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(54) **ULTRA-THIN EMBEDDED RIGID COVER WITHOUT JOINTS**

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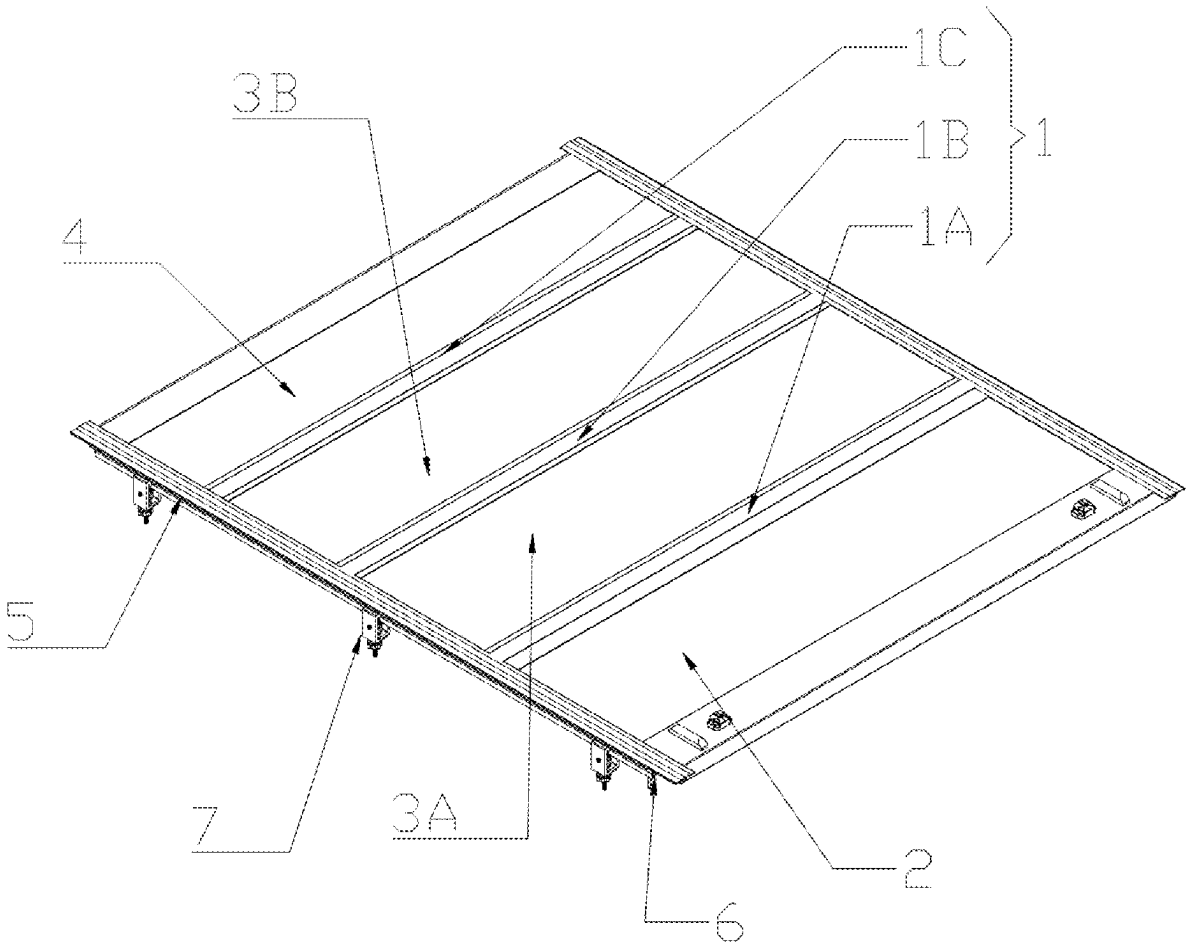
(57) **ABSTRACT**

The present invention discloses an ultra-thin embedded rigid cover without joints, including a side rubber strip, a guide rail system, a clamp system, a fixing lock bolt, a plurality of cover plates and a plurality of soft rotating shafts. The cover plate includes a front plate, a first intermediate plate, a second intermediate plate and a small plate, the front plate and the first intermediate plate, the first intermediate plate and the second intermediate plate, the second intermediate plate and the small plate are all connected to each other by a soft rotating shaft, the soft rotating shaft is of flexible material or of a material combining flexibility and rigidity.



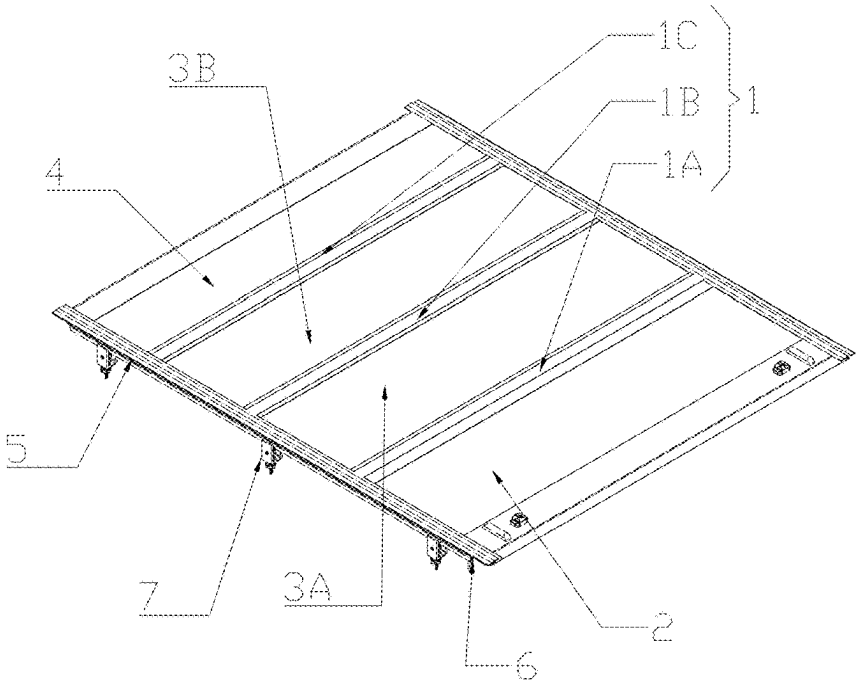

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Fig. 1

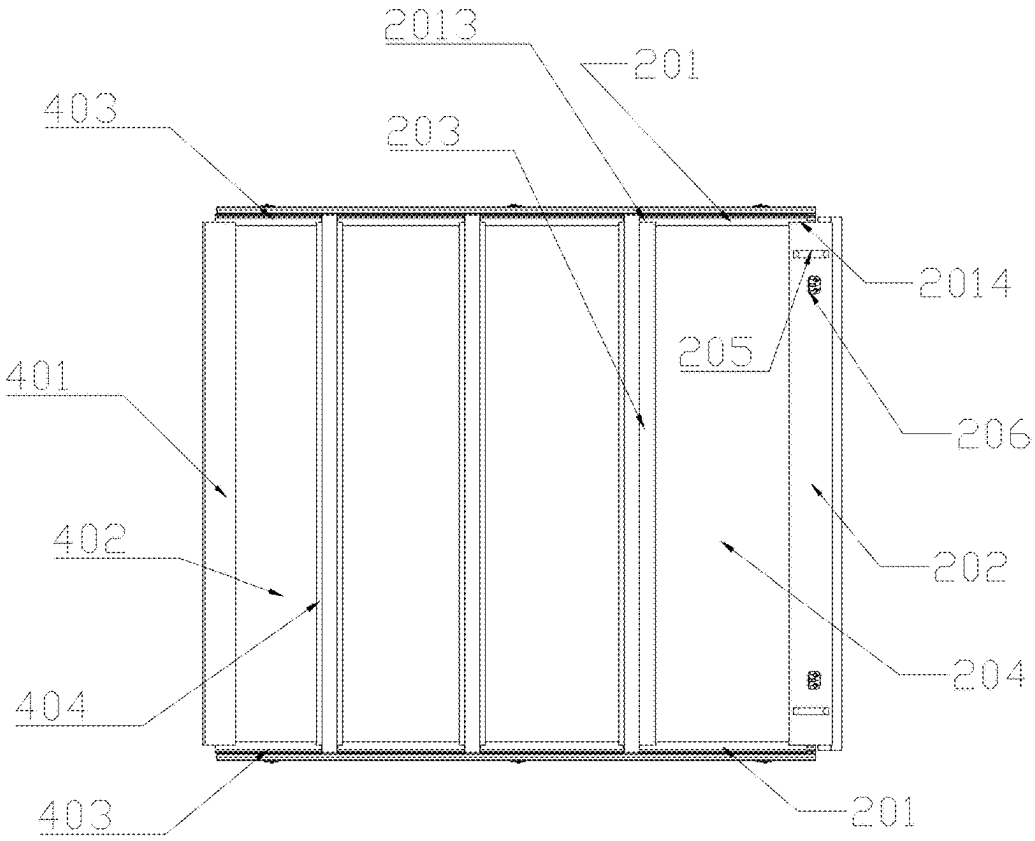
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Fig. 2

