threshold corner to instantly snap the bar into the channel.

Brief Description of the Drawings

[0014]

Fig. 1 shows a perspective view of the invention;
Fig. 2 shows an exploded view of the invention including a pair of handles;
Fig. 3a shows a cross sectional view of the invention with an elongated bar of the handles contacting surface of a ledge;
Figs. 3b-3c show cross sectional views of the invention with the elongated bar of the handles being pushed past the ledge toward a channel; and
Fig. 3d shows a cross sectional view of the invention with the elongated bar of the handles disposed within the channel.

Preferred Embodiments of the Invention

[0015] The present invention provides an apparatus 100 for mounting and retaining a sub-system 120 onto system 135 as shown in Fig. 1. The sub-system 120 may be removably coupled to system 135 in the form of an adapter and once coupled, sub-system 120 is secured within apparatus 100 in a firm retaining relationship with system 135.

[0016] The present invention advantageously facilitates the quick mounting and demounting of sub-system 120 and system 135 without requiring additional or specialized tools. In one embodiment of the invention, system 135 comprises a circuit breaker and sub-system 120 comprises a circuit breaker adapter.

[0017] The apparatus 100 comprises a base bracket 212, a first handle 215 and a second handle 218 as shown in Fig. 2. The base bracket 212 further comprises two parallel sidewalls 223 and 225 in which mounting holes 228-231 are formed near the four corners of the side-

walls. Preferably, the base bracket 212 is made of a metal, however it may also be made of hard plastic or any other material suitable for mounting support.

[0018] Each of the handles 215 and 218 comprises a first arm 233 and a second arm 236 that are coupled at each proximal end by an elongated bar 240. Projections 244-247, preferably in the form of tubular or cylindrical projections are formed at the distal end of the arms 233 and 236 for insertion into the mounting holes 228-231 to form a pivoting. The pivoting allows rotational movement of the handles 215 and 218 relative to the base bracket 212.

[0019] The sub-system 120 comprises a channel 312 with a ledge 315 formed along each top 142 and bottom 143 lateral extensions of sub-system 120 as shown in Fig. 3a. The ledge 315 further includes a corner 322 formed between the meeting of the ledge 315 and the channel 312. The channel 312 serves to maintain a mounted structure, in this case, the elongated bar 240 in position, whereby the elongated bar 240 is disposed within the channel 312 and is abutted against the corner 322 of the ledge 315 by a tension acting from the handles 215 and 218 relative to the base bracket 212.

[0020] Preferably, the first arm 233, second arm 236 and elongated bar 240 are made of a resilient material which would resiliently provide a clamping engagement for retaining sub-system 120 with system 135 once the elongated bar 240 is abutted against the corner 322 of the ledge 315.

[0021] In one embodiment of the invention, the width of the elongated bar 240 is formed to match the width of the channel 312 so that the bar 240 may be disposed firmly within the channel 312.

[0022] In another embodiment of the invention, the width of the elongated bar 240 may be made slightly wider than the width of the channel 312 so that when the bar 240 is disposed within the channel 312, the entire surface length of the resilient bar 240 is constricted by an inward tension from the contacting walls of the channel 312. The constriction advantageously allows an elastic deformation of the elongated bar 240 and resulting an outward tension from the surface length of the elongated bar 240 against the contacting walls of the channel 312, thereby providing a firm embedding of the elongated bar 240 within the channel 312.

[0023] Preferably, the elongated bar 240 is made of a rectangular shape although other shapes such as circular, triangular or hexagonal may also be used.

[0024] When the elongated bar 240 is abutted against the corner 322 of the ledge 315, the resilient handles 215 and 218 are put in tension relative to the base bracket 212. The handles 215 and 218 now operate as a clamper that clamps sub-system 120 and system 135 in a firm clamping engagement.

[0025] When in used, the system 135 is coupled to the base bracket 212 through a securing device, such as screws. The base bracket 212 may in turn be mounted onto the wall of a controller box. The sub-system 120 is coupled to system 135 and the handles 215 and 218 are turned into contacting the top 142 and bottom 143 lateral extensions of sub-system 120.

[0026] In a preferred embodiment of the invention, the elongated bar 240 is disposed within the channel 312 through a snapping-action means. The means includes biasing the handles 215 and 218 by traversing the handles 215 and 218 inward relative to sub-system 120 along and against surface traction of the ledge 315 towards the channel 312. Once the elongated bar 240 traverses past the threshold corner 322 of the ledge 315, the bar 240 instantly snaps into channel 312 and retained therein by abutting against the corner 322 of the ledge 315.

