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(54) Title: SWITCH PACK ASSEMBLY FOR CABLE CLUSTERS OF NETWORK SWITCHES AND THE SPECIAL RELEASE TOOL ASSEMBLY THEREOF

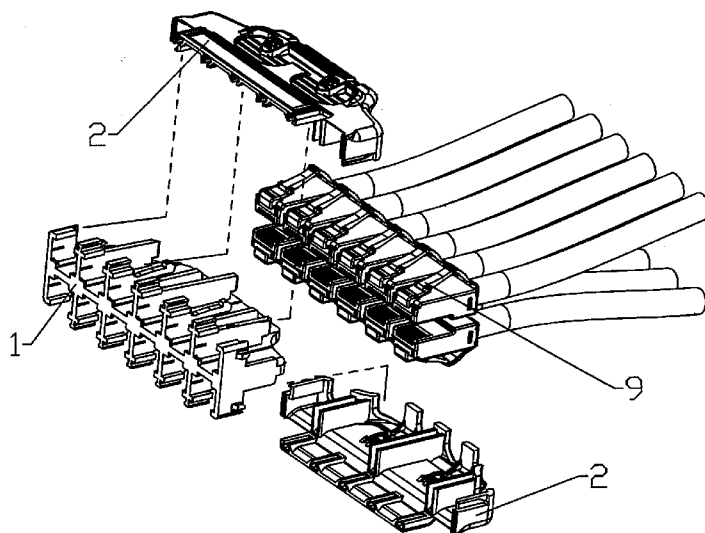


Figure 6

(57) Abstract: The present invention relates to a switch pack assembly for cable clusters of network switches and the special release tool assembly thereof, the switch pack assembly comprises a central framework and two covers arranged movably at two sides of the central framework, several longitudinal parallel cable-oriented holding troughs are arranged on the central framework, the main body of the cover covers on the cable-oriented holding troughs to correspondingly form cable-oriented cavities four sides of each of which are closed, open windows are arranged at the positions on the main body of the cover corresponding to the front parts of at least one pair of cable-oriented cavities distributed symmetrically along the longitudinal central axis of the cover, and a longitudinal sliding guide component and a whole-body-pulling resisting component are further arranged on the outside of the switch pack assembly for cable clusters.

**Switch Pack Assembly for Cable Clusters of Network Switches
and the Special Release Tool Assembly Thereof**

Technology Field

5 The present invention relates to the technical field of network switches, especially to the assembly structures for the plug and the release of cables of network switches, in particular to a switch pack assembly for cable clusters of network switches and the special release tool assembly thereof.

10 **Background Technology**

 In the modern society, with the continuous development of science and technology, the contacts between people are becoming closer increasingly, and the constructions of communication infrastructure are becoming more perfect and progressive, so as to promote the communication process between people to be guaranteed. However, for network switches at the
15 core position of the network, a small switch only has a few dozen of cable interfaces, while a large switch has hundreds or even thousands of cable interfaces, under such a situation, the intensive degree of cables on the switch can be imagined, and if one or one set of cables need to be plugged and pulled for debugging, it is very difficult and complex in the case of an unusual intensity of cables, if the manipulation is improper, it will affect the communication quality of
20 other cable interfaces, and may even lead to wrong plug and pull, so as to result in communication failure and even communication paralysis, which would have great impacts on people's work.

 In the existing technology, in order to solve the drawbacks caused by plugging and pulling a single cable on a network switch, people have carried out a variety of attempts, some people
25 proposed the technical solution of grouping cables, and plugging and pulling each group as a whole, in which a group of neighboring cables having certain functions can be assembled into an overall structure, and then be plugged and pulled integrally, and there are mainly two types of solutions as following:

 (1) The first solution is that a set of (normally 12) cables (usually connected with RJ45
30 standard interfaces) are assembled and fixed together with a simple frame and screws, then are plugged as a whole, but a drawing tool equipped specially is needed for the pull operation; this structure only has the function of plugging and pulling cables as a whole, and lacks the function of plugging and pulling one separate cable, at the same time the drawing tool equipped specially can not unlock specific sites, it can only press all cable snap-fit components down as a whole,

and all cables can not be pulled out completely until all of them are unlocked and released, therefore not only the operation is inconvenient, but also the assembled structure is oversized, causing the cost relatively high.

(2) The second solution is that a set of cables are assembled and fixed together through a specific structure, and it also has the function of plugging cables as a whole, no separate tool is needed to pull cables as a whole, while the unlocking and pulling out the cables as a whole is achieved by using the clamping structure arranged at its end directly, of course, this operation requires specific inner parts to cooperate, thus resulting in the overall structure of the device more complex, the cost relatively high, and inevitably the volume relatively large; at the same time, it also has the function of plugging and pulling one separate cable, but in the operation of plugging and pulling cables individually, it is necessary to use a specific operational tool to achieve the function, for in the maintenance process of the switch, the operation of replacing some cables individually will be conducted frequently, while the operation of plugging and pulling the cables integrally will be seldom conducted, unless in the processes of new installation, commissioning and replacement will it be possible to conduct such an operation, so the structure and function will cause inconvenience to users instead.

Disclosure of the Invention

The object of the present invention is to overcome the problems and defects of the prior art mentioned above to provide a switch pack assembly for cable clusters of network switches and the special release tool assembly thereof, which can achieve the operations of plugging and pulling a single cable arbitrarily and cables integrally, have simple and practical structures, are assembled conveniently and quickly, have stable and firm whole structures and a comprehensive application field.

In order to realize the above object, the switch pack assembly for cable clusters of network switches and the special release tool assembly thereof of the present invention have the following structures:

The switch pack assembly for cable clusters of network switches comprises a central framework and two covers arranged movably at two sides of the central framework, its main features are that: several longitudinal parallel cable-oriented holding troughs are arranged on the central framework, each of the covers locks one of the side surfaces of the central framework by sliding in the longitudinal direction, moreover the main body of the cover covers on the cable-oriented holding troughs to correspondingly form cable-oriented cavities four sides of each of which are closed, open windows are arranged at the positions on the main body of the cover

corresponding to the front parts of at least one pair of cable-oriented cavities distributed by bilateral symmetry along the longitudinal central axis of the cover, and a longitudinal sliding guide component and a whole-body-pulling resisting component are further arranged on the outside of the switch pack assembly for cable clusters.

5 The central framework of the switch pack assembly for cable clusters of network switches includes a central lateral substrate, on two side surfaces of the central lateral substrate both are arranged spacedly several longitudinal clapboards perpendicular to the central lateral substrate and extending along the longitudinal direction, and each of the cable-oriented holding troughs is formed between adjacent longitudinal clapboards.

10 The longitudinal clapboards of the switch pack assembly for cable clusters of network switches arranged on the two side surfaces of the central lateral substrate are mirror-image symmetrical about the central lateral substrate as the symmetry axis.

Between the cover of the switch pack assembly for cable clusters of network switches and at least one longitudinal clapboard on the corresponding side of the central lateral substrate is
15 arranged a longitudinal sliding guide mechanism along which the cover slides to and fro.

Between the cover of the switch pack assembly for cable clusters of network switches and each of the longitudinal clapboards on the corresponding side of the central lateral substrate is arranged the longitudinal sliding guide mechanism along which the cover slides to and fro.

The longitudinal sliding guide mechanism of the switch pack assembly for cable clusters of
20 network switches can include a longitudinal sliding guide rail / a longitudinal sliding guide groove arranged on the top part of the longitudinal clapboard and a longitudinal sliding guide groove / a longitudinal sliding guide rail arranged on the corresponding site of the cover, and the longitudinal sliding guide rail slides to and fro in the longitudinal sliding guide groove.

The cross-sectional shape of the longitudinal sliding guide rail of the switch pack assembly
25 for cable clusters of network switches can be "T", "Y", "V", "L", "F", "E", "C", "S" or "Z", and the cross-sectional shape of the longitudinal sliding guide groove matches that of the longitudinal sliding guide rail.

Between the cover of the switch pack assembly for cable clusters of network switches and at least one longitudinal clapboard on the corresponding side of the central lateral substrate is
30 arranged a longitudinal movable snap-fit mechanism.

The longitudinal movable snap-fit mechanisms of the switch pack assembly for cable clusters of network switches are arranged respectively on at least one pair of the longitudinal clapboards distributed by bilateral symmetry along the longitudinal central axis of the cover.