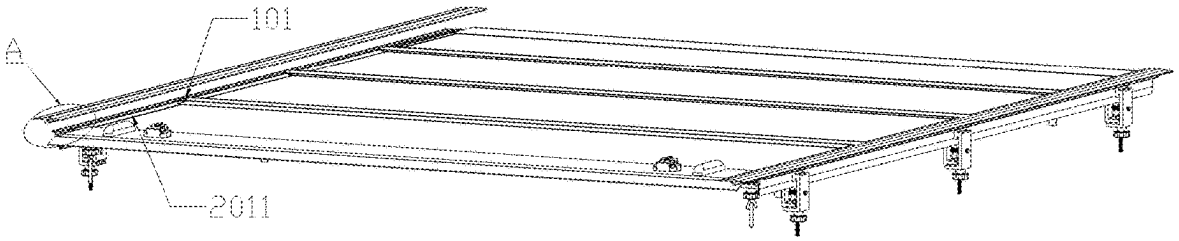

Fig. 3

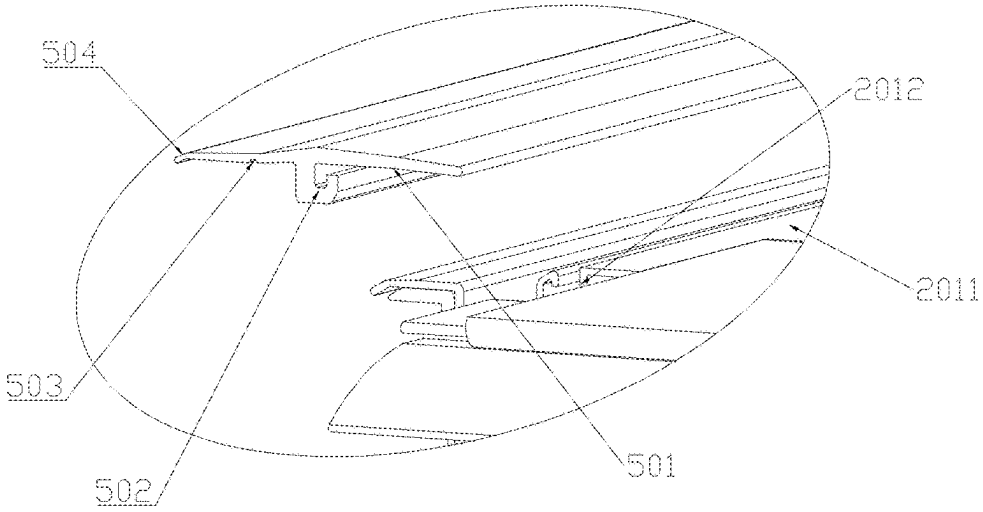

Fig. 4

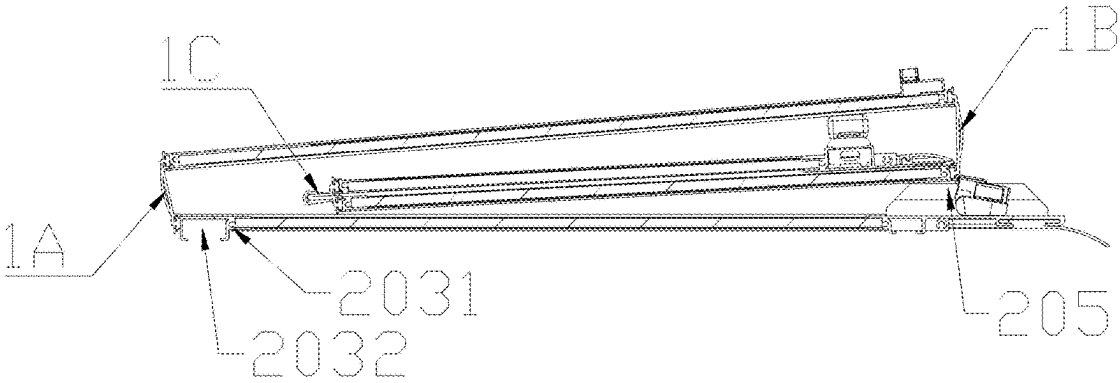

Fig. 5

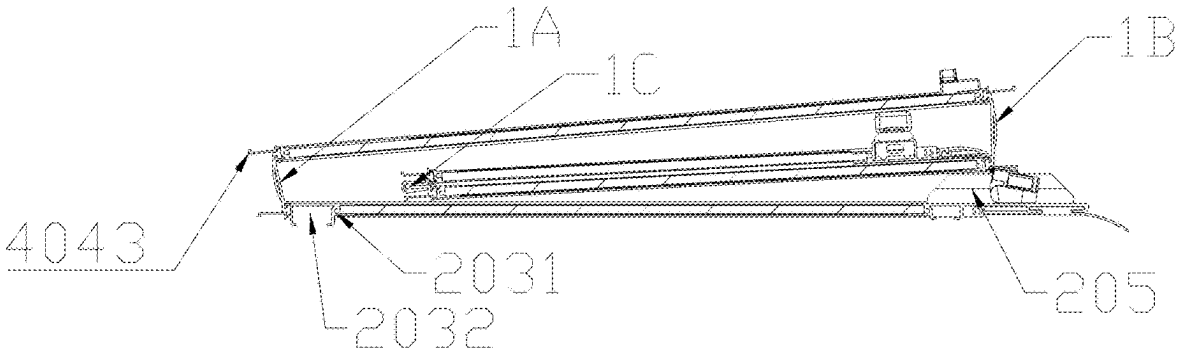

Fig. 6

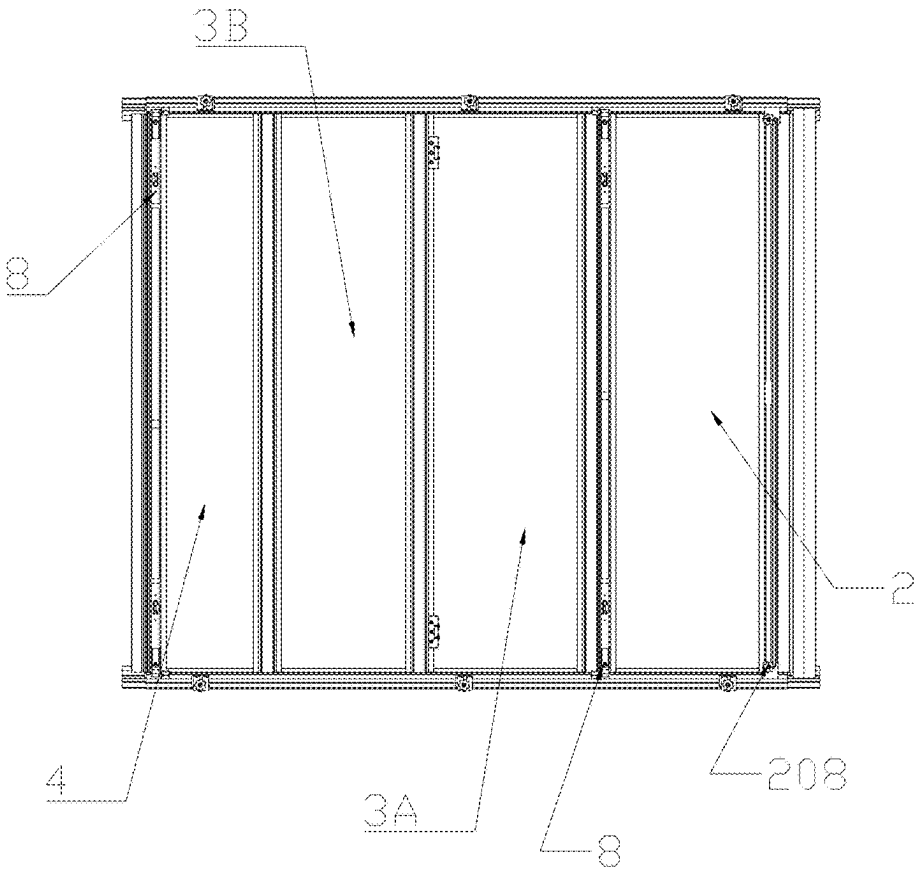

Fig. 7

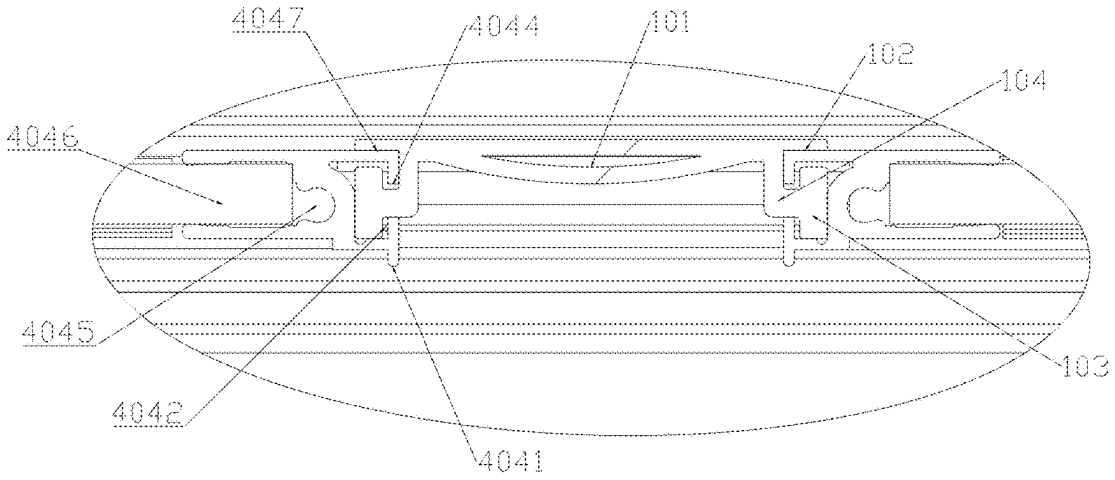

Fig. 8

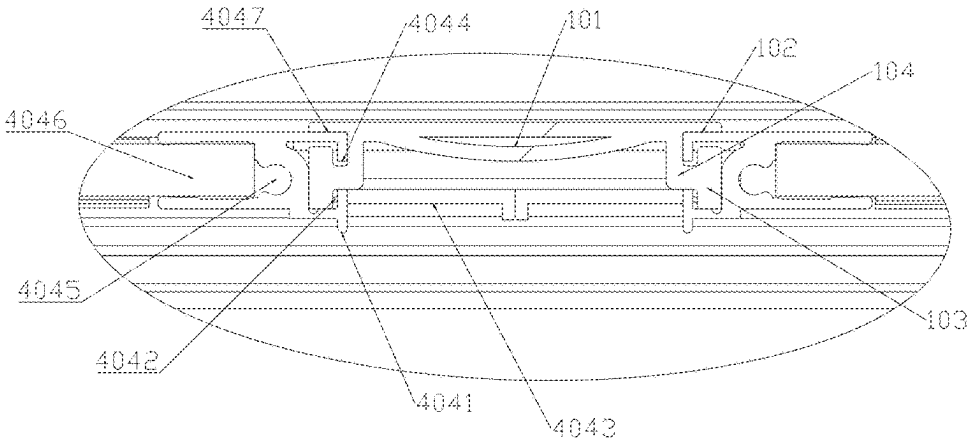

Fig. 9

Fig. 10

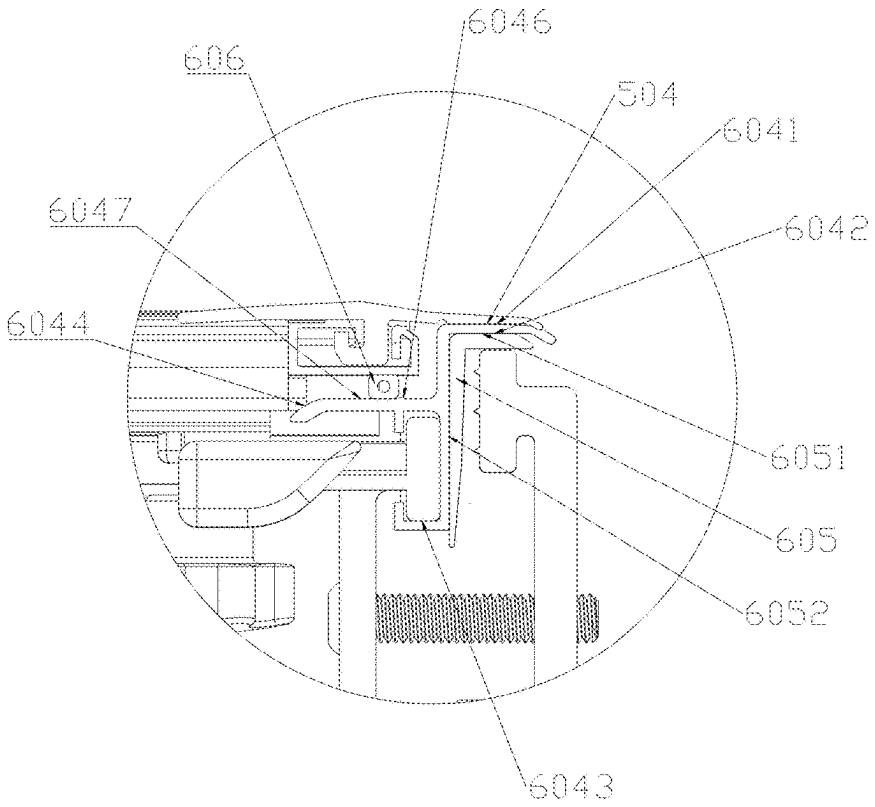

Fig. 11

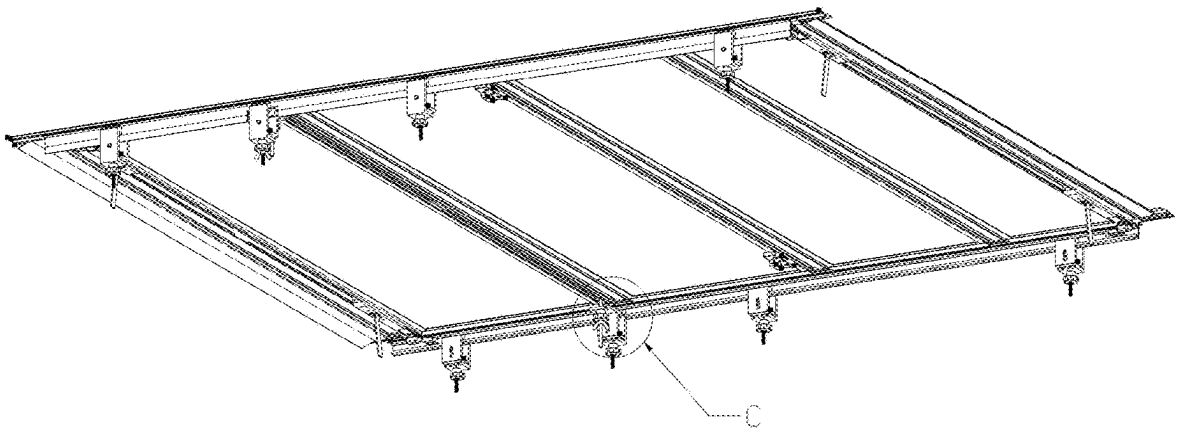

Fig. 12

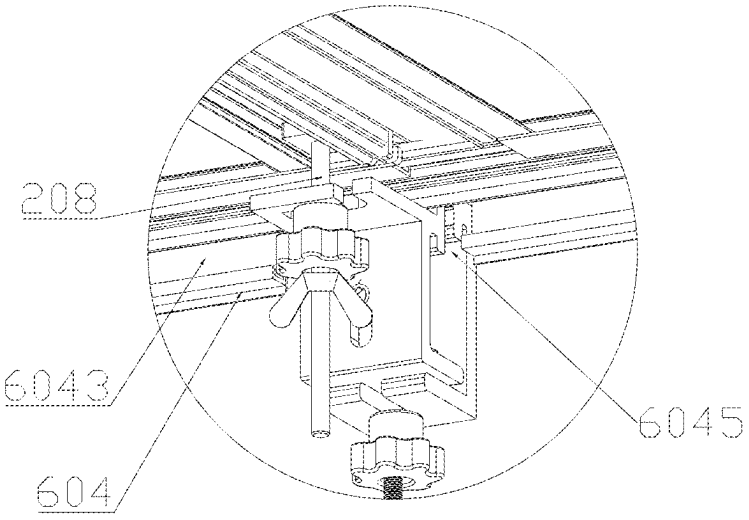

Fig. 13

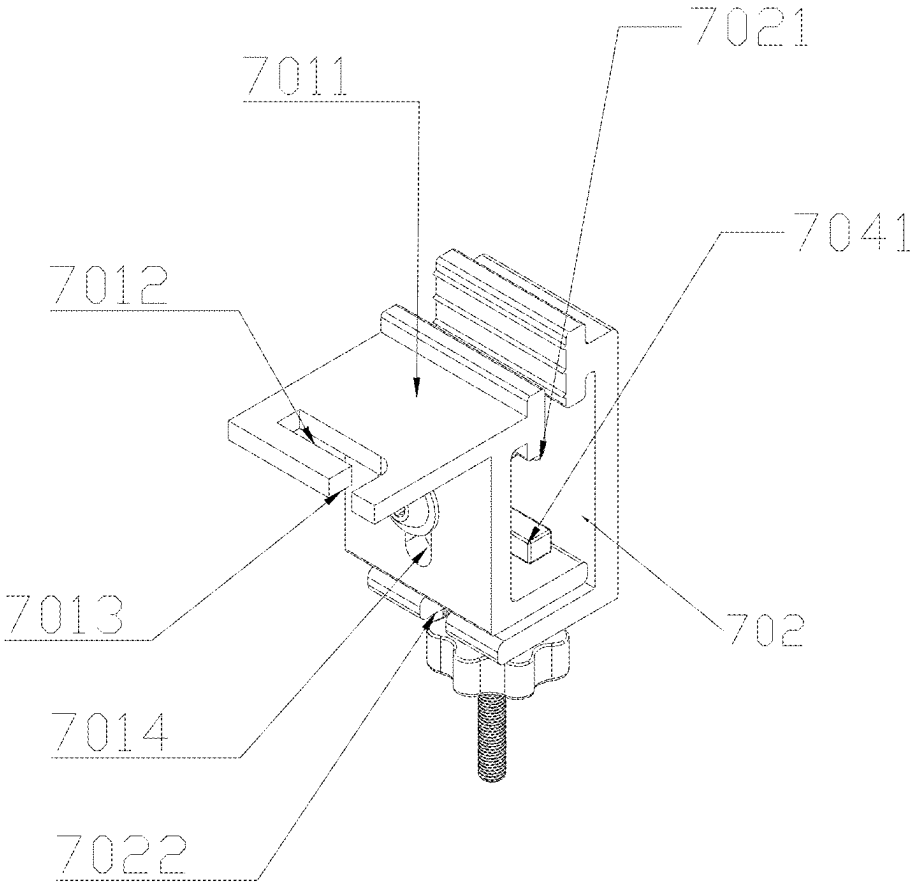

Fig. 14

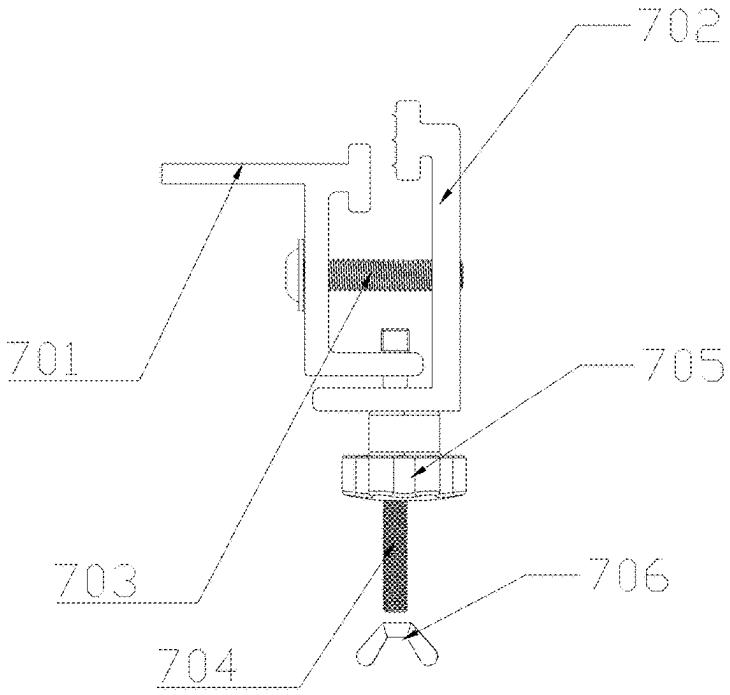

Fig. 15

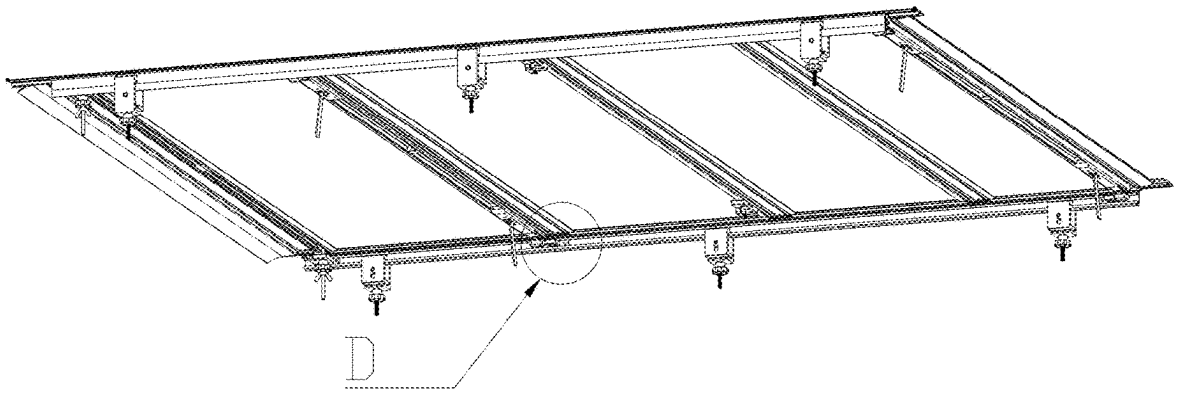

Fig. 16

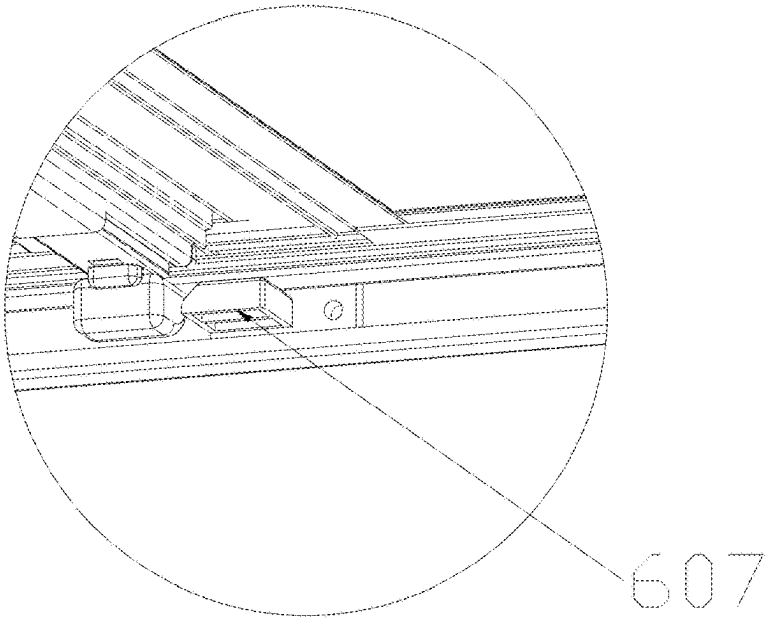

Fig. 17

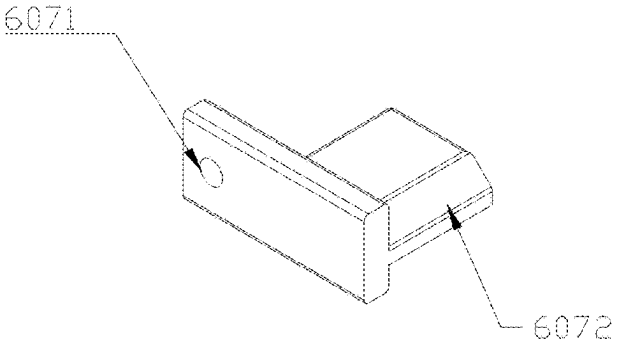

Fig. 18

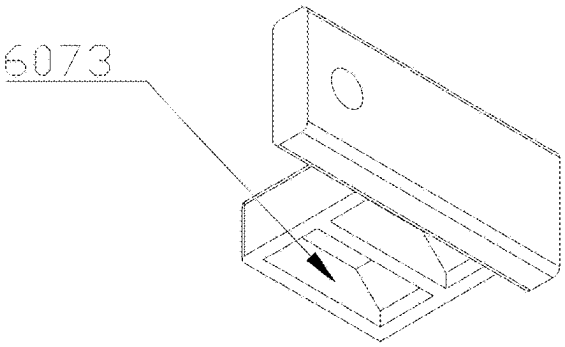

Fig. 19

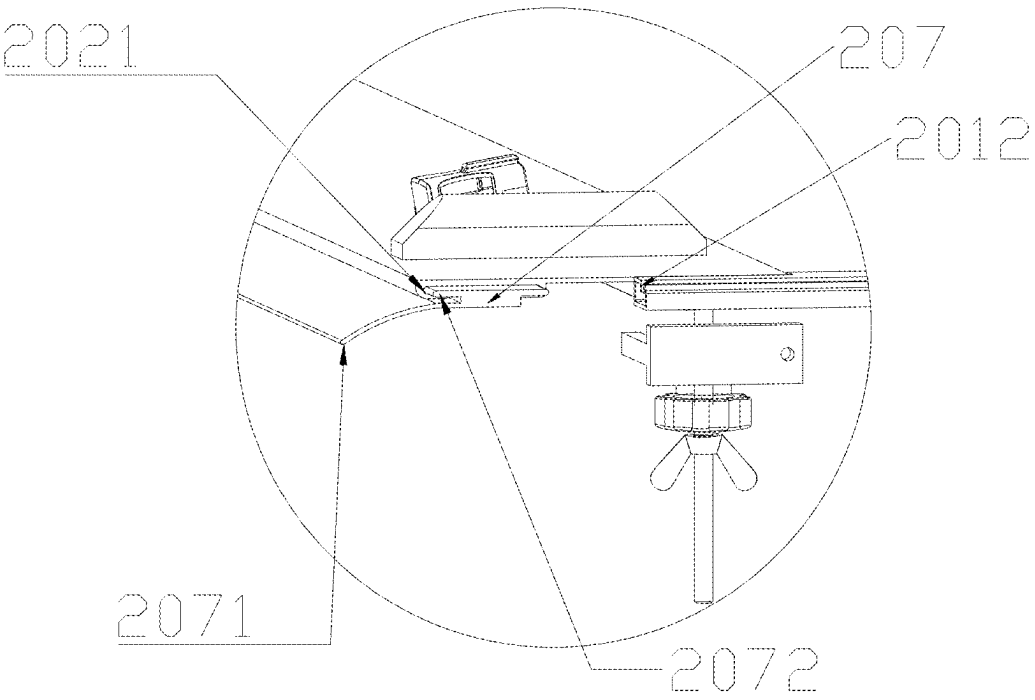

Fig. 20

ULTRA-THIN EMBEDDED RIGID COVER WITHOUT JOINTS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] The application claims priority of Chinese patent application CN202410178482.3, filed on Feb. 9, 2024, which is incorporated herein by reference in its entireties.

TECHNICAL FIELD

[0002] This invention is relevant to automotive spare parts, especially an ultra-thin embedded rigid cover without joints.

BACKGROUND TECHNOLOGY

[0003] Pickup trucks have both car-like comfort and strong power, due to the pickup truck's strong ability to carry cargo and adapt to poor road surface, its comprehensive performance also makes it become one of the common off-road models nowadays.

[0004] In order to make the pickup truck adapt to more diverse environments, most of the existing pickup trucks are required to be installed with a cover, which currently consists of a hard cover and a soft cover, the soft cover has the specificity of easy fabrication, but it cannot provide good support performance in the process of use and is very easy to be damaged, while the hard cover has strong support performance, but due to the rotating shaft structure in the hard cover, the existing hard cover cannot be made very thin.

About the Invention

[0005] To overcome the deficiencies of the prior art, the present invention provides a tri-fold semi-embedded cover of a front bar with a front extension panel, by changing the connecting structure of the front bar, to solve the above problem.

[0006] In order to solve the above problems of the existing technology, the technical solution adopted in the invention is as follows:

[0007] An ultra-thin embedded rigid cover without joints, including a side rubber strip, a guide rail system, a clamp system, a fixing lock bolt, a plurality of cover plates and a plurality of soft rotating shafts, with a gap between two adjacent cover plates.