[0027] The abutment of the elongated bar 240 against the corner 322 of the ledge 315 sets the handles 215 and 218 in a biased state. The resilient handles 215 and 218 are thereby set in tension relative to the base bracket 212. This allows the handles 215 and 218 to now operate as a clamper that clamps sub-system 120 and system 135 in a firm clamping engagement.

[0028] When required, the clamping may be disengaged by pushing the handles 215 and 218 out from the channel 312. Removably engaging the handles 215 and 218 from sub-system 120 advantageously facilitates the quick mounting and dismounting of sub-system 120 from system 135 and without requiring any specialized tools.

[0029] While the invention has been particularly shown and described with reference to various embodiments, it will be recognized by those skilled in the art that modifications and changes may be made to the present invention without departing from the spirit and scope thereof. The scope of the invention should therefore be determined not with reference to the above description but with reference to the appended claims along with their full scope of equivalents.

Claims

1. A mounting device for removably coupling a sub-system to a system comprising:

   a base bracket for housing the system and sub-system, said base bracket includes at least 2 resilient handles, each handle includes an elongated bar; and
   a channel and a ledge formed along each top and bottom lateral extensions of said sub-system, said ledge includes a corner formed between the ledge and channel;
   wherein each handle is resiliently extendible inward relative to the sub-system to dispose the elongated bar within the channel, thereby abutting the elongated bar against the corner of said ledge to provide biasing for clamping engagement between the system and sub-system.

2. The mounting device as claimed in claim 1, wherein

the elongated bar is disposed within the channel by means of a snapping-action mechanism.

3. The mounting device as claimed in claim 1 or 2, wherein the handles are pivoted substantially at opposite corners of the base bracket.

4. The mounting device as claimed in any precedent claim, wherein the handles are pivoted to the base bracket.

5. The mounting device as claimed in any precedent claim, wherein the handles are turned relative to the base bracket to contact the sub-system.

6. A method for removably coupling a sub-system to a system comprising the steps of:

housing the system and sub-system within a base bracket comprising at least 2 resilient handles, each handle includes an elongated bar;
providing a sub-system with a channel and a ledge formed along each top and bottom lateral extensions of said sub-system; and
exerting each handle inward relative to the sub-system to dispose the elongated bar within the channel, thereby abutting the bar against the ledge's corner by tension acting from the handles relative to the base bracket to provide clamping engagement between the system and sub-system.

7. The method as claimed in claim 6, wherein the step of exerting the handles inward further includes the step of traversing the elongated bar along the ledge and past the ledge's threshold corner to instantly snap the bar into the channel.

8. The method as claimed in claim 6 or 7, wherein the step of housing the system and sub-system within a base bracket further includes the step of:

mounting the system onto the wall of the base bracket; and
coupling the sub-system and the system.

9. The method as claimed in any of claims 6 to 8, wherein the handles are disposed substantially at opposite corners of the base bracket.