The longitudinal movable snap-fit mechanism of the switch pack assembly for cable

clusters of network switches can include an elastic locking tenon arranged on one longitudinal clapboard and a locking hook / a locking slot arranged on the corresponding location of the cover, and on the location of the cover corresponding to the elastic locking tenon is further arranged movably an elastic push button the lower part of which props against the elastic locking tenon.

5 On the corresponding place of the cover of the switch pack assembly for cable clusters of network switches corresponding to at least one longitudinal clapboard on the corresponding side of the central lateral substrate is arranged a position-limiting guide mechanism.

The position-limiting guide mechanisms of the switch pack assembly for cable clusters of network switches are arranged respectively on the corresponding places of the cover
10 corresponding to at least one pair of the longitudinal clapboards distributed by bilateral symmetry along the longitudinal central axis of the cover.

The position-limiting guide mechanism of the switch pack assembly for cable clusters of network switches includes a pair of position-limiting longitudinal guide plates arranged on two sides of the place of the cover corresponding to the longitudinal clapboard, perpendicular to the
15 main body of the cover and extending along the longitudinal direction, and between the position-limiting longitudinal guide plates is formed a guide slot into which the longitudinal clapboard is inserted.

At the rear end of the cover of the switch pack assembly for cable clusters of network switches are arranged cable-oriented notches corresponding to the cable-oriented cavities
20 respectively, and the bottom parts of the cable-oriented notches prop against the central lateral substrate to form cable-oriented position-limiting holes.

The longitudinal sliding guide component of the switch pack assembly for cable clusters of network switches includes two longitudinal sliding guide convex blocks / longitudinal sliding guide grooves on the lateral surfaces of the longitudinal clapboards arranged at two ends of the
25 central lateral substrate.

The open windows on the main body of the cover of the switch pack assembly for cable clusters of network switches are arranged at the positions corresponding to the front parts of the cable-oriented cavities at two ends of the central framework.

The whole-body-pulling resisting component of the cover of the switch pack assembly for
30 cable clusters of network switches can be a lateral resisting convex bar / lateral resisting groove arranged at the middle part of the outside of the cover.

The main features of the special release tool assembly for pulling the above mentioned switch pack assembly for cable clusters integrally away from network switches are that: the special release tool assembly comprises a pair of clamping handles the rear ends of which are

hinged movably with each other, and the shape of the front end of the clamping handle matches that of the switch pack assembly for cable clusters, at the positions of the front end of the clamping handle corresponding to the open windows on the cover are all arranged pressure plates, moreover at the position of the inside of the front end of the clamping handle
5 corresponding to the longitudinal sliding guide component of the switch pack assembly for cable clusters of network switches is arranged a longitudinal sliding positioning mechanism, and at the position of the inside of the front end of the clamping handle corresponding to the whole-body-pulling resisting component of the switch pack assembly for cable clusters is arranged a pulling force-applying mechanism.

10 The pressure plates at the front end of the clamping handle of the special release tool assembly for pulling the switch pack assembly for cable clusters integrally away from network switches are arranged at the positions corresponding to the front parts of the cable-oriented cavities at two ends of the central framework.

At two sides of the front end of the clamping handle of the special release tool assembly for
15 pulling the switch pack assembly for cable clusters integrally away from network switches are all arranged position-limiting baffle plates perpendicular to the plane of the clamping handle and extending into the inside of the special release tool assembly, the longitudinal sliding positioning mechanism can include two longitudinal sliding guide grooves / longitudinal sliding guide convex blocks arranged at the insides of the position-limiting baffle plates and corresponding to
20 the longitudinal sliding guide convex blocks / longitudinal sliding guide grooves on the lateral surfaces of the longitudinal clapboards arranged at two ends of the central lateral substrate, and the longitudinal sliding guide convex blocks slide to and fro in the longitudinal sliding guide grooves respectively.

The pulling force-applying mechanism of the special release tool assembly for pulling the
25 switch pack assembly for cable clusters integrally away from network switches is a lateral pulling elastic locking hook arranged at the inside of the front end of the clamping handle and corresponding to the lateral resisting convex bar / lateral resisting groove at the middle part of the outside of the cover, and the lateral pulling elastic locking hook hooks the lateral resisting convex bar / lateral resisting groove at the middle part of the outside of the cover.

30 At the ends of the clamping handles of the special release tool assembly for pulling the switch pack assembly for cable clusters integrally away from network switches are all arranged hinged pivots, moreover the hinged pivots are inserted spacedly and staggeredly into each other, and a hinge is inserted into a central shaft hole of the hinged pivots.

With the switch pack assembly for cable clusters of network switches and its special release

tool assembly of the present invention, for the switch pack assembly for cable clusters adopts a structure of the central framework having several cable-oriented cavities and the covers locking two sides of the central framework by sliding in the longitudinal direction, which can be assembled and disassembled conveniently, so as to achieve plugging, pulling and replacing a single cable very easily, at the same time, open windows are arranged on the cover above the front parts of the cable-oriented cavities at two ends of the central framework, so as to guarantee that the cable snap-fit components at the two ends and the interfaces of the switch are locked each other fixedly, and the middle cable snap-fit components are compressed, therefore not only the switch pack assembly for cable clusters can be fixed firmly on the switch, but also the unlocking operation can be achieved by only pressing the locked cable snap-fit components at two ends of the central framework when the switch pack assembly for cable clusters is to be removed, to cause users to plug and pull the switch pack assembly for cable clusters quickly to save the operation time, or plug and pull cables individually to facilitate the replacement and maintenance according to the actual needs; furthermore, the longitudinal sliding guide component and the whole-body-pulling resisting component are further arranged on the outside of the switch pack assembly for cable clusters, and in the corresponding special release tool assembly are arranged pressure plates corresponding to the open windows on the cover, so as to have the effect of unlocking the whole switch pack assembly for cable clusters by pressing the cable snap-fit components directly, meanwhile at the corresponding positions are arranged the longitudinal sliding positioning mechanism and the pulling force-applying mechanism, which can not only guide and position the special release tool assembly exactly, but also guarantee the completion of plugging and pulling the switch pack assembly for cable clusters as a whole when cables on the switch are intensive and hands can not touch the unlocking mechanism directly, thus not only the structures are simple and practical, but also the operation of assembling cables is convenient and quick, the whole structures are stable and firm, have relative long service lives and extend the usage time of cables, so as to decrease the production cost and the maintenance cost, therefore they would have a comprehensive application field, bring great convenience to people's work, and lay a solid foundation for the further development of the technologies of exchanging and maintaining cables of network switches.

Description of the Figures

Fig.1 is a schematic view of the whole structure of the central framework of the switch pack assembly for cable clusters of network switches according to the present invention.

Fig.2 is a front view of the central framework of the switch pack assembly for cable clusters

of network switches according to the present invention.

Fig.3 is a schematic view of the whole structure of the cover of the switch pack assembly for cable clusters of network switches according to the present invention.

Fig.4 is a schematic view of the inside of the cover of the switch pack assembly for cable clusters of network switches according to the present invention.

Fig.5 is a side schematic view of the cover of the switch pack assembly for cable clusters of network switches according to the present invention.

Fig.6 is a schematic view of the whole assembling process of the switch pack assembly for cable clusters of network switches according to the present invention.

Fig.7 is a schematic view of the whole structure of the clamping handle of the special release tool assembly for pulling the switch pack assembly for cable clusters integrally away from network switches according to the present invention.

Fig.8 is a schematic view of the whole structure of the clamping handle of the special release tool assembly for pulling the switch pack assembly for cable clusters integrally away from network switches seen from another direction according to the present invention.

Fig.9 is a side schematic view of the clamping handle of the special release tool assembly for pulling the switch pack assembly for cable clusters integrally away from network switches according to the present invention.

Fig.10 is a schematic view of the whole assembling process of the special release tool assembly for pulling the switch pack assembly for cable clusters integrally away from network switches according to the present invention.

Fig.11 is a schematic view of the whole structure when the special release tool assembly clamps the switch pack assembly for cable clusters according to the present invention.

Preferred Embodiments of the Invention

In order to understand the technical content of the present invention clearly, the present invention is further exemplified by reference to the following examples.

Please refer to Fig. 1 and Fig. 2, the switch pack assembly for cable clusters of network switches comprises a central framework 1 and two covers 2 arranged movably at two sides of the central framework 1, wherein several longitudinal parallel cable-oriented holding troughs 13 are arranged on the central framework 1.