[0008] The cover plate includes a front plate, a first intermediate plate, a second intermediate plate and a small plate, the front plate and the first intermediate plate, the first intermediate plate and the second intermediate plate, the second intermediate plate and the small plate are all connected to each other by a soft rotating shaft, the soft rotating shaft is of a flexible material or a material combining flexibility and rigidity, the front plate, the first intermediate plate, the second intermediate plate, the small plate and the soft rotating shaft are all connected to a side rubber strip at both ends, the soft rotating shaft is provided with an intermediate connecting bubble, two ends of the front plate, two ends of the first intermediate plate, two ends of the second intermediate plate and two ends of the small plate are connected to a side rail (front plate, intermediate plate and small panels all with corresponding side rails), the side rail is provided with a bonding section, the side rubber strip is provided with a gluing section, the bonding section is bonded to the gluing section;

[0009] The fixing lock bolt is arbitrarily connected to the first intermediate plate, the second intermediate plate and the small plate (the arbitrary connection herein means that the fixing lock bolt can be connected to one or more of the above mentioned plates, or it can be arbitrarily connected to any position of the above mentioned plates), the front plate is connected to either a fixing lock bolt or a front plate fixing rod (the front plate can be connected to the fixing lock bolt or the front plate fixing rod, by connecting only one of them, if the front plate fixing rod is connected, it is necessary to arrange the front plate fixing rod on the side of the front plate close to the front of the car, on the other hand. if the fixing lock bolt is connected, the fixing lock bolt is arranged on the side of the front plate close to the tail of the car).

[0010] The present invention does not set end caps at both ends of the soft rotating shaft, the soft rotating shaft will be directly connected to a side rubber strip on both sides, which can reduce the thickness of the car cover.

[0011] An ultra-thin embedded rigid cover without joints, includes a side rubber strip, a guide rail system, a clamp system, a fixing lock bolt, a plurality of cover plates and a plurality of soft rotating shafts;

[0012] The cover plate includes a front plate, a first intermediate plate, a second intermediate plate and a small plate, the front plate and the first intermediate plate, the first intermediate plate and the second intermediate plate, the second intermediate plate and the small plate are all connected to each other by a soft rotating shaft, the soft rotating shaft is of a flexible material or a material combining flexibility and rigidity, the front plate, the first intermediate plate, the second intermediate plate, the small plate and the soft rotating shaft are connected to the a side rubber strip at both ends, the soft rotating shaft is provided with an intermediate connecting bubble, two ends of the front plate, two ends of the first intermediate plate, two ends of the second intermediate plate and two ends of the small plate are connected to a side rail, the side rail is provided with a bonding section, the side rubber strip is provided with a gluing section, the bonding section is bonded to the gluing section;

[0013] The fixing lock bolt is arbitrarily connected to the first intermediate plate, the second intermediate plate and the small plate (the arbitrary connection here means that the fixing lock bolt can be connected to one or more of the above mentioned plates, or it can be arbitrarily connected to any position of the above mentioned plates), the front plate is connected to either a fixing lock bolt or a front plate fixing rod (the front plate can be connected to either a fixing lock bolt or a front plate fixing rod, by connecting only one of them, if the front plate fixing rod is connected, it is necessary to arrange the front plate fixing rod on the side of the front plate close to the tail of the car, on the other hand, if the fixing lock bolt is connected, the fixing lock bolt is arranged on the side of the front plate close to the tail of the car); when the car cover is unfolded, the two adjacent cover plates are abutting against each other (the cover plates here include the front plate, the intermediate plate, and the rear bar).

[0014] The pressing rod is connected with a resisting rod, the rear pressing rod is connected with a rear bar resisting rod, when the car cover is spread, the two resisting rods are pressed against each other.

[0015] An ultra-thin embedded rigid cover without joints, includes a side rubber strip, a guide rail system, a clamp

system, a fixing lock bolt, a plurality of cover plates and a plurality of soft rotating shafts, with a gap between two adjacent cover plates;

[0016] The cover plates includes a front plate, a second intermediate plate and a small plate, the front plate and the first intermediate plate, the first intermediate plate and the second intermediate plate, the second intermediate plate and the small plate are connected to each other by a soft rotating shaft, the soft rotating shaft is of a flexible material or a material combining flexibility and rigidity, the front plate, the second intermediate plate, the small plate and the soft rotating shaft are all connected to a side rubber strip at both ends, the soft rotating shaft is provided with an intermediate connecting bubble, two ends of the front plate, two ends of the second intermediate plate and two ends of the small plate are connected to a side rail, the side rail is provided with an bonding section, the side rubber strip is provided with a gluing section, the bonding section is bonded to the gluing section;

[0017] The fixing lock bolt is arbitrarily connected to the second intermediate plate and the small plate, the front plate is connected to the fixing lock bolt or the front plate fixing rod.

[0018] The intermediate plate can be provided in a plurality of ways or only one, depending on the length of the car cover and the number of folded layers.

[0019] An ultra-thin embedded rigid cover without joints, includes a side rubber strip, a guide rail system, a clamp system, a fixing lock bolt, a plurality of cover plates and a plurality of soft rotating shafts.

[0020] The cover plate includes a front plate, a second intermediate plate and a small plate, the front plate and the second intermediate plate, the second intermediate plate and the small plate are connected to each other by a soft rotating shaft, the soft rotating shaft is a flexible material or a material combining flexibility and rigidity, the front plate, the second intermediate plate, the small plate and the soft rotating shaft are connected to a side rubber strip at both ends, the soft rotating shaft is provided with an intermediate connecting bubble, two ends of the front plate, two ends of the second intermediate plate and two ends of the small plate are connected to a side rail, the side rail is provided with a bonding section, the side rubber strip is provided with a gluing section, the bonding section is bonded to the gluing section.

[0021] The fixing lock bolt is arbitrarily connected to the second intermediate plate and the small plate, the front plate is connected to the fixing lock bolt or the front plate fixing rod, whereby two adjacent cover plates are abutting against each other when the cover is unfolded.

[0022] An ultra-thin embedded rigid cover without joints, includes a side rubber strip, a guide rail system, a clamp system, a fixing lock bolt, a plurality of covers and a plurality of soft rotating shafts;

[0023] The soft rotating shaft includes a first soft rotating shaft and a third soft rotating shaft, the first soft rotating shaft is of a width greater or less than the width of the third soft rotating shaft, the soft rotating shaft is of a flexible material or a material combining flexibility and rigidity;

[0024] The cover plate includes a front plate, a second intermediate plate and a small plate, the front plate and the second intermediate plate are connected to each other by a first soft rotating shaft, the second intermediate plate and the small plate are connected to each other by a second soft rotating shaft, the front plate, the second intermediate plate, the small plate and the soft rotating shaft are all connected to a side rubber strip at both sides, the soft rotating shaft is provided with an intermediate connecting bubble, two ends of the front plate, two ends of the second intermediate plate and two ends of the small plate are connected to a side rail, the side rail is provided with a bonding section, the side rubber strip is provided with a gluing section, the bonding section is bonded to the gluing section;

[0025] The fixing lock bolt is arbitrarily connected to the second intermediate plate and the small plate, the front plate is connected to the fixing lock bolt or the front plate fixing rod.

[0026] An ultra-thin embedded rigid cover without joints, includes a side rubber strip, a guide rail system, a clamp system, a fixing lock bolt, a plurality of covers and a plurality of soft rotating shafts;

[0027] The soft rotating shaft includes a first soft rotating shaft and a third soft rotating shaft, the first soft rotating shaft is of a width greater or less than the width of the third soft rotating shaft, the soft rotating shaft is of a flexible material or a material combining flexibility and rigidity;

[0028] The cover plate includes a front plate, a second intermediate plate and a small plate, the front plate and the second intermediate plate are connected to each other by a first soft rotating shaft, the second intermediate plate and the small plate are connected to each other by a second soft rotating shaft, the front plate, the second intermediate plate, the small plate and the soft rotating shaft are all connected to a side rubber strip at both sides, the soft rotating shaft is provided with an intermediate connecting bubble, two ends of the front plate, two ends of the second intermediate plate and two ends of the small plate are connected to a side rail, the side rail is provided with a bonding section, the side rubber strip is provided with a gluing section, the bonding section is bonded to the gluing section;

[0029] The fixing lock bolt is arbitrarily connected to the second intermediate plate and the small plate, the front plate is connected to the fixing lock bolt or the front plate fixing rod.

[0030] Further, the front plate includes a plate body, a front plate side rail, a front plate front bar, a front plate rear bar, a plate body, a front plate support, a front plate buckle, a front plate rubber strip and a front plate fixing rod, the plate body is surrounded by a front plate front bar, a front plate rear bar and two front plate side rails, the front plate side rails are provided with a rear protrusion and a front protrusion, the rear protrusion is connected to the front plate rear bar, the front protrusion is connected to the front plate front bar, the thickness of the plate body is less than or equal to 10 mm, the front bar support, the front bar buckle and the front plate fixing rod are symmetrically connected to the front plate front bar, the fixing lock bolt is connected to the front plate rear bar, the front plate side rail is provided with a side rail bending hook, the side rubber strip is provided with a bending hook section, the bending hook section is used for hooking the side rail bending hook; the front plate is connected to a guide rail system through a front plate fixing rod, the front plate rubber strip is provided with an extension surface and a front plate rubber strip insertion head, the front plate front bar is provided with a front plate front bar groove, the front plate rubber strip insertion head is clamped with the front plate front bar groove, the front plate consists of a plate body surrounded by four frames,

wherein the front plate rear bar is used for connecting a soft rotating shaft, the two front plate side rails are used for connecting the side rubber strips and the guide rails, the plate body in the middle serves as a support, by providing a bending hook at the side rubber strips, it can be fitted with the side rails bending hooks to provide a better connecting effect.

[0031] Further, the small plate includes a rear bar, a small plate body, a small plate side rail, a small plate front bar and a rear bar rubber strip; the rear bar rubber strip is provided with a rear bar rubber strip hole, a rear bar rubber strip insertion head and a rear bar rubber strip gluing surface, the rear bar is provided with a rear bar profile lower surface and an insertion groove, the rear bar rubber strip insertion head is snapped into the insertion groove, the rear bar rubber strip gluing surface is glued to the rear bar profile lower surface. The structure of the small plate is similar to the structure of the front plate structure, both of which are constituted by a surrounding frame and a small plate body in the centre, similarly, if the rear bar profile is to be mated with the rear bar rubber strip, a corresponding snap together structure needs to be set up, and the rear bar rubber strip is to be provided with rear bar rubber strip holes, which are used to increase the amount of compression.

[0032] Further, the side rubber strip is provided with a gluing section, a bending hook section, a groove and a lower pressing and bending surface, the gluing section is used for bonding with the side rail and the intermediate rotating shaft. The groove allows the glue strip to have an automatic downward pressure stress, which can enhance the waterproof effect. The lower pressing and bending surface also serves to increase the degree of downward pressure on the side rubber strip.

[0033] Further, the first soft rotating shaft, second soft rotating shaft and third soft rotating shaft are interchangeable, so that the plate is able to be pressed against the front rail support when the cover is flipped and fold. the soft rotating shaft includes an intermediate connecting bubble, a pressing bar, a snap-in head, and a snap-neck section; the small plate front bar includes a pressing rod, a rod groove, a resisting rod, an upper pressing head, a screw-fixing hole, a plate groove, and an upper plane; the pressing bar is provided on the upper side of the upper plane to enhance waterproofing, the snap-in head is clamped with the rod groove, the pressing rod squeezes the snap-neck section in cooperation with the upper pressing head after deformation, the plate groove is used to connect the plate body, the screw fixing holes are used to connect the side rail by screws. The soft rotating shaft is equipped with an intermediate connecting bubble, which increases the expansion and contraction elasticity of the soft rotating shaft, it can also play a very good waterproof effect by connecting the pressing bar with the upper plane. The soft rotating shaft structure can ensure the smoothness of the car cover flipping and folding, and by setting the rod groove and the pressure bar to ensure that the two ends of the soft rotating shaft are stuck in the inside of the rod groove and not easy to fall off, so as to form a stable connection with the car cover.

[0034] Further, the fixing lock bolt includes a lock bolt base, a lock bolt cover, a lock bolt, a lock bolt spring steel, a steel wire, a lock bolt cylinder, a spring, and a cylindrical rod, the lock bolt groove is connected to a plate body, both ends of the lock bolt groove is connected to a lock bolt base, the lock bolt base is connected with a lock bolt cover, the lock bolt base is provided with a lock bolt cavity, a spring arrangement compartment and a cylindrical travelling compartment, the lock bolt cavity, the spring arrangement compartment and the cylindrical travelling compartment are mutually connected, the lock bolt includes a sliding block, the sliding block is provided in the lock bolt cavity, the lock bolt cylinder is located within the spring arrangement compartment and the cylinder traveling compartment, one end of the lock bolt cylinder is connected to the sliding block through the lock bolt spring steel, the other end of the lock bolt cylinder is connected to a steel wire, the lock bolt cylinder is sleeved with a spring, the spring is located in the spring arrangement compartment, the lock bolt is connected to a pulling strap, the pulling strap is located in the cylinder travelling compartment, the pulling strap extends out from the lock bolt cover, the lock bolt groove is connected with a steel wire support block, the steel wire passes through the steel wire support block, the lock bolt cover is provided with a steel wire hole, the steel wire passes through the steel wire hole, the cylindrical travelling compartment is connected with two cylindrical rods, the cylindrical rod is used for positioning the pulling strap.