10. The method as claimed in any of claims 6 to 9, wherein the elongated bar comprises a rectangular bar.

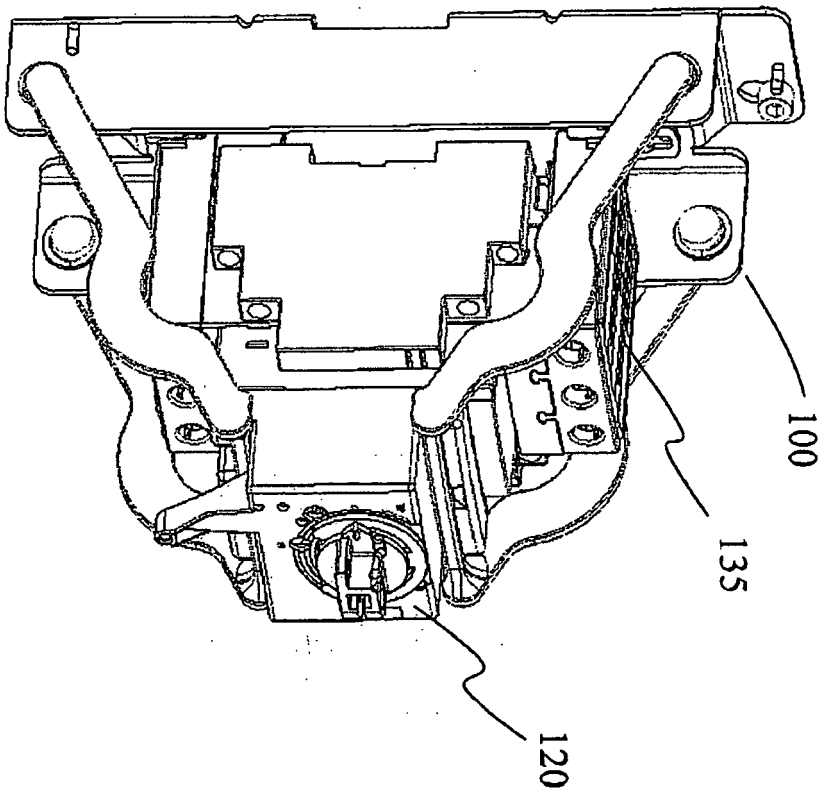

Fig. 1

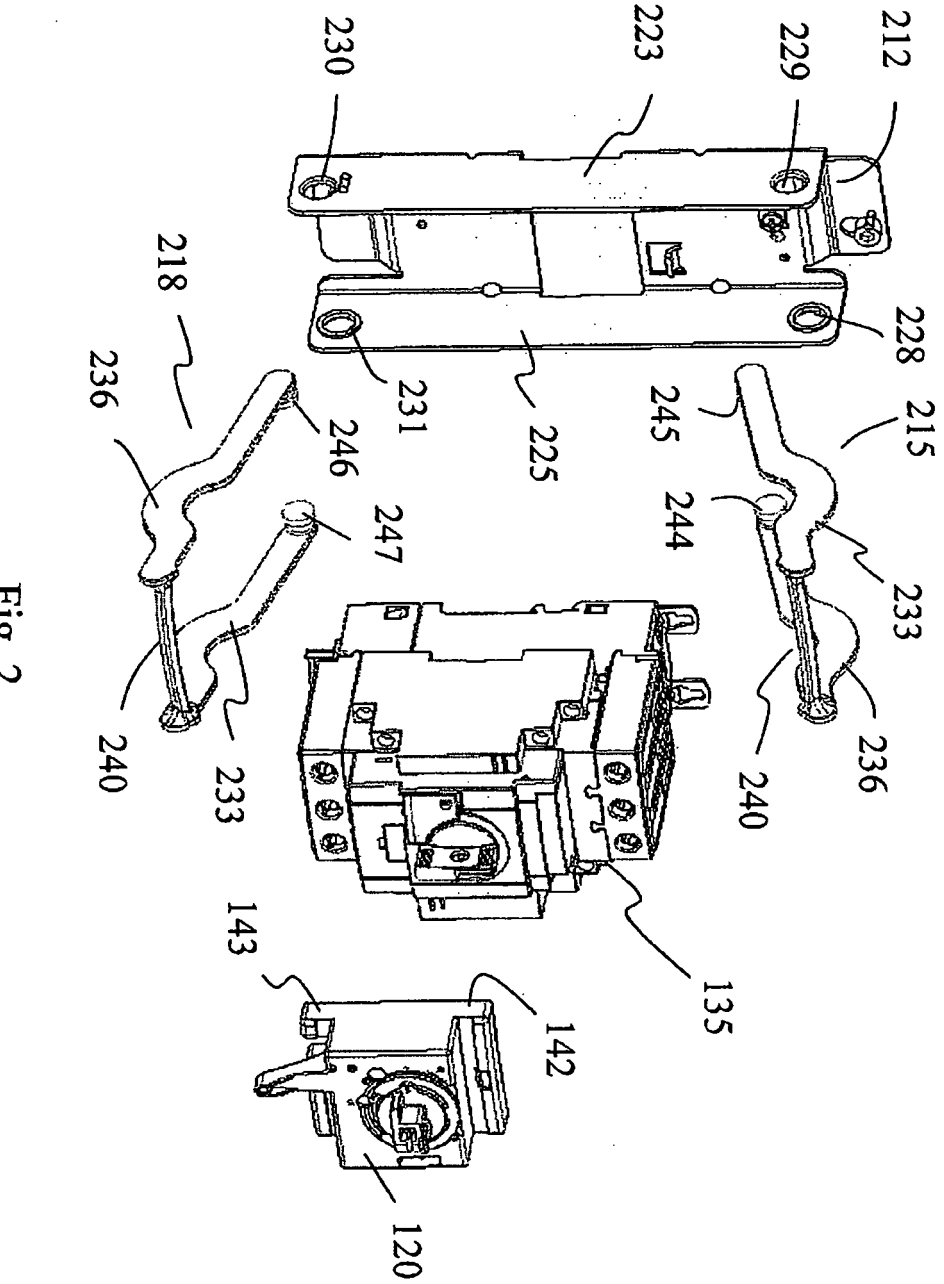
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Fig. 2