Wherein the central framework 1 includes a central horizontal substrate 11, on two side surfaces of the central lateral substrate 11 both are arranged spacedly several longitudinal clapboards 12 perpendicular to the central lateral substrate 11 and extending along the

longitudinal direction, and each of the cable-oriented holding troughs 13 is formed between adjacent longitudinal clapboards 12; meanwhile in the embodiment of the present invention, the longitudinal clapboards 12 arranged on the two side surfaces of the central lateral substrate 11 are mirror-image symmetrical about the central lateral substrate 11 as the symmetry axis, which makes the cable-oriented holding troughs 13 form two layers: the upper layer and the lower layer, and the number of the cable-oriented holding troughs 13 in each layer is at least 2, and can be 3, 4, 5, 6 or even more; and the width and the depth of the cable-oriented holding trough 13 should match the cable head to be assembled, for the RJ45 patch cord, because its size is an international standard, it is very easy to determine the size of the cable-oriented holding trough 13. in addition, the bottom of the RJ45 patch cord itself has a convex step, therefore in order to position and lock fixedly the cable with RJ45 patch cord longitudinally, at the corresponding position of the bottom of the cable-oriented holding trough 13 (i.e. on the central lateral substrate 11) can be arranged a position-limiting convex block 131, or a position-limiting looking hook, while at the front end of the cable-oriented holding trough 13 near to the central lateral substrate 11 is arranged a position-limiting baffle 132, so that when the cable with RJ45 patch cord is inserted into the cable-oriented holding trough 13, the convex step at the bottom of the patch cord and the position-limiting baffle 132 at the bottom of the front end of the cable-oriented holding trough 13 can be cooperated to prop against each other, and the rear end of the patch cord props against the position-limiting convex block 131, to achieve a very good longitudinal positioning effect, to prevent the cable from slipping backward and protruding forward.

Then please refer to Fig. 3 to Fig. 6, each of the covers 2 locks one of the side surfaces of the central framework 1 by sliding in the longitudinal direction, moreover the main body of the cover 2 covers on the cable-oriented holding troughs 13 to correspondingly form cable-oriented cavities four sides of each of which are closed, open windows 21 are arranged at the positions on the main body of the cover 2 corresponding to the front parts of at least one pair of cable-oriented cavities distributed by bilateral symmetry along the longitudinal central axis of the cover 2, and used mainly to allow that the cable snap-fit components 9 at the cable heads corresponding to the open windows 21 and the interfaces of the switch are locked each other fixedly, whereas other cable snap-fit components 9 at the cable heads above which there are no open windows 21 are compressed, therefore not only the switch pack assembly for cable clusters can be fixed firmly on the switch, but also the unlocking operation can be achieved by only pressing the locked cable snap-fit components 9 at the corresponding positions when the switch pack assembly for cable clusters is to be removed.

In order to obtain the fixation effect as good as possible, in the embodiment of the present

invention, the open windows 21 on the main body of the cover 2 are arranged at the positions corresponding to the front parts of the cable-oriented cavities at two ends of the central framework 1, so that when the cover is assembled, only the cable snap-fit components 9 of four cables near to the two ends of the central framework 1 can be locked fixedly with the interfaces of the network switch, whereas correspondingly the cable snap-fit components 9 of the cables at other positions are compressed, then not only the above structure facilitates the plugging and pulling operations, but also when the cover 2 is removed, the cable snap-fit components 9 at the middle position compressed previously would rise up, and be locked fixedly and automatically with the interfaces of the network switch, therefore the backward movement of the cover 2 would not move the cables together to cause them to release from the network switch.

Meanwhile, between the cover 2 and at least one longitudinal clapboard 12 on the corresponding side of the central lateral substrate 11 is arranged a longitudinal sliding guide mechanism along which the cover 2 slides to and fro; in the embodiment of the present invention, the longitudinal sliding guide mechanism includes a longitudinal sliding guide rail 121 arranged on the top part of the longitudinal clapboard 12, of course a longitudinal sliding guide groove can be arranged here instead, and a longitudinal sliding guide groove 22 is also arranged on the corresponding site of the cover 2, of course a longitudinal sliding guide rail can be arranged correspondingly here instead, in such a case, the longitudinal sliding guide rail 121 slides to and fro in the longitudinal sliding guide groove 22, so as to achieve the reciprocating movement of the cover 2 relative to the central framework 1, to ensure that users can assemble the cover 2 conveniently and flexibly, and disassemble the cover 2 conveniently.

Moreover, the cross-sectional shape of the longitudinal sliding guide rail 121 can be any one of various shapes, as long as it can be positioned fixedly along the direction perpendicular to the sliding direction of the rail, in the embodiment of the present invention the shape adopted is a "T" shape, of course, according to the actual needs, the shape can be chosen from different shapes of "Y", "V", "L", "F", "E", "C", "S" or "Z", at the same time, the cross-sectional shape of the longitudinal sliding guide groove 22 matches that of the longitudinal sliding guide rail 121, so as to ensure that the cover can be positioned fixedly along the direction perpendicular to the central framework and slide freely along the longitudinal direction.

Not only that, in order to obtain a more firm positioning effect and keep the balance of force received during sliding, between the cover 2 and each of the longitudinal clapboards 12 on the corresponding side of the central lateral substrate 11 is arranged the above mentioned longitudinal sliding guide mechanism, so as to ensure that the cover 2 can slide to and fro along the longitudinal sliding guide mechanism stably.

Additionally, between the cover 2 and at least one longitudinal clapboard 12 on the corresponding side of the central lateral substrate 11 is arranged a longitudinal movable snap-fit mechanism, which is used to allow that the cover 2 can be positioned and locked stably on the central framework 1, and would not be released when the whole switch pack assembly for cable clusters is plugged and pulled, in order to obtain a more stable positioning effect, the longitudinal movable snap-fit mechanisms can be arranged respectively on at least one pair of the longitudinal clapboards 12 distributed by bilateral symmetry along the longitudinal central axis of the cover 2, and in the embodiment of the present invention, the number of the longitudinal movable snap-fit mechanisms is 2 in general, and they are arranged respectively on two longitudinal clapboards 12 nearest to the longitudinal central axis of the cover 2.

Wherein the longitudinal movable snap-fit mechanism can include an elastic locking tenon 122 arranged on one longitudinal clapboard 12 and a locking hook 23 arranged on the corresponding location of the cover 2, of course a locking slot can be arranged here instead, and on the location of the cover 2 corresponding to the elastic locking tenon 122 is further arranged movably an elastic push button 24 the lower part of which props against the elastic locking tenon 122.

Please refer to Fig. 3 to Fig. 6 again, on the corresponding place of the cover 2 corresponding to at least one longitudinal clapboard 12 on the corresponding side of the central lateral substrate 11 of the central framework 1 is arranged a position-limiting guide mechanism.

Wherein the position-limiting guide mechanism includes a pair of position-limiting longitudinal guide plates 25 arranged on two sides of the place of the cover 2 corresponding to the longitudinal clapboard 12, perpendicular to the main body of the cover 2 and extending along the longitudinal direction, and between the position-limiting longitudinal guide plates 25 is formed a guide slot 26 into which the longitudinal clapboard 12 is inserted.

Meanwhile, in order to make the guide function more precise and stable, and easier to use, the position-limiting guide mechanisms can be arranged respectively on the corresponding places of the cover 2 corresponding to at least one pair of the longitudinal clapboards 12 distributed by bilateral symmetry along the longitudinal central axis of the cover 2, and in the embodiment of the present invention, the position-limiting guide mechanisms are arranged respectively on the corresponding places of the cover 2 corresponding to the longitudinal clapboard 12 nearest to the longitudinal central axis of the cover 2 and the pair of the longitudinal clapboards 12 most far away from the longitudinal central axis of the cover 2.

Please refer to Fig. 3 to Fig. 6 again, at the rear end of the cover 2 are further arranged cable-oriented notches 27 corresponding to and cooperating with the cable-oriented cavities

mentioned above respectively, and the bottom parts of the cable-oriented notches 27 prop directly against the rear part of the central lateral substrate 11 of the central framework 1, so as to form together cable-oriented position-limiting holes, which are used mainly to restraint and position the rear parts of the cables, and prevent adjacent cables from twisting, so as to facilitate maintainers to manage cables and know the corresponding relationship of the cables and the interfaces of the network switch.