[0035] Further, the clamp system includes a left clamp, a right clamp and a T-rod, the left clamp and the right clamp are connected by screws, the T-rod passes through the left clamp and the right clamp, the T-rod is connected with a nut, the left clamp is provided with a waist hole; the right clamp is provided with a threaded hole and a half-waist hole, the screw passes through the waist hole and the screw hole, the T-rod passes through the half-waist hole. the clamp assembly is mainly to connect the guide rail to the hopper, when in use, part of the left clamp extends into the rail groove, while the right clamp is located on the outer side of the hopper, the left clamp and the right clamp are connected by screws to clamp the guide rail to the car body, and then longitudinally connect the T-rod to achieve multi-directional positioning of the left clamp and the right clamp.

[0036] Further, the guide rail system includes a guide rail, the guide rail includes a guide rail groove, a lock bolt arcing surface, a guide rail support plane and a rubber strip gluing surface, the lock bolt arcing surface is located on the inner side of the guide rail, the guide rail support plane is located on the outer side of the guide rail; the guide rail support plane includes a support upper surface and a support lower surface, the support upper surface is attached to the lower pressing and bending surface, the first guide rail rubber strip includes a rubber strip top surface and a rubber strip gluing surface, the rubber strip top surface is glued to the support lower surface, the rubber strip gluing surface is glued to the guide rail groove. The lock bolt arching surface is connected to the guide rail groove by a guide rail gluing surface, the guide rail gluing surface is provided with a positioning strip, the guide rail gluing surface is bonded with a second guide rail rubber strip, the second guide rail rubber strip is provided along the positioning strip. As the guide rail is connected to both the cargo hopper and the car cover, the guide rail should not only ensure the stability of the connection, but also have a certain degree of sealing, therefore, it is necessary to set up a number of rubber strips in the guide rail system, in which the first guide rail rubber strips are set on the outer side of the guide rail, the clamping system is loaded with the first guide rubber strips when clamped, so that it can play a good anti-slip effect, the second guide rail rubber strip is set up on the inner side of the guide rail to play

a waterproof effect and prevent rainwater from entering the hopper, in addition, the side rail rubber strip is located on the upper side of the guide rail, which also plays a certain waterproof effect.

[0037] Further, the guide rail groove is connected to a front plate fixing clamp, the front plate fixing rod includes a threaded rod, one end of the threaded rod is connected to a square head, which is used to clamp with the front plate front plate groove, the threaded rod passes through the front plate fixing clamp and connects to a plum nut and butterfly nut, the front bar fixing clamp includes a front and rear groove, a snap-in notch and a slide-in opening, the slide-in opening is connected to the guide rail groove, the snap-in notch is connected to the front and rear grooves, the snap-in notch and the front and rear grooves are used to connect the threaded rod, the front bar is connected to the guide rail through the front bar fixing clamp, the installation of the front bar fixing clamp ensures the stability of the front bar connection, one end of the front bar fixing clamp is connected to the guide rail, followed by the front plate fixing rod extends into the snap-in notch, and finally the plum nut and butterfly nut are connected to the front plate fixing rod to complete the fixing of the front plate, as the front plate fixing clamp is also provided with front and rear grooves, the front bar fixing rod can be moved back and forth along the front and rear grooves after it is extended into the front and rear grooves, which allows fine-tuned according to the position of the front bar.

[0038] The beneficial effects of the present invention are:

[0039] 1. The present invention makes it possible to make the overall car cover thinner, smaller and lighter by omitting the original rotating shaft joint.

[0040] 2. The present invention adopts a simple soft rotating shaft structure, which is easier and cheaper than the previous rigid structure, and can be designed to be thinner.

DESCRIPTION OF FIG

[0041] FIG. **1** is a structural schematic diagram I of the present invention.

[0042] FIG. **2** is a structural schematic diagram II of the present invention.

[0043] FIG. **3** is a structural schematic diagram III of the present invention.

[0044] FIG. **4** is a structural schematic diagram of part A in FIG. **3**.

[0045] FIG. **5** is a schematic diagram I of the folded car cover.

[0046] FIG. **6** is a schematic diagram II of the folded car cover.

[0047] FIG. **7** is a structural schematic diagram IV of the present invention.

[0048] FIG. **8** is a connection schematic diagram I of the soft rotating shaft.

[0049] FIG. **9** is a connection schematic diagram II of the soft rotating shaft.

[0050] FIG. **10** is a structural schematic diagram V of the present invention.

[0051] FIG. **11** is a partially enlarged view of part B in FIG. **10**.

[0052] FIG. **12** is a structural schematic diagram VI of the present invention.

[0053] FIG. **13** is a partially enlarged view of part C in FIG. **12**.

[0054] FIG. **14** is a structural schematic diagram of a clamp system of the present invention.

[0055] FIG. **15** is a front view of the clamp system.

[0056] FIG. **16** is a structural schematic diagram VII of the present invention.

[0057] FIG. **17** is a partially enlarged view of part D in FIG. **16**.

[0058] FIG. **18** is a structural schematic view of a guide rail resisting block.

[0059] FIG. **19** is another structural schematic view of the guide rail resisting block.

[0060] FIG. **20** is a usage schematic diagram of the guide rail resisting block.

[0061] FIGS.: **1**—Soft rotating shaft; **1**A—First soft rotating shaft; **1**B—Second soft rotating shaft; **1**C—Third soft rotating shaft; **101**—Intermediate connecting bubble; **102**—Pressing bar; **103**—Snap-in head; **104**—Snap-neck section; **2**—Front plate; **201**—Front plate side rail; **2011**—Bonding section; **2012**—Side rail bending hook; **2013**—Rear protrusion; **2014**—Front protrusion; **202**—Front plate front bar; **2021**—Front plate front bar groove; **203**—Front plate rear bar; **204**—Plate body; **205**—Front bar support; **206**—Front bar buckle; **207**—Front plate rubber strip; **2071**—Extension surface; **2072**—Front plate rubber strip insertion head; **208**—Front plate fixing rod; **2081**—Threaded rod; **2082**—Square head; **3**A—First intermediate plate; **3**B—Second intermediate plate; **3B011**—Rear bar pressing rod; **3B012**—Rear bar resisting rod; **4**—Small plate; **401**—Rear bar; **4011**—Rear bar profile lower surface; **4012**—Gluing groove; **402**—Small plate body; **403**—Small plate side rail; **404**—Small plate front bar; **4041**—Pressing rod; **4042**—Rod groove; **4043**—Resisting rod; **4044**—Upper pressing head; **4045**—Screw fixing hole; **4046**—Plate groove; **4047**—Upper Plane; **405**—Rear bar rubber strip; **4051**—Rear are rubber strip hole; **4052**—Rear bar rubber strip insertion head; **4053**—Rear bar rubber strip gluing surface; **5**—Side rubber strip; **501**—Gluing section; **502**—Bending hook section; **503**—Groove; **504**—Lower pressing and bending surface; **6**—Guide System; **6**—Guide rail system; **601**—Front bar fixing clamp; **6011**—Front and rear grooves; **6012**—Snap-in notch; **6013**—Slide-in section; **6014**—Threaded hole; **602**—Plum nut; **603**—Butterfly nut; **604**—Guide rail; **6041**—Supporting upper surface; **6042**—Supporting lower surface; **6043**—Guide rail groove; **6044**—Lock bolt arching surface; **6045**—Gluing surface; **6046**—Positioning strip; **605**—First guide rail rubber strip; **6051**—Rubber strip top surface; **6052**—Rubber strip gluing surface; **606**—Second guide rail rubber strip; **607**—Guide rail resisting block; **7**—Clamp system; **701**—Left clamp; **7011**—Waisted hole; **702**—Right clamp; **7021**—Threaded connecting hole; **7022**—Half-waisted hole; **703**—Screw; **704**—T-rod; **7041**—Positioning head; **705**—Nut; **8**—Fixing lock tongue; **801**—Lock tongue base; **8011**—Spring arrangement compartment; **8012**—Cylindrical travelling compartment; **8013**—Lock tongue cavity; **802**—Wire support block; **803**—Lock tongue cover; **8031**—Fixing screw hole; **8032**—Wire hole; **804**—Lock bolt; **8043**—Sliding block; **8044**—Decorative cover; **805**—Lock bolt spring steel; **806**—Wire; **807**—Lock bolt cylinder; **808**—Spring; **809**—Cylindrical bar; **810**—Pull strap.

The Concrete Method to Carry Out

[0062] The following instruction further explains the invention's concrete implementation method.

[0063] In order to enable a clearer understanding of the objects mentioned above, features and advantages of the present invention, the invention is described in detail below in connecting with the accompanying FIG and specific embodiments. It should be noted that the embodiments of the present invention and the features in the embodiments can be combined without conflict.

[0064] The terms "first", "second", "third", etc. are only used to differentiate the description and should not be construed as indicating or implying relative importance.

[0065] In the description of the invention, it should also be noted that, unless otherwise expressly specified and limited, the terms "arranged," "installed," "connected," and "combined" should be understood in a broad sense. for example, it may be a fixing connecting, it can also be a detachable connecting or an integral connecting. it can be a mechanical connecting or an electrical connecting. it can be a direct connecting or an indirect connecting through an intermediate media. And it can be internal connecting within two assemblies. For those of ordinary skill in this field, specific meanings of the above terms in the present invention can be understood in specific situations.

[0066] The specific embodiments of the present invention will be described in detail below in connecting with the accompanying FIG. It should be understood that the specific embodiments described herein are intended only to illustrate and explain the present invention and not to limit it.

Embodiment 1

[0067] As shown in FIGS. **1-7** and **13**, an ultra-thin embedded rigid cover without joints includes a side rubber strip **5**, a guide rail system **6**, a clamp system **7**, a fixing lock bolt, a plurality of cover plates, and a plurality of soft rotating shafts **1**, with a gap between two adjacent cover plates **204**;

[0068] The cover plate includes a front plate **2**, a first intermediate plate **3**A, a second intermediate plate **3**B and a small plate **4**, the front plate **2** and the first intermediate plate **3**A, the first intermediate plate **3**A and the second intermediate plate **3**B, the second intermediate plate **3**B and the small plate **4** are all connected by a soft rotating shaft **1**, the soft rotating shaft **1** is of a flexible material or a material combining flexibility and rigidity, the plurality of flexible rotating shafts **1** have the same width and are interchangeable, the front plate **2**, the first intermediate plate **3**A, the second intermediate plate **3**B, the small plate **4** and the soft rotating shaft **1** are connected to a side rubber strip **5** at both end, the rotating shaft **1** is provided with an intermediate connecting bubble **101**, two ends of the front plate **2**, two ends of the first intermediate plate **3**A, two ends of the second intermediate plate **3**B and two ends of the small plate **4** are connected to a side rail (the front, intermediate and small plates all with corresponding side rails), the side rail is provided with a bonding section **2011**, the side rubber strip **5** is provided with a gluing section **501**, the bonding section **2011** is bonded to the gluing section **501**, the gluing section **501** is bonded to the soft rotating shaft **1**,

[0069] The small plate **4** are both connected to a fixing lock bolt **8**, the front plate **2** is connected to a front bar fixing rod **208**.

[0070] The fixed lock lock bolt **8** is arbitrarily connected to the first intermediate plate **3**A, the second intermediate plate **3**B and the small plate **4** (arbitrarily connected herein means that the fixing lock bolt can be connected to one or more of the above mentioned plates, or it can be arbitrarily connected to any position of the above mentioned plates), the front plate **2** is connected to either a fixing lock bolt **8** or a front plate fixing rod **208** (the front plate **2** can be connected to either a fixing lock bolt **8** or a front plate fixing rod **208**, by connecting only one of them. if the front plate fixing rod **208** is connected, it is necessary to arrange the front plate fixing rod **208** on the side of the front plate **2** close to the front of the car, on the other hand, if the fixing lock bolt **8** is connected, the fixing lock bolt **8** is arranged on the side of the front plate **2** close to the tail of the car).

[0071] The present invention does not set end caps at both ends of the soft rotating shaft **1**, the soft rotating shaft will be directly connected to a side rubber strip on both sides, which can reduce the thickness of the car cover.

Embodiment 2

[0072] As shown in FIGS. **1-7**, and **14**, an ultra-thin embedded rigid cover without joints includes a side rubber strip **5**, a guide rail system **6**, a clamp system **7**, a fixing lock bolt, a plurality of cover plates and a plurality of soft rotating shafts **1**;

[0073] The cover plate includes a front plate **2**, a first intermediate plate **3**A, a second intermediate plate **3**B and a small plate **4**, the front plate **2** and the first intermediate plate **3**A, the first intermediate plate **3**A and the second intermediate plate **3**B, the second intermediate plate **3**B and the small plate **4** are all connected to each other by a soft rotating shaft **1**, the soft rotating shaft **1** is of a flexible material or a material combining flexibility and rigidity, the plurality of flexible rotating shafts **1** have the same width and are interchangeable, the front plate **2**, the first intermediate plate **3**A, the second intermediate plate **3**B, the small plate **4** and the soft rotating shaft **1** are connected to side rubber strips **5** at both ends, the rotating shaft **1** is provided with an intermediate connecting bubble **101**, two ends of the front plate **2**, two ends of the first intermediate plate **3**A, two ends of the second intermediate plate **3**B and two ends of the small plate **4** are connected to a side rail (the front, intermediate and small plates all with corresponding side rails), the side rail is provided with a bonding section **2011**, the side rubber strips **5** are provided with a gluing section **501**, the bonding section **2011** is bonded to the gluing section **501**, the gluing section **501** is bonded to the soft rotating shaft **1**.