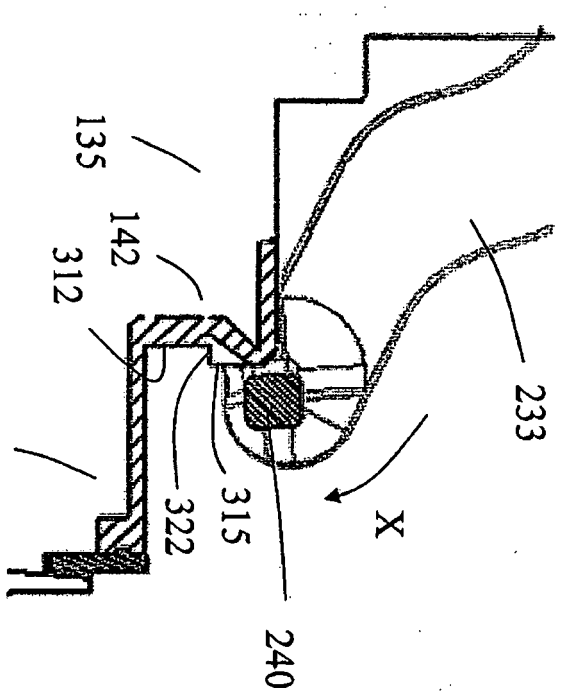

Fig. 3a

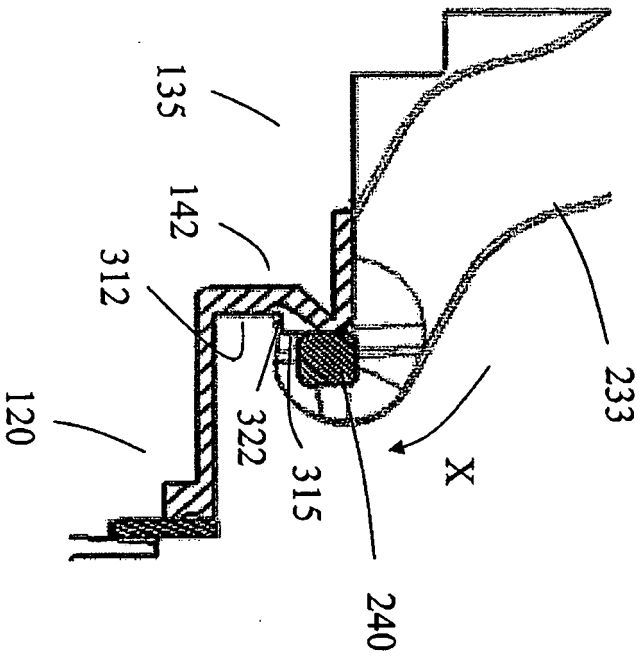

Fig. 3b

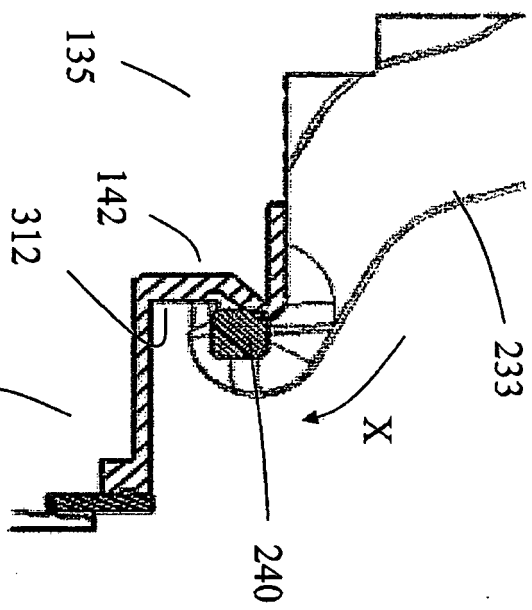

Fig. 3c

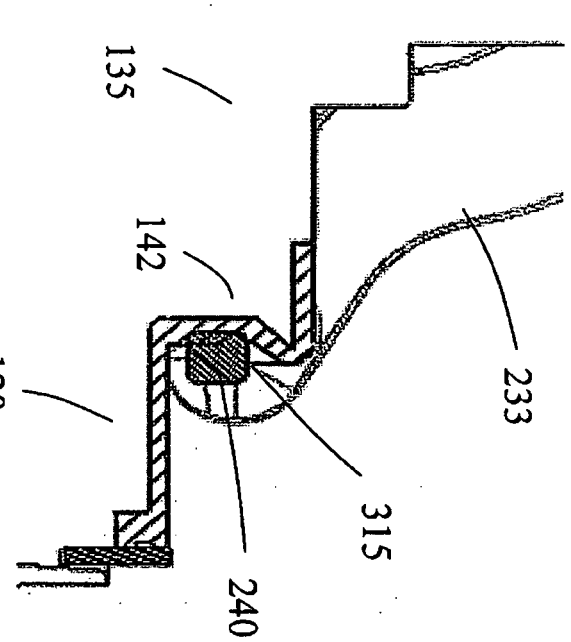

Fig. 3d