Then please refer to Fig. 7 to Fig. 11, in order to ensure that the switch pack assembly for cable clusters of network switches of the present invention still can be plugged and pulled integrally and conveniently when the cables are intensive and hands can not touch the cable snap-fit components 9, the present invention further provides a special release tool assembly 3 for pulling the above mentioned switch pack assembly for cable clusters integrally away from network switches, wherein the special release tool assembly 3 comprises a pair of clamping handles 31 the rear ends of which are hinged movably with each other, in the embodiment of the present invention, at the rear ends of the clamping handles 31 are all arranged hinged pivots 32, moreover the hinged pivots 32 on the clamping handles 31 are inserted spacedly and staggeredly into each other, and the central shaft holes 33 of them coincide with each other, and a hinge 4 is inserted into and fixed in the central shaft hole 33 of the hinged pivots 32, allowing the pair of the clamping handles 31 to be able to rotate around the hinged pivots 32, so as to open a certain angle according to actual needs, and clamp the above mentioned switch pack assembly for cable clusters very well

Wherein the shape of the front end of the clamping handle 31 matches that of the switch pack assembly for cable clusters, and at the positions of the front end of the clamping handle 31 corresponding to the open windows 21 on the cover 2 are all arranged pressure plates 34, in the embodiment of the present invention, corresponding to the positions of the open windows 21 mentioned above, the pressure plates 34 at the front end of the clamping handle 31 are arranged at the positions corresponding to the front parts of the cable-oriented cavities at two ends of the central framework 1, therefore after the user clamps the switch pack assembly for cable clusters with the clamping handles, the pressure plates 34 at the corresponding positions can compress the cable snap-fit components 9 on the cables, so as to unlock them and the interfaces of network switches, to pull the whole switch pack assembly for cable clusters out smoothly.

Meanwhile, in order to guide and position the special release tool assembly better during the clamping process, a longitudinal sliding guide component is further arranged on the outside of the switch pack assembly for cable clusters, in the embodiment of the present invention, the longitudinal sliding guide component includes two longitudinal sliding guide convex blocks 123

on the lateral surfaces of the longitudinal clapboards 12 arranged at two ends of the central lateral substrate 11 of the central framework 1, of course two longitudinal sliding guide grooves can be arranged here instead, which can also play the guiding and positioning role for the sliding, at the same time, at the position of the inside of the front end of the clamping handle 31 corresponding to the longitudinal sliding guide component of the switch pack assembly for cable clusters is arranged a longitudinal sliding positioning mechanism, in the embodiment of the present invention, at two sides of the front end of the clamping handle 31 are all arranged position-limiting baffle plates 35 perpendicular to the plane of the clamping handle 31 and extending into the inside of the special release tool assembly, correspondingly the longitudinal sliding positioning mechanism includes two longitudinal sliding guide grooves 351 arranged at the insides of the position-limiting baffle plates 35 and corresponding to the longitudinal sliding guide convex blocks 123 on the lateral surfaces of the longitudinal clapboards 12 arranged at two ends of the central lateral substrate 11 of the central framework 1, so that the longitudinal sliding guide convex blocks 123 slide to and fro in the longitudinal sliding guide grooves 351 respectively, to play a very good guiding and positioning function for the sliding, to prevent the special release tool assembly from deviating from the right position during the clamping process, to generate the exact positioning, clamping and unlocking effects.

In addition, if the longitudinal sliding guide component of the switch pack assembly for cable clusters adopts two longitudinal sliding guide grooves instead, then the longitudinal sliding positioning mechanism can adopt two longitudinal sliding guide convex blocks, which also can generate the guiding and positioning effect for the sliding.

Not only that, in order to cause the switch pack assembly for cable clusters to be pulled out smoothly after the special release tool assembly clamps and unlocks the switch pack assembly for cable clusters, a corresponding pulling mechanism is necessary, for this, a whole-body-pulling resisting component is further arranged on the outside of the switch pack assembly for cable clusters, in the embodiment of the present invention, the whole-body-pulling resisting component is a lateral resisting convex bar 28 arranged between two elastic push buttons 24 at the middle part of the outside of the cover 2, of course the structure of a lateral resisting groove can be adopted here instead, which can play the same resisting function. At the same time, at the position of the inside of the front end of the clamping handle 31 corresponding to the whole-body-pulling resisting component of the switch pack assembly for cable clusters is arranged a pulling force-applying mechanism, the pulling force-applying mechanism is a lateral pulling elastic locking hook 36 arranged at the inside of the front end of the clamping handle 31 and corresponding to the lateral resisting convex bar 28 between two elastic push buttons 24 at

the middle part of the outside of the cover 2, and the lateral pulling elastic locking hook 36 hooks the lateral resisting convex bar 28 at the middle part of the outside of the cover 2, so that the switch pack assembly for cable clusters can be pulled integrally and smoothly out of the network switch by using the pulling force-applying mechanism to act on the whole-body-pulling resisting component, meanwhile when the whole-body-pulling resisting component adopts a lateral resisting groove instead, the lateral pulling elastic locking hook 36 can also hook the lateral resisting convex bar 28 at the middle part of the outside of the cover 2, so as to complete the pulling operation.

With the switch pack assembly for cable clusters of network switches and its special release tool assembly of the present invention, for the switch pack assembly for cable clusters adopts a structure of the central framework 1 having several cable-oriented cavities and the covers 2 locking two sides of the central framework 1 by sliding in the longitudinal direction, which can be assembled and disassembled conveniently, so as to achieve plugging, pulling and replacing a single cable very easily, at the same time, open windows 21 are arranged on the cover 2 above the front parts of the cable-oriented cavities at two ends of the central framework 1, so as to guarantee that the cable snap-fit components 9 of the cables at the two ends and the interfaces of the switch are locked each other fixedly, and the cable snap-fit components 9 of the middle cables are compressed, therefore not only the switch pack assembly for cable clusters can be fixed firmly on the switch, but also the unlocking operation can be achieved by only pressing the locked cable snap-fit components at two ends of the central framework 1 when the switch pack assembly for cable clusters is to be removed, to cause users to plug and pull the switch pack assembly for cable clusters quickly to save the operation time, or plug and pull cables individually to facilitate the replacement and maintenance according to the actual needs; furthermore, the longitudinal sliding guide component and the whole-body-pulling resisting component are further arranged on the outside of the switch pack assembly for cable clusters, and in the corresponding special release tool assembly are arranged pressure plates 34 corresponding to the open windows 21 on the cover 2, so as to have the effect of unlocking the whole switch pack assembly for cable clusters by pressing the cable snap-fit components 9 directly, meanwhile at the corresponding positions are arranged the longitudinal sliding positioning mechanism and the pulling force-applying mechanism, which can not only guide and position the special release tool assembly exactly, but also guarantee the completion of plugging and pulling the switch pack assembly for cable clusters as a whole when cables on the switch are intensive and hands can not touch the unlocking mechanism directly, thus not only the structures are simple and practical, but also the operation of assembling cables is convenient and quick, the

whole structures are stable and firm, have relative long service lives and extend the usage time of cables, so as to decrease the production cost and the maintenance cost, therefore they would have a comprehensive application field, bring great convenience to people's work, and lay a solid foundation for the further development of the technologies of exchanging and maintaining cables of network switches.

It should be noted that, all the documents mentioned in the present invention are cited as references in the present application, just as each document is cited individually as a references. In addition, it should also be understood that the content described above is the embodiments of the present invention and the technical principles used in the present invention, after reading the above content of the present invention, the technicians skilled in the art can make various modifications or changes to the present invention without departure from the spirit and scope of the present invention, these equivalent forms also fall within the scope of the present invention.