[0074] The small plate **4** are both connected to a fixing lock bolt **8**, the front plate **2** is connected to a front bar fixing rod **208**.

[0075] The fixing lock bolt **8** is arbitrarily connected to the first intermediate plate **3**A, the second intermediate plate **3**B and the small plate **4** (arbitrary connected herein means that the fixing lock bolt **8** can be connected to one or more of the above mentioned plates, or it can be arbitrarily connected to any position of the above mentioned plates), the front plate **2** is connected to either a fixing lock bolt **8** or the front plate fixing rod **208** (the front plate **2** can be connected to either a fixing lock bolt **8** or a front plate fixing rod **208**, by connecting only one of them, if the front plate fixing rod **208** is connected, it is necessary to arrange the front plate fixing rod **208** on the side of the front plate **2** close to the front of the car, on the other hand, if the fixing lock bolt is connected, the fixing lock bolt is arranged on the side of the front plate **2** close to the tail of the car); whereby the two adjacent covers are abutting against each other when the cover is

unfolded (the cover plates herein include the front plate **2**, the intermediate plate, and the rear rail **401**),

[0076] The pressing rod **4041** is connected with a resisting rod **4043**, when the car cover is spread, the two resisting rods **4043** are pressed against each other.

Embodiment 3

[0077] As shown in FIGS. **1-7**, and **13**, an ultra-thin embedded rigid cover without joints, includes a side rubber strip **5**, a guide rail system **6**, a clamp system **7**, a fixing lock bolt, a plurality of cover plates and a plurality of soft rotating shafts **1**, with a gap between two adjacent cover plates;

[0078] The cover plate includes a front plate **2**, a second intermediate plate **3**B and a small plate **4**, the front plate **2** and the second intermediate plate **3**B, the second intermediate plate **3**B and the small plate **4** are connected to each other by a soft rotating shaft **1**, the soft rotating shaft **1** is of a flexible material or a material combining flexibility and rigidity, the plurality of flexible rotating shafts **1** have the same width and are interchangeable, the front plate **2**, the second intermediate plate **3**B, the small plate **4** and the soft rotating shafts **1** are connected to a side rubber strip **5** at both ends, the soft rotating shafts **1** are provided with an intermediate connecting bubble **101**, two ends of the front plate **2**, two ends of the second intermediate plate **3**B and two ends of the small plate **4** are all connected to a side rail, the side rail is provided with a bonding section **2011**, the side rubber strip **5** is provided with a gluing section **501**, the bonding section **2011** is bonded to the gluing section **501**, the gluing section **501** is bonded to the soft rotating shaft **1**,

[0079] The small plate **4** are both connected to a fixing lock bolt **8**, the front plate **2** is connected to a front bar fixing rod **208**.

[0080] The fixing lock bolt is arbitrarily connected to the second intermediate plate **3**B and the small plate **4**, the front plate **2** is connected to the fixing lock bolt **8** or to the front plate fixing rod **208**.

[0081] The intermediate plate can be provided in a plurality of ways or only one, depending on the length of the car cover and the number of folded layers.

Embodiment 4

[0082] As shown in FIGS. **1-7** and **13**, an ultra-thin embedded rigid cover without joints includes a side rubber strip **5**, a guide rail system **6**, a clamp system **7**, a fixing lock bolt, a plurality of cover plates and a plurality of soft rotating shafts **1**.

[0083] The cover plate includes a front plate **2**, a second intermediate plate **3**B and a small plate **4**, the front plate **2** and the second intermediate plate **3**B, the second intermediate plate **3**B and the small plate **4** are connected to each other by a soft rotating shaft **1**, the soft rotating shaft **1** is of a flexible material or a material combining flexibility and rigidity, the plurality of flexible rotating shafts **1** have the same width and are interchangeable, the front plate **2**, the second intermediate plate **3**B, the small plate **4** and the soft rotating shafts **1** are connected to a side rubber strip **5** at both sides, two ends of the front plate **2**, two ends of the second intermediate plate **3**B and two ends of the small plate **4** are all connected to a side rail, the side rail is provided with a bonding section **2011**, the side rubber strip **5** is provided with a gluing section **501**, the bonding section **2011** is bonded to the gluing section **501**.

[0084] The fixing lock bolt is arbitrarily connected to the second intermediate plate **3**B and the small plate **4**, the front plate **2** is connected to the fixing lock bolt **8** or to the front plate fixing rod **208**, whereby two adjacent cover plates are abutting against each other when the cover is unfolded.

Embodiment 5

[0085] As shown in FIGS. **1-7** and **13**, an ultra-thin embedded rigid cover without joints includes a side rubber strip **5**, a guide system **6**, a clip system **7**, a fixing lock bolt, a plurality of cover plates and a plurality of soft rotating shafts **1**, with a gap between two adjacent cover plates;

[0086] The soft rotating shaft **1** includes a first soft rotating shaft **1**A and a third soft rotating shaft **1**C, the first soft rotating shaft **1**A is of a width greater or less than the width of the third soft rotating shaft **1**C, the soft rotating shaft **1** is of a flexible material or a material combining flexibility and rigidity;

[0087] The cover plate includes a front plate **2**, a second intermediate plate **3**B and a small plate **4**, the front plate **2** and the second intermediate plate **3**B are connected to each other by a first soft rotating shaft **1**A, the second intermediate plate **3**B and the small plate **4** are connected to each other by a second soft rotating shaft **1**B, the front plate **2**, the second intermediate plate **3**B, the small plate **4** and the soft rotating shaft **1** are connected to a side rubber strip **5** at the ends, the soft rotating shaft **1** is provided with an intermediate connecting bubble **101**, two ends of the front plate **2**, two ends of the second intermediate plate **3**B and two ends of the small plate **4** are connected to a side rail, the side rail is provided with a bonding section **2011**, the side rubber strip **5** is provided with a gluing section **501**, the bonding section **2011** is bonded to the gluing section **501**, the gluing section **501** is bonded to the soft rotating shaft **1**.

[0088] The fixing lock bolt is arbitrarily connected to the second intermediate plate **3**B and the small plate **4**, the front plate **2** is connected to the fixing lock bolt **8** or to the front plate fixing rod **208**.

Embodiment 6

[0089] As shown in FIGS. **1-7** and **13**, an ultra-thin embedded rigid cover without joints includes a side rubber strip **5**, a guide rail system **6**, a clamp system **7**, a fixing lock bolt, a plurality of covers and a plurality of soft rotating shafts **1**;

[0090] The soft rotating shaft **1** includes a first soft rotating shaft **1**A and a third soft rotating shaft **1**C, the first soft rotating shaft **1**A is of a width greater or less than the width of the third soft rotating shaft **1**C, the soft rotating shaft **1** is of a flexible material or a material combining flexibility and rigidity;

[0091] The cover plate includes a front plate **2**, a second intermediate plate **3**B and a small plate **4**, the front plate **2** and the second intermediate plate **3**B are connected to each other by a first flexible rotating shaft **1**A, the second intermediate plate **3**B and the small plate **4** are connected to each other by a second flexible rotating shaft **1**B, the front plate **2**, the second intermediate plate **3**B, the small plate **4** and the soft rotating shaft **1** are connected to a side rubber strip **5** at the ends, the soft rotating shaft **1** is provided with an intermediate connecting bubble **101**, two ends of the front plate **2**, two ends of the second intermediate plate **3**B and two ends of the small plate **4** are connected to a side rail, the

side rail is provided with a bonding section **2011**, the side rubber strip **5** is provided with a gluing section **501**, the bonding section **2011** is bonded to the gluing section **501**;

[0092] The fixing lock bolt is arbitrarily connected to the second intermediate plate **3**B and the small plate **4**, the front plate **2** is connected to the fixing lock bolt or the front plate fixing rod **208**, the two adjacent covers are abutting against each other when the cover is unfolded.

Embodiment 7

[0093] On the basis of any one of embodiments 1-6, as shown in FIG. **19-22**, the front plate **2** includes a front plate side rail **201**, a front plate front bar **202**, a front plate rear bar **203**, a plate body **204**, a front plate support **205**, a front plate buckle **206**, a front plate rubber strip **207** and a front plate fixing rod **208**, the plate body **204** is surrounded by a front plate front bar **202**, a front plate rear bar **401** and two front plate side rails, the front plate side rails **201** are provided with a rear protrusion and a front protrusion, the rear protrusion **2013** is connected to the front plate rear bar **203**, the front protrusion **2014** is connected to the front plate front bar **202**, the thickness of the plate body **204** is less than or equal to 10 mm.

[0094] The front bar support **205**, the front bar buckle **206** and the front plate fixing rod **208** are symmetrically connected to the front plate front bar **202**, the fixing lock bolt **8** is connected to the front plate rear bar **203**, the front plate side rail **201** is provided with a side rail bending hook **2012**, the side rubber strip **5** is provided with a bending hook section **502**, the bending hook section **502** is used for hooking the side rail bending hook **2012**.

[0095] The front plate **2** is connected to a guide rail system **6** through a front plate fixing rod **208**, the front plate rubber strip **207** is provided with an extension surface **2071** and a front plate rubber strip insertion head **2072**, the front plate front bar **202** is provided with a front plate front bar groove **2021**, the front plate rubber strip insertion head **2072** is clamped with the front plate front bar groove **2021**.

[0096] The front plate **2** consists of a plate body **204** surrounded by four side rails, wherein the front plate rear bar **203** is used for connecting the soft rotating shaft **1**, the two front plate side rails **201** are used for connecting a side rubber strip **5** and a guide rail **604**, the plate body **204** in the middle serves as a support, by providing a bending hook **502** at the side rubber strip **5**, it can be fitted with the side rail bending hooks **2012** to provide a better connecting effect.

Embodiment 8

[0097] On the basis of any of embodiments 7, as shown in FIGS. **1718**, the small plate **4** includes a rear bar **401**, a small plate body **402**, a small plate side rail **403**, a small plate front bar **404** and a rear bar rubber strip **405**;

[0098] The rear bar rubber strip **405** is provided with a rear bar rubber strip hole **4051**, a rear bar rubber strip insertion head **4052** and a rear bar rubber strip gluing surface **4053**, the rear bar **401** is provided with a rear bar profile lower surface **4011** and an insertion groove **4012**, the rear bar rubber strip insertion head **4052** is snapped into the insertion groove **4012**, the rear bar rubber strip gluing surface **4053** is glued to the rear bar profile lower surface **4011**.

[0099] The structure of the small plate **4** is similar to the structure of the front plate **2**, both of which are constituted by the surrounding frame and the small plate body **402** in the intermediate, similarly, if the rear bar **401** profile is to be mated with the rear bar rubber strip, a corresponding snap together structure needs to be set up, and the rear bar rubber strip **405** is to be provided with the rear bar rubber strip holes **4051**, which are used to increase the amount of compression.

Embodiment 9

[0100] On the basis of any of embodiment 8, as shown in FIGS. **15-16**, the side rubber strip **5** is provided with a gluing section **501**, a bending hook section **502**, a groove **503** and a lower pressing and bending surface **504**, the gluing section **501** is used for bonding with the side rails and the intermediate rotating shaft. The groove **503** allows the glue strip to have an automatic downward pressure stress, which can increase the waterproof effect. The lower pressing and bending surface **504** also serves to increase the degree of downward pressure on the side gluing strip **5**.

Embodiment 10

[0101] On the basis of embodiment 9, the first soft rotating shaft **1**A, second soft rotating shaft **1**B and third soft rotating shaft **1**C are interchangeable, so that the plate is able to be pressed against the front bar support **205** when the cover is flipped and fold.

[0102] The soft rotating shaft **1** includes an intermediate connecting bubble **101**, a pressing bar **102**, a snap-in head **103**, and a snap-neck section **104**;

[0103] The small plate front bar **404** includes a pressing rod **4041**, a rod groove **4042**, a resisting rod **4043**, an upper pressing head **4044**, a screw-fixing hole **4045**, a plate groove **4046**, and an upper plane **4047**;

[0104] The pressing bar **102** is provided on the upper side of the upper plane **4047** to enhance waterproofing, the snap-in head **103** is clamped with the rod groove **4042**, the pressing rod **4041** squeezes the snap-neck section **104** in cooperation with the upper pressing head **4044** after deformation, the plate groove **4046** is used to connect the plate body **204**, the screw fixing holes **4045** are used to connect the side rail by screws **703**.