Claims**I claim:**

1. A switch pack assembly for cable clusters of network switches, comprising a central
5 framework and two covers arranged movably at two sides of the central framework,
characterized in that, several longitudinal parallel cable-oriented holding troughs are arranged on
the central framework, each of the covers locks one of the side surfaces of the central framework
by sliding in the longitudinal direction, moreover the main body of the cover covers on the
cable-oriented holding troughs to correspondingly form cable-oriented cavities four sides of each
10 of which are closed, open windows are arranged at the positions on the main body of the cover
corresponding to the front parts of at least one pair of cable-oriented cavities distributed by
bilateral symmetry along the longitudinal central axis of the cover, and a longitudinal sliding
guide component and a whole-body-pulling resisting component are further arranged on the
outside of the switch pack assembly for cable clusters.
- 15 2. The switch pack assembly for cable clusters of network switches according to according to
claim 1, characterized in that, the central framework includes a central lateral substrate, on two
side surfaces of the central lateral substrate both are arranged spacedly several longitudinal
clapboards perpendicular to the central lateral substrate and extending along the longitudinal
direction, and each of the cable-oriented holding troughs is formed between adjacent
20 longitudinal clapboards.
3. The switch pack assembly for cable clusters of network switches according to according to
claim 2, characterized in that, the longitudinal clapboards arranged on the two side surfaces of
the central lateral substrate are mirror-image symmetrical about the central lateral substrate as
the symmetry axis.
- 25 4. The switch pack assembly for cable clusters of network switches according to according to
claim 2, characterized in that, between the cover and at least one longitudinal clapboard on the
corresponding side of the central lateral substrate is arranged a longitudinal sliding guide
mechanism along which the cover slides to and fro.
5. The switch pack assembly for cable clusters of network switches according to according to
30 claim 4, characterized in that, between the cover and each of the longitudinal clapboards on the
corresponding side of the central lateral substrate is arranged the longitudinal sliding guide
mechanism along which the cover slides to and fro.
6. The switch pack assembly for cable clusters of network switches according to according to
claim 4 or 5, characterized in that, the longitudinal sliding guide mechanism includes a

longitudinal sliding guide rail / a longitudinal sliding guide groove arranged on the top part of the longitudinal clapboard and a longitudinal sliding guide groove / a longitudinal sliding guide rail arranged on the corresponding site of the cover, and the longitudinal sliding guide rail slides to and fro in the longitudinal sliding guide groove.

5 7. The switch pack assembly for cable clusters of network switches according to according to claim 6, characterized in that, the cross-sectional shape of the longitudinal sliding guide rail is "T", "Y", "V", "L", "F", "E", "C", "S" or "Z", and the cross-sectional shape of the longitudinal sliding guide groove matches that of the longitudinal sliding guide rail.

10 8. The switch pack assembly for cable clusters of network switches according to according to claim 2, characterized in that, between the cover and at least one longitudinal clapboard on the corresponding side of the central lateral substrate is arranged a longitudinal movable snap-fit mechanism.

15 9. The switch pack assembly for cable clusters of network switches according to according to claim 8, characterized in that, the longitudinal movable snap-fit mechanisms are arranged respectively on at least one pair of the longitudinal clapboards distributed by bilateral symmetry along the longitudinal central axis of the cover.

20 10. The switch pack assembly for cable clusters of network switches according to according to claim 8 or 9, characterized in that, the longitudinal movable snap-fit mechanism includes an elastic locking tenon arranged on one longitudinal clapboard and a locking hook / a locking slot arranged on the corresponding location of the cover, and on the location of the cover corresponding to the elastic locking tenon is further arranged movably an elastic push button the lower part of which props against the elastic locking tenon.

25 11. The switch pack assembly for cable clusters of network switches according to according to claim 2, characterized in that, on the corresponding place of the cover corresponding to at least one longitudinal clapboard on the corresponding side of the central lateral substrate is arranged a position-limiting guide mechanism.

30 12. The switch pack assembly for cable clusters of network switches according to according to claim 11, characterized in that, the position-limiting guide mechanisms are arranged respectively on the corresponding places of the cover corresponding to at least one pair of the longitudinal clapboards distributed by bilateral symmetry along the longitudinal central axis of the cover.

13. The switch pack assembly for cable clusters of network switches according to according to claim 11 or 12, characterized in that, the position-limiting guide mechanism includes a pair of position-limiting longitudinal guide plates arranged on two sides of the place of the cover corresponding to the longitudinal clapboard, perpendicular to the main body of the cover and

extending along the longitudinal direction, and between the position-limiting longitudinal guide plates is formed a guide slot into which the longitudinal clapboard is inserted.

14. The switch pack assembly for cable clusters of network switches according to according to any one of claims 2, 3, 4, 5, 8, 9, 11 and 12, characterized in that, at the rear end of the cover are arranged cable-oriented notches corresponding to the cable-oriented cavities respectively, and the bottom parts of the cable-oriented notches prop against the central lateral substrate to form cable-oriented position-limiting holes.

15. The switch pack assembly for cable clusters of network switches according to according to any one of claims 2, 3, 4, 5, 8, 9, 11 and 12, characterized in that, the longitudinal sliding guide component includes two longitudinal sliding guide convex blocks / longitudinal sliding guide grooves on the lateral surfaces of the longitudinal clapboards arranged at two ends of the central lateral substrate.

16. The switch pack assembly for cable clusters of network switches according to according to any one of claims 1, 2, 3, 4, 5, 8, 9, 11 and 12, characterized in that, the open windows on the main body of the cover are arranged at the positions corresponding to the front parts of the cable-oriented cavities at two ends of the central framework.

17. The switch pack assembly for cable clusters of network switches according to according to any one of claims 1, 2, 3, 4, 5, 8, 9, 11 and 12, characterized in that, the whole-body-pulling resisting component is a lateral resisting convex bar / lateral resisting groove arranged at the middle part of the outside of the cover.

18. A special release tool assembly for pulling the switch pack assembly for cable clusters according to claim 1 integrally away from network switches, characterized in that, the special release tool assembly comprises a pair of clamping handles the rear ends of which are hinged movably with each other, and the shape of the front end of the clamping handle matches that of the switch pack assembly for cable clusters, at the positions of the front end of the clamping handle corresponding to the open windows on the cover are all arranged pressure plates, moreover at the position of the inside of the front end of the clamping handle corresponding to the longitudinal sliding guide component of the switch pack assembly for cable clusters of network switches is arranged a longitudinal sliding positioning mechanism, and at the position of the inside of the front end of the clamping handle corresponding to the whole-body-pulling resisting component of the switch pack assembly for cable clusters is arranged a pulling force-applying mechanism.

19. The special release tool assembly for pulling the switch pack assembly for cable clusters integrally away from network switches according to claim 18, characterized in that, the open

windows on the main body of the cover are arranged at the positions corresponding to the front parts of the cable-oriented cavities at two ends of the central framework, and the pressure plates at the front end of the clamping handle of the special release tool assembly for pulling the switch pack assembly for cable clusters integrally away from network switches are arranged at the positions corresponding to the front parts of the cable-oriented cavities at two ends of the central framework.

20. The special release tool assembly for pulling the switch pack assembly for cable clusters integrally away from network switches according to claim 18, characterized in that, the central framework of the switch pack assembly for cable clusters includes a central lateral substrate, on two side surfaces of the central lateral substrate both are arranged spacedly several longitudinal clapboards perpendicular to the central lateral substrate and extending along the longitudinal direction, and each of the cable-oriented holding troughs is formed between adjacent longitudinal clapboards, the longitudinal sliding guide component of the switch pack assembly for cable clusters includes two longitudinal sliding guide convex blocks / longitudinal sliding guide grooves on the lateral surfaces of the longitudinal clapboards arranged at two ends of the central lateral substrate, at two sides of the front end of the clamping handle are all arranged position-limiting baffle plates perpendicular to the plane of the clamping handle and extending into the inside of the special release tool assembly, the longitudinal sliding positioning mechanism includes two longitudinal sliding guide grooves / longitudinal sliding guide convex blocks arranged at the insides of the position-limiting baffle plates and corresponding to the longitudinal sliding guide convex blocks / longitudinal sliding guide grooves on the lateral surfaces of the longitudinal clapboards arranged at two ends of the central lateral substrate, and the longitudinal sliding guide convex blocks slide to and fro in the longitudinal sliding guide grooves respectively.

21. The special release tool assembly for pulling the switch pack assembly for cable clusters integrally away from network switches according to claim 18, characterized in that, the whole-body-pulling resisting component is a lateral resisting convex bar / lateral resisting groove arranged at the middle part of the outside of the cover, the pulling force-applying mechanism is a lateral pulling elastic locking hook arranged at the inside of the front end of the clamping handle and corresponding to the lateral resisting convex bar / lateral resisting groove at the middle part of the outside of the cover, and the lateral pulling elastic locking hook hooks the lateral resisting convex bar / lateral resisting groove at the middle part of the outside of the cover.

22. The special release tool assembly for pulling the switch pack assembly for cable clusters integrally away from network switches according to any one of claims 18 to 21, characterized in

that, at the ends of the clamping handles are all arranged hinged pivots, moreover the hinged pivots are inserted spacedly and staggeredly into each other, and a hinge is inserted into a central shaft hole of the hinged pivots.

1/6

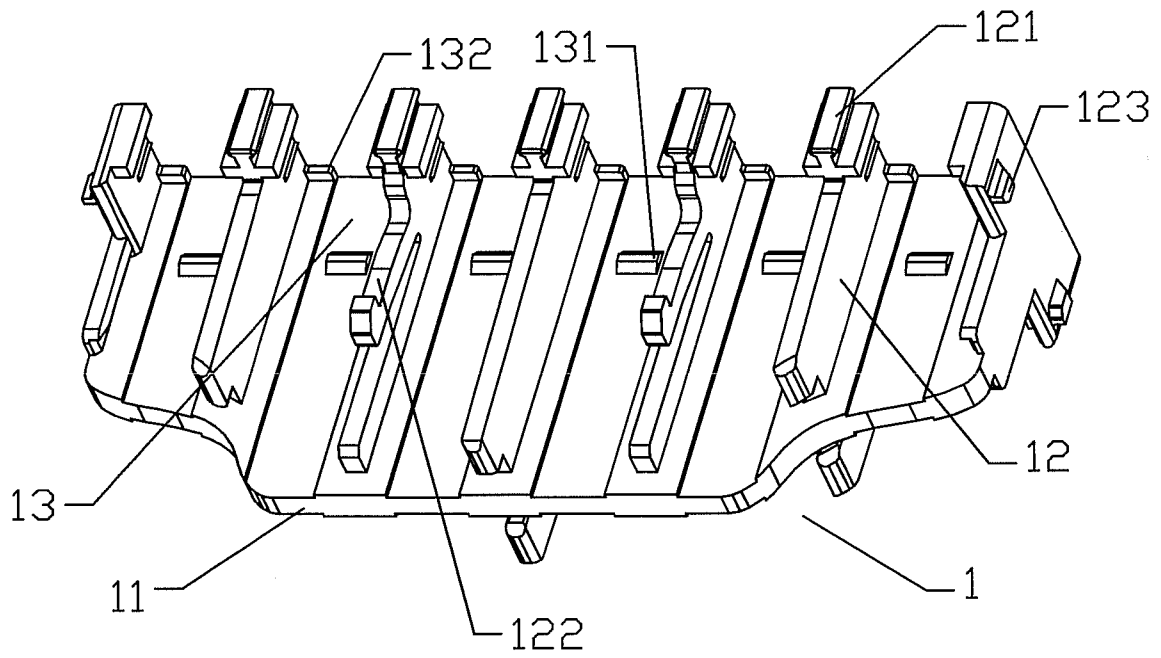


Figure 1

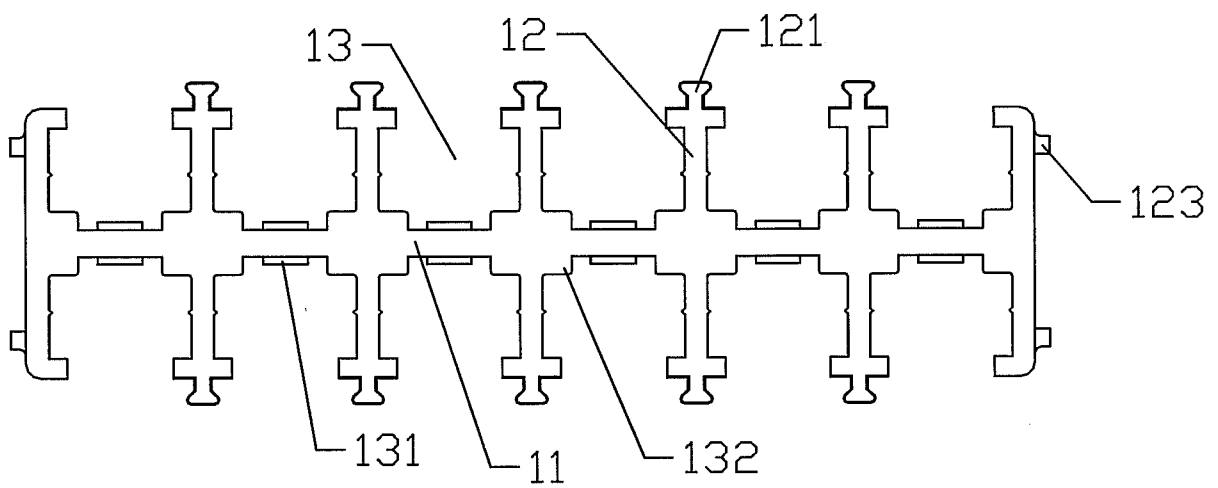


Figure 2

2/6

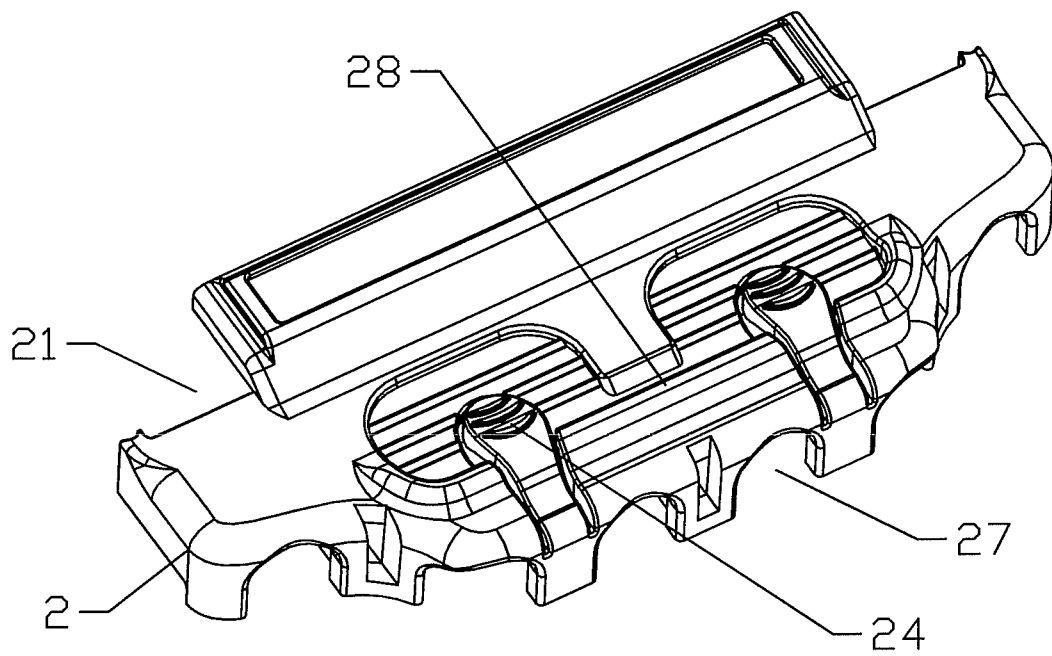


Figure 3

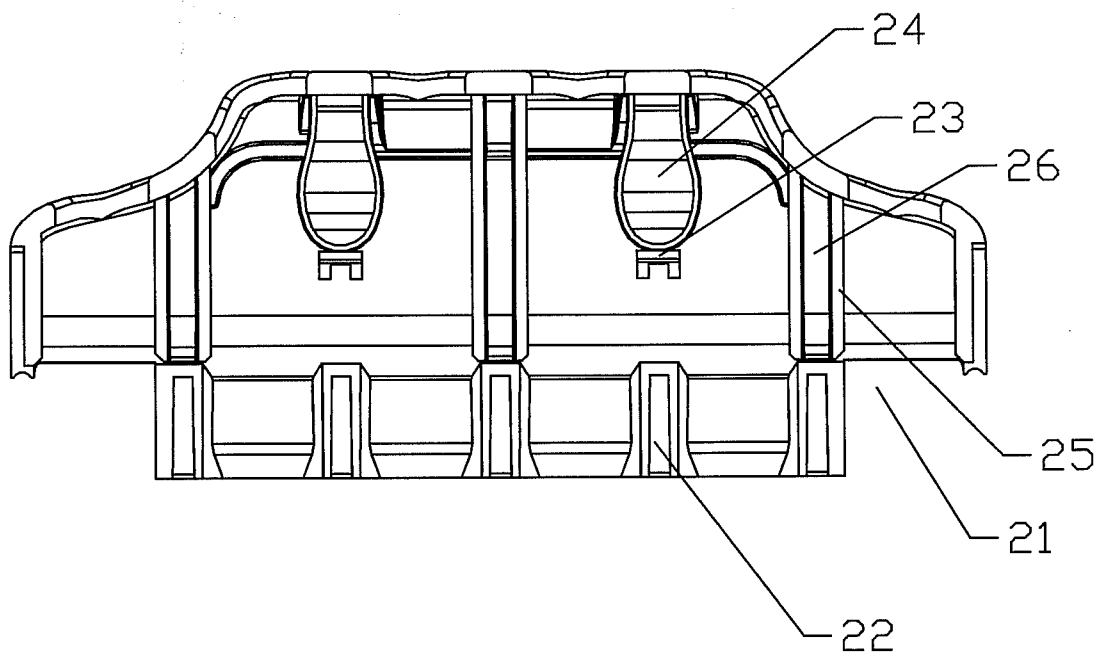


Figure 4

3/6

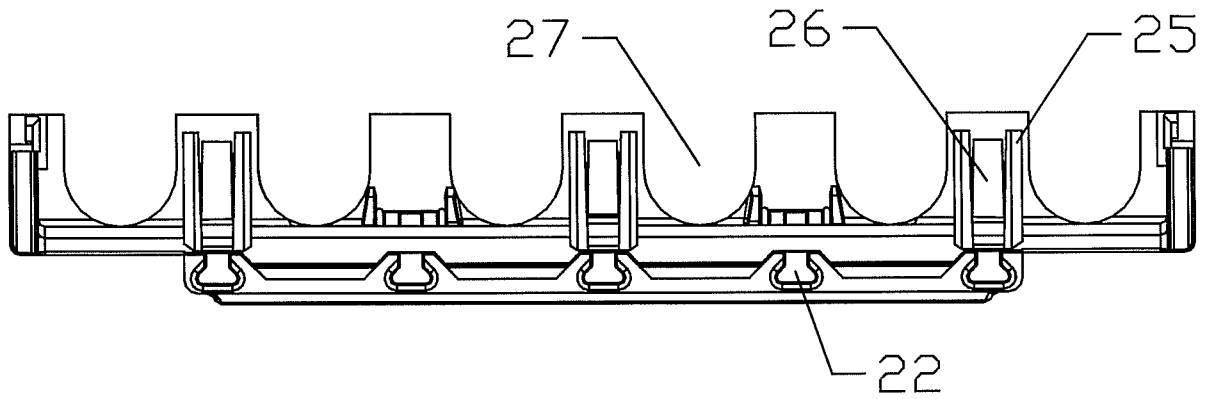