[0105] When installing, the two snap-in heads **103** are extended into a rod groove **4042** to connect the soft rotating shaft **1**. Then the pressing rod **4041** is pressed, and the pressing rod **4041** is deformed to clamp the snap-neck section **104**, preventing the snap-in heads **103** from slipping out of the rod groove **4042**, the pressing bar **102** is covered with the upper plane **4047**, which can be bonded by glue.

[0106] The soft rotating shaft **1** is provided with an intermediate connecting bubble **101**, which greatly increases the expansion and contraction elasticity of the soft rotating shaft **101**, it can also play a good waterproof effect by connecting the pressing bar **102** with the upper plane **4047**.

[0107] The structure of the soft rotating shaft **1** can ensure the smoothness of the car cover flipping and folding, and by setting the rod groove **4042** and the pressure bar **4041** to ensure that the two ends of the soft rotating shaft are locked in the inside of the rod groove **4042** and not easy to fall off, so as to form a stable connection with the car cover.

Embodiment 11

[0108] On the basis of any of embodiment 10, as shown in FIG. **23**, the fixing lock bolt **8** includes a lock bolt groove, a lock bolt base **801**, a lock bolt cover **803**, a lock bolt **804**,

a lock bolt spring steel **805**, a steel wire **806**, a lock bolt cylinder **807**, a spring **808**, and a cylindrical rod **809**.

[0109] The lock bolt base **801** is connected with a lock bolt cover **803**, the lock bolt cover is provided with a fixing screw hole **8031**, the lock bolt base **801** is provided with a lock bolt cavity **8013**, a spring arrangement compartment **8011** and a cylindrical travelling compartment **8012**, the lock bolt cavity **8013**, the spring arrangement compartment **8011** and the cylindrical travelling compartment **8012** are mutually connected, there are two lock bolt base **801**, the two lock bolt base **801** are located at each end of the cover.

[0110] The lock bolt **804** includes a sliding block **8043**, the sliding block **8043** is provided in the lock bolt cavity **8013**.

[0111] The lock bolt cylinder **807** is located within the spring arrangement compartment **8011** and the cylinder traveling compartment **8012**, one end of the lock bolt cylinder **807** is connected to the sliding block **8043** through the lock bolt spring steel **805**, the other end of the lock bolt cylinder **807** is connected to a steel wire **806**, the lock bolt cylinder **807** is sleeved with a spring **808**, the spring **808** is located in the spring arrangement compartment **8011**, the lock bolt **804** is connected to a pulling strap **810**, the pulling strap **810** is located in the cylinder travelling compartment **8012**, the pulling strap **810** extends out from the lock bolt cover **803**.

[0112] The lock bolt **804** groove is connected with a steel wire support block **802**, the steel wire **806** passes through the steel wire support block **802**.

[0113] The lock bolt cover **803** is provided with a steel wire hole **8032**, the steel wire **806** passes through the steel wire hole **8032**.

[0114] The cylindrical travelling compartment **8012** is connected with two cylindrical rods **809**, the cylindrical rod **809** is used for positioning the pulling strap **810**. The lock bolt **804** is connected with a decoration cover **8044**.

[0115] When installing the fixed lock bolt **8**, it is necessary to first set the lock bolt base **801** at the bottom of the car cover, and then install the lock bolt **804** and other parts on the lock bolt base **801**, when in use, simply pull the pulling strap **810** manually to open the lock bolt **804**, and press down on the car cover after use to lock the lock bolt **804** closed.

Embodiment 12

[0116] On the basis of any of embodiment 11, as shown in FIG. **24**, the clamp system **7** includes a left clamp **701**, a right clamp **702** and a T-rod **704**, the left clamp **701** and the right clamp **702** are connected by screws **703**, the T-rod **704** passes through the left clamp **701** and the right clamp **702**, the T-rod **704** is connected with a nut **705**.

[0117] The left clamp **701** is provided with a waist hole **7014**, the right clamp **702** is provided with a threaded hole **7021** and a half-waist hole **7022**, the screw **703** passes through the waist hole **7014** and the screw **703** hole, the T-rod **704** passes through the half-waist hole **7022**.

[0118] The clamp assembly is mainly to connect the guide rail **604** to the hopper, when in use, part of the left clamp **701** extends into the guide rail groove **6043**, while the right clamp **702** is located on the outer side of the hopper, the left clamp **701** and the right clamp **702** are connected by screws **703** to clamp the guide rail **604** to the car body, then longitudinally connect the T-rod **704** to achieve multi-directional positioning of the left clamp **701** and the right clamp **702**, One end of the T-bar **704** is a positioning head **7041**.

[0119] As the left clamp **701** is provided with front and rear grooves **7012**, the front bar fixing rod **208** can be moved back and forth along the front and rear grooves **7012** after it is extended into the front and rear grooves **7012**, so that it may be fine-tuned according to the position of the front bar **2**.

Embodiment 13

[0120] On the basis of embodiment 12, as shown in FIGS. **8-12**, the guide rail system **6** includes a guide rail **604**, the guide rail **604** includes a guide rail groove **6043**, a lock bolt arcing surface **6044**, a guide rail support plane and a rubber strip gluing surface **6045**, the lock bolt arcing surface **6044** is located on the inner side of the guide rail **604**, the guide rail support plane is located on the outer side of the guide rail **604**.

[0121] The guide rail support plane includes a support upper surface **6041** and a support lower surface **6042**, the support upper surface **6041** is attached to the lower pressing and bending surface **504**, the first guide rail rubber strip **605** includes a rubber strip top surface **6051** and a rubber strip gluing surface **6052**, the rubber strip top surface **6051** is glued to the support lower surface **6042**, the rubber strip gluing surface is glued to the guide rail groove **6043**.

[0122] The lock bolt arching surface **6044** is connected to the guide rail groove **6043** by a guide rail gluing surface **6047**, the guide rail gluing surface **6047** is provided with a positioning strip **6046**, the guide rail gluing surface **6047** is bonded with a second guide rail rubber strip **606**, the second guide rail rubber strip **606** is provided along the positioning strip **6046**.

[0123] As the guide rail **604** is connected to both the cargo hopper and the cover, the guide rail **604** should not only ensure the stability of the connection, but also have a certain degree of sealing, therefore, it is necessary to set up a plurality of adhesive strips in the guide rail system **6**, wherein the first guide rail rubber strip **605** is set on the outer side of the guide rail **604**, the clamp system **7** is loaded with the first guide rail rubber strip **605** when clamped, which can play a good anti-slip effect, the second guide rail rubber strip **606** is set up on the inner side of the guide rail **604** to play a waterproof effect and prevent rainwater from entering the hopper, in addition, the side rail rubber strip is located on the upper side of the guide rail **604**, which also plays a certain waterproof effect.

[0124] Furthermore, a positioning strip **6046** is provided on the gluing surface **6045**, so that the second guide rail rubber strip **606** can be arranged along the positioning strip **6046** when it is installed, avoiding problems of the status quo not being aligned.

[0125] The guide rail groove **6043** is connected to the guide rail resisting block **607**, by connecting the guide rail resisting block **607** in the guide rail groove **6043**, the guide rail resisting block **607** holds the lock bolt, so as to limit the lock bolt.

Embodiment 14

[0126] On the basis of embodiment 13, the guide rail groove **6043** is connected to a front plate fixing clamp **601**, the front plate fixing rod **208** includes a threaded rod **2081**,

one end of the threaded rod **2081** is connected to a square head **2082**, which is used to clamp with the front plate front plate groove **2021**, the threaded rod **2081** passes through the front plate fixing clamp **601** and connects to a plum nut **602** and butterfly nut **603**.

[0127] The front bar fixing clamp **601** includes a front and rear groove **6011**, a snap-in notch **6012** and a slide-in opening **6013**, the slide-in opening **6012** is connected to the guide rail groove **6043**, the snap-in notch **6012** is connected to the front and rear grooves **6011**, the snap-in notch **6012** and the front and rear grooves **6011** are used to connect the threaded rod **208**.

[0128] The front bar is connected to the guide rail **604** through the front bar fixing clamp **601**, the installation of the front bar fixing clamp **601** ensures the stability of the front bar connection, one end of the front bar fixing clamp **601** is connected to the guide rail **604**, followed by the front plate fixing rod **208** extends into the snap-in notch **6012**, and finally the plum nut **602** and butterfly nut **603** are connected to the front plate fixing rod **208** to complete the fixing of the front plate **2**.

[0129] As the front plate **2** fixing clamp is also provided with front and rear grooves **6011**, the front bar fixing rod **208** can be moved back and forth along the front and rear grooves after it is extended into the front and rear grooves **6011**, which allows fine-tuned according to the position of the front bar **2**.

[0130] The first intermediate plate **3**A and the second intermediate plate **3**B are connected with the fixing lock bolt **8**; or neither of the first intermediate plate **3**A nor of the second intermediate plate **3**B is provided with the fixing lock bolt **8**;

[0131] The front plate **2** is connected with a fixing lock bolt **8**, the fixing lock bolt **8** is connected to the rear part of the front plate, the front plate fixing rod **208** is connected to the front part of the front plate **2**.

[0132] The invention is not limited to the above-mentioned optional embodiments. Anyone can come up with various other forms of products under the inspiration of the invention, however, regardless of any changes in its shape or structure. All technical solutions that fall within the scope defined by the claims of the present invention shall fall within the scope of protection of the invention.

1. An ultra-thin embedded rigid cover without joints, wherein, it includes a side rubber strip (**5**), a guide rail system (**6**), a clamp system (**7**), a fixing lock bolt (**8**), a plurality of cover plates and a plurality of soft rotating shafts (**1**), with a gap between two adjacent cover plates;

The cover plate (**204**) includes a front plate (**2**), a first intermediate plate (**3**A), a second intermediate plate (**3**B) and a small plate (**4**), the front plate (**2**) and the first intermediate plate (**3**A), the first intermediate plate (**3**A) and the second intermediate plate (**3**B), the second intermediate plate (**3**B) and the small plate (**4**) are all connected to each other by soft rotating shafts (**1**), the soft rotating shaft (**1**) is of a flexible material or of a material combining flexibility and rigidity, the front plate (**2**), the first intermediate plate (**3**A), the second intermediate plate (**3**B), the small plate (**4**) and the soft rotating shaft (**1**) are connected to a side rubber strip (**5**) at both ends, two ends of the front plate (**2**), two ends of the first intermediate plate (**3**A), two ends of the second intermediate plate (**3**B) and two ends of the small plate (**4**) are connected to a side rail, the side rail is provided with a bonding section (**2011**), the side rubber strip (**5**) is provided with a gluing section (**501**), the bonding section (**2011**) is bonded to the gluing section (**501**), the gluing section (**501**) is bonded to the soft rotating shaft (**1**);

The small plate (**4**) is connected with a fixing lock bolt (**8**), the front plate (**2**) is connected with a front bar fixing rod (**208**).

2. An ultra-thin embedded rigid cover without joints, wherein, it includes a side rubber strip (**5**), a guide rail system (**6**), a clamp system (**7**), a fixing lock bolt (**8**), a plurality of cover plates and a plurality of soft rotating shafts (**1**);

The cover plate includes a front plate (**2**), a first intermediate plate (**3**A), a second intermediate plate (**3**B) and a small plate (**4**), the front plate (**2**) and the first intermediate plate (**3**A), the first intermediate plate (**3**A) and the second intermediate plate (**3**B), the second intermediate plate (**3**B) and the small plate (**4**) are all connected to each other by a soft rotating shaft (**1**), the soft rotating shaft (**1**) is of flexible material or of a material combining flexibility and rigidity, the front plate (**2**), the first intermediate plate (**3**A), the second intermediate plate (**3**B), the small plate (**4**) and the soft rotating shaft (**1**) are connected to a side rubber strip (**5**) at both ends, two ends of the front plate (**2**), two ends of the first intermediate plate (**3**A), two ends of the second intermediate plate (**3**B) and two ends of the small plate (**4**) are connected to a side rail, the side rail is provided with a bonding section (**2011**), the side rubber strip (**5**) is provided with a gluing section (**501**), the bonding section (**2011**) is bonded to the gluing section (**501**), the gluing section (**501**) is bonded to the soft rotating shaft (**1**);

The small plate (**4**) is connected with a fixing lock bolt (**8**), the front plate (**2**) is connected with a front bar fixing rod (**208**).

3. An ultra-thin embedded rigid cover without joints, wherein, it includes a side rubber strip (**5**), a guide rail system (**6**), a clamp system (**7**), a fixing lock bolt (**8**), a plurality of cover plates and a plurality of soft rotating shafts (**1**), with a gap between two adjacent cover plates;

The cover plate includes a front plate (**2**), a second intermediate plate (**3**B) and a small plate (**4**), the front plate (**2**) and the second intermediate plate (**3**B), the second intermediate plate (**3**B) and the small plate (**4**) are connected to each other by a soft rotating shaft (**1**), the soft rotating shaft (**1**) is of a flexible material or a material combining flexibility and rigidity, the front plate (**2**), the second intermediate plate (**3**B), the small plate (**4**) and the soft rotating shaft (**1**) are connected to a side rubber strip (**5**) at both ends, two ends of the front plate (**2**), two ends of the second intermediate plate (**3**B) and two ends of the small plate (**4**) are connected to a side rail, the side rail is provided with a bonding section (**2011**), the side rubber strip (**5**) is provided with a gluing portion (**501**), the bonding section (**2011**) is bonded with the gluing section (**501**) the gluing section (**501**) is bonded with the soft rotating shaft (**1**);

The small plate (**4**) is connected with a fixing lock bolt (**8**), the front plate (**2**) is connected with a front bar fixing rod (**208**).