Figure 5

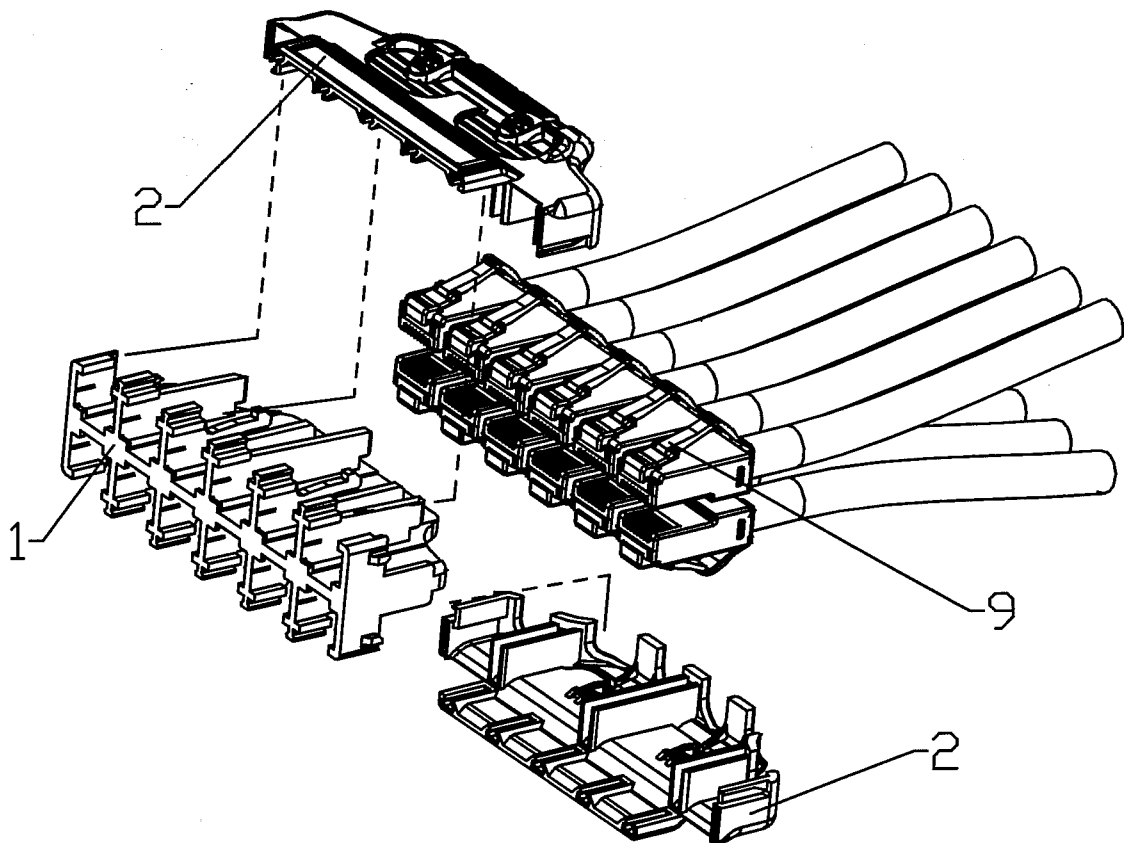


Figure 6

4/6

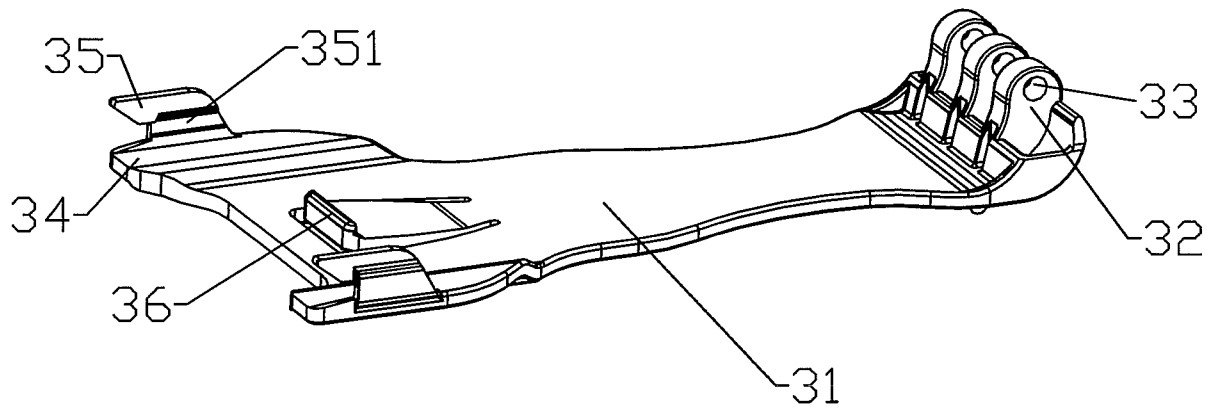


Figure 7

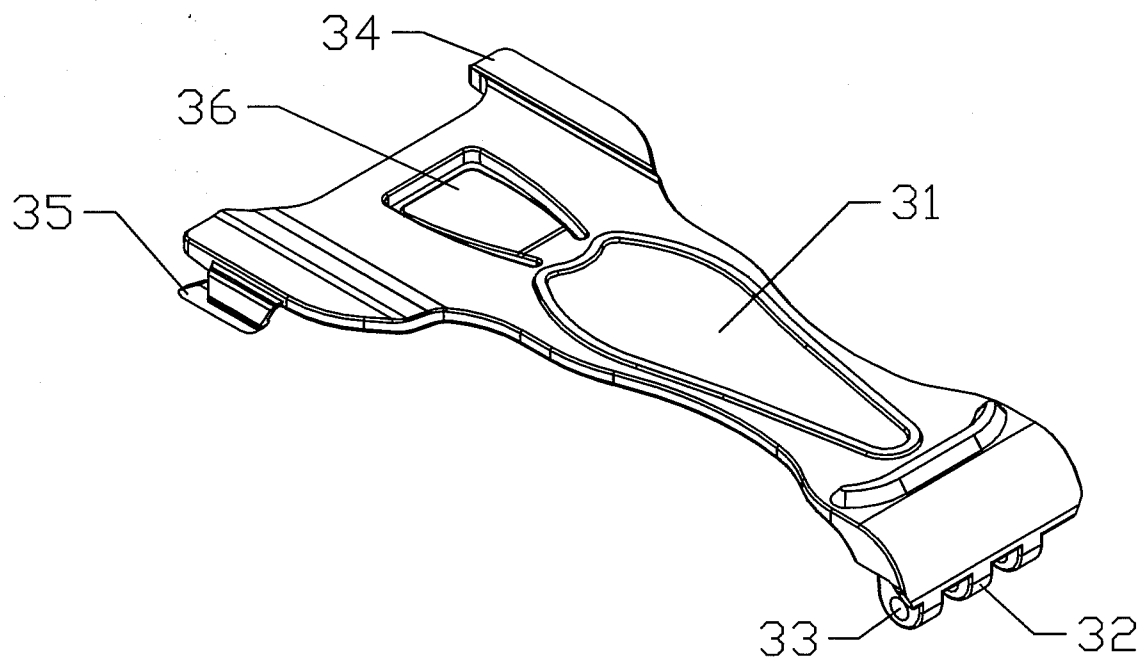


Figure 8

5/6

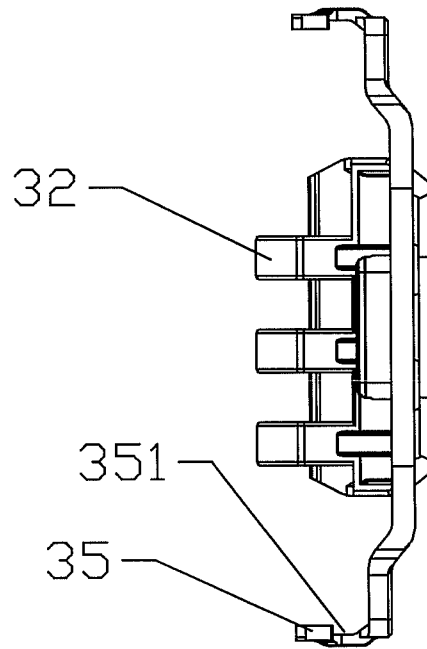


Figure 9

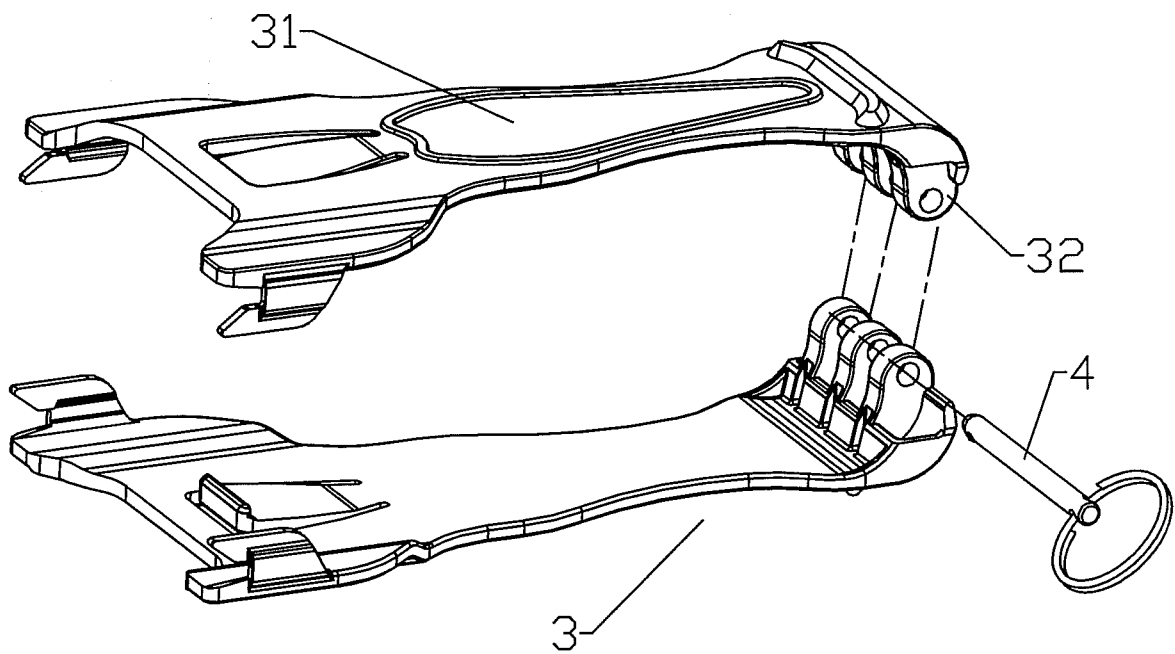


Figure 10

6/6

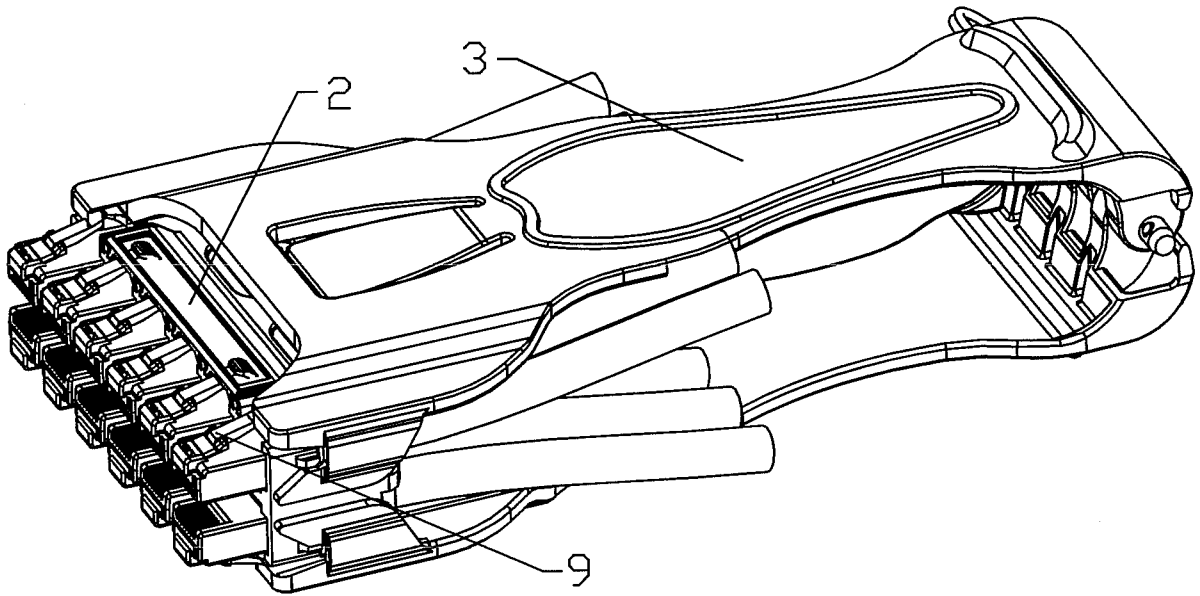


Figure 11

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2009/069827

A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - H01R 13/60 (2010.01)

USPC - 439/540.1

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC(8) - H01R 13/60, 24/00 (2010.01)

USPC - 398/117, 139; 439/71, 842, 816, 540.01, 676, 498, 352; 385/134, 135

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

MicroPatent, GooglePatent

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 7,381,087 B2 (ALVAREZ) 03 June 2008 (03.06.2008) entire document	1-22
Y	US 6,857,900 B2 (KLEEBERGER et al) 22 February 2005 (22.02.2005) entire document	1-22
Y	US 4,767,355 A (PHILLIPSON et al) 30 August 1988 (30.08.1988) entire document	7

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

* Special categories of cited documents:

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

17 February 2010

Date of mailing of the international search report

26 FEB 2010

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