4. An ultra-thin embedded rigid cover without joints, wherein, it includes a side rubber strip (**5**), a guide rail

system (**6**), a clamp system (**7**), a fixing lock bolt (**8**), a plurality of cover plates and a plurality of soft rotating shafts (**1**);

The cover plate includes a front plate (**2**), a second intermediate plate (**3**B) and a small plate (**4**), the front plate (**2**) and the second intermediate plate (**3**B), the second intermediate plate (**3**B) and the small plate (**4**) are all connected to each other by a soft rotating shaft (**1**), the soft rotating shaft (**1**) is of a flexible material or a material combining flexibility and rigidity, the front plate (**2**), the second intermediate plate (**3**B), the small plate (**4**) and the soft rotating shafts (**1**) are all connected to a side rubber strip (**5**), two ends of the front plate (**2**), two ends of the second intermediate plate (**3**B) and two ends of the small plate (**4**) are connected to a side rail, the side rail is provided with a bonding section (**2011**), the side rubber strip (**5**) is provided with a gluing portion (**501**), the bonding section (**2011**) is bonded with the gluing section (**501**) the gluing section (**501**) is bonded with the soft rotating shaft (**1**);

The small plate (**4**) is connected with a fixing lock bolt (**8**), the front plate (**2**) is connected with a front bar fixing rod (**208**).

5. An ultra-thin embedded rigid cover without joints, wherein, it includes a side rubber strip (**5**), a guide rail system (**6**), a clamp system (**7**), a fixing lock bolt (**8**), a plurality of cover plates and a plurality of soft rotating shafts (**1**), with a gap between two adjacent cover plates;

The soft rotating shaft (**1**) includes a first soft rotating shaft (**1**A) and a third soft rotating shaft (**1**C), the first soft rotating shaft (**1**A) is of a width greater than or less than the width of the third soft rotating shaft (**1**C), the soft rotating shafts (**1**) are of a flexible material or of a material combining flexibility and rigidity;

The cover plate includes a front plate (**2**), a second intermediate plate (**3**B) and a small plate (**4**), the front plate (**2**) and the second intermediate plate (**3**B) are connected to each other by a first soft rotating shaft (**1**A), the second intermediate plate (**3**B) and the small plate (**4**) are connected to each other by a second soft rotating shaft (**1**B), the front plate (**2**), the second intermediate plate (**3**B), the small plate (**4**) and the soft rotating shaft (**1**) are all connected to a side rubber strip (**5**) at both ends, two ends of the front plate (**2**), two ends of the second intermediate plate (**3**B) and two ends of the small plate (**4**) are connected to a side rail, the side rail is provided with a bonding section (**2011**), the side rubber strip (**5**) is provided with a gluing section (**501**), the bonding section (**2011**) is glued to the gluing section (**501**), the gluing section (**501**) is bonded to the soft rotating shaft (**1**);

The small plate (**4**) is connected with a fixing lock bolt (**8**), the front plate (**2**) is connected with a front bar fixing rod (**208**).

6. An ultra-thin embedded rigid cover without joints, wherein, it includes a side rubber strip (**5**), a guide rail system (**6**), a clamp system (**7**), a fixing lock bolt (**8**), a plurality of cover plates and a plurality of soft rotating shafts (**1**);

The soft rotating shafts (**1**) include a first soft rotating shaft (**1**A) and a third soft rotating shaft (**1**C), the first soft rotating shaft (**1**A) is of a width greater than or less than the width of the third soft rotating shaft (**1**C), the soft rotating shafts (**1**) are of flexible material or of a material combining flexibility and rigidity;

The cover plate includes a front plate (**2**), a second intermediate plate (**3**B) and a small plate (**4**), the front plate (**2**) and the second intermediate plate (**3**B) are connected to each other by a first soft rotating shaft (**1**A), the second intermediate plate (**3**B) and the small plate (**4**) are connected to each other by a second soft rotating shaft (**1**B), the front plate (**2**), the second intermediate plate (**3**B), the small plate (**4**) and the soft rotating shaft (**1**) are all connected to a side rubber strip (**5**) at both ends, two ends of the front plate (**2**), two ends of the second intermediate plate (**3**B) and two ends of the small plate (**4**) are connected to a side rail, the side rail is provided with a bonding section (**2011**), the side rubber strip (**5**) is provided with a gluing section (**501**), the bonding section (**2011**) is bonded with the gluing section (**501**), the gluing section (**501**) is bonded with the soft rotating shaft (**1**);

The small plate (**4**) is connected with a fixing lock bolt (**8**), the front plate (**2**) is connected with a front bar fixing rod (**208**).

7. An ultra-thin embedded rigid cover without joints according to any one of claims **1**-**6**, wherein, the front plate (**2**) includes a front plate side rail (**201**), a front plate front bar (**202**), a front plate rear bar (**203**), a plate body (**204**), a front bar support (**205**), a front bar buckle (**206**), a front plate rubber strip (**2**) and a front plate fixing rod (**208**);

The plate body (**204**) is surrounded by a front plate front bar (**202**), a front plate rear bar (**401**) and two front plate side rails, the front plate side rail (**201**) is provided with a rear protrusion (**2013**) and a front protrusion (**2014**), the rear protrusion (**2013**) is connected to the front plate rear bar (**203**), the front protrusion (**2014**) is connected to the front plate front bar (**202**), the thickness of the plate body (**204**) is less than or equal to 10 mm;

The front bar support (**205**), the front bar buckle (**206**) and the front plate fixing rod (**208**) are symmetrically connected to the front plate front bar (**202**), the fixing lock bolt (**8**) is connected to the front plate rear bar (**203**), the front plate side rail (**201**) is provided with a side rail bending hook (**2012**), the side rubber strip (**5**) is provided with a bending hook section (**502**), the bending hook section (**502**) is used for hooking the side rail bending hook (**2012**);

The front plate (**2**) is connected to the guide rail system (**6**) by a front plate fixing rod (**208**).

The front plate rubber strip (**207**) is provided with an extension surface (**2071**) and a front plate rubber strip insertion head (**2072**), the front plate front bar (**202**) is provided with a front plate front bar groove (**2021**), the front plate rubber strip insertion head (**2072**) is clamped with the front plate front bar groove (**2021**).

8. An ultra-thin embedded rigid cover without joints according to any one of claims **1** to **6**, wherein, the small plate (**4**) includes a rear rail (**401**), a small plate body (**402**), a small plate side rail (**403**), a small plate front bar (**404**) and a rear bar rubber strip (**405**);

The rear bar rubber strip (**405**) is provided with a rear bar rubber strip hole (**4051**), a rear bar rubber strip insertion head (**4052**) and a rear bar rubber strip adhesive surface (**4053**), the rear bar (**401**) is provided with a rear bar profile lower surface (**4011**) and an insertion groove

(**4012**), the rear bar rubber strip insertion head (**4052**) is stuck into the insertion groove (**4012**), the rear bar rubber strip adhesive surface (**4053**) is bonded to the rear bar profile lower surface (**4011**).

9. An ultra-thin embedded rigid cover without joints according to any one of claims **1** to **6**, wherein, the side rubber strip (**5**) is provided with a gluing section (**501**), a bending hook section (**502**), a groove (**503**) and a lower pressing and bending surface (**504**), the gluing section (**501**) is for bonding with the side rails and the intermediate rotating shafts.

10. An ultra-thin embedded rigid cover without joints according to any one of claims **1-6**, wherein, the soft rotating shaft (**1**) includes an intermediate connecting bubble (**101**), a pressing bar (**102**), a snap-in head (**103**), and a snap-in neck section (**104**);

The small plate front bar (**404**) includes a pressing rod (**4041**), a rod groove (**4042**), an upper pressing head (**4044**), a screw fixing hole (**4045**), a snap-in plate groove (**4046**) and an upper plane (**4047**);

The pressing bar (**102**) is provided on the upper side of the upper plane (**4047**), the snap-in head (**103**) is clamped with the rod groove (**4042**), the pressing rod (**4041**) squeezes the snap-neck section (**104**) in cooperation with the upper pressing head (**4044**) after deformation, the snap-in plate groove (**4046**) is used to connect the plate body (**204**), the screw fixing holes (**4045**) are used to connect the side rails by screws (**703**).

11. An ultra-thin embedded rigid cover without joints according to any one of claims **2**, **4** and **6**, wherein, the soft rotating shaft (**1**) includes an intermediate connecting bubble (**101**), a pressing bar (**102**), a snap-in head (**103**), and a snap-in neck section (**104**);

The small plate front bar (**404**) includes a pressing rod (**4041**), a rod groove (**4042**), a resisting rod (**4043**), an upper pressing head (**4044**), a screw fixing hole (**4045**), a snap-in plate groove (**4046**) and an upper plane (**4047**);

The pressing bar (**102**) is provided on the upper side of the upper plane (**4047**), the snap-in head (**103**) is clamped with the rod groove (**4042**), the pressing rod (**4041**) is connected with the resisting rod (**4043**), the pressing rod (**4041**) squeezes the snap-neck section (**104**) in cooperation with the upper pressing head (**4044**) after deformation, the snap-in plate groove (**4046**) is used to connect the plate body (**204**), the screw fixing holes (**4045**) are used to connect the side rails by screws (**703**).

12. An ultra-thin embedded rigid cover without joints according to any one of claims **1-6**, wherein, the fixing lock bolt (**8**) includes a lock bolt base (**801**), a lock bolt cover (**803**), a lock bolt (**804**), a lock bolt spring steel (**805**), a steel wire (**806**), a lock bolt cylinder (**807**), a spring (**808**), and a cylindrical rod (**809**);

The lock bolt base (**801**) is connected with a lock bolt cover (**803**), the lock bolt base (**801**) is provided with a lock bolt cavity (**8013**), a spring arrangement compartment (**8011**) and a cylindrical travelling compartment (**8012**), the lock bolt cavity (**8013**), the spring arrangement compartment (**8011**) and the cylindrical travelling compartment (**8012**) are mutually connected;

The lock bolt (**804**) includes a sliding block (**8043**), the sliding block (**8043**) is provided in the lock bolt cavity (**8013**);

The lock bolt cylinder (**807**) is located within the spring arrangement compartment (**8011**) and the cylinder traveling compartment (**8012**), one end of the lock bolt cylinder (**807**) is connected to the sliding block (**8043**) through the lock bolt spring steel (**805**), the other end of the lock bolt cylinder (**807**) is connected to a steel wire (**806**), the lock bolt cylinder (**807**) is sleeved with a spring (**808**), the spring (**808**) is located in the spring arrangement compartment (**8011**), the lock bolt (**804**) pulling rope is connected to a pulling strap (**810**), the pulling strap (**810**) is located in the cylinder travelling compartment (**8012**), the pulling strap (**810**) extends out from the lock bolt cover (**803**).

13. An ultra-thin embedded rigid cover without joints according to claim **12**, wherein, the locking tongue groove is connected with a steel wire support block (**802**), the steel wire (**806**) passes through the steel wire support block (**802**);

The locking tongue cover (**803**) is provided with a steel wire hole (**8032**), the steel wire (**806**) passes through the steel wire hole (**8032**);

The cylindrical travelling compartment (**8012**) is connected with two cylindrical rods (**809**), the cylindrical rod (**809**) is used for positioning the pulling strap (**810**).

14. An ultra-thin embedded rigid cover without joints according to any one of claims **1-6**, wherein, the clamp system (**7**) includes a left clamp (**701**), a right clamp (**702**) and a T-rod (**704**), the left clamps (**701**) and the right clamps (**702**) are connected by screws (**703**), the T-rod (**704**) passes through the left clamp (**701**) and the right clamp (**702**), the T-rod (**704**) is connected with a nut (**705**), one end of the T-rod (**704**) is a positioning head (**7041**);

The left clamp (**701**) is provided with a waist hole (**7011**), the right clamp (**702**) is provided with a threaded connection hole (**7021**) and a half-waist hole (**7022**), the screw (**703**) passes through the waist hole (**7011**) and the threaded connection hole (**7021**), the T-rod (**704**) passes through the half-waist hole (**7022**).

15. An ultra-thin embedded rigid cover without joints according to any one of claims **1-6**, wherein, the guide rail system (**6**) includes a guide rail (**604**), the guide rail (**604**) includes a guide rail groove (**6043**), a lock bolt arching surface (**6044**), a guide rail support plane and a rubber strip gluing surface (**6045**), the lock bolt arching surface (**6044**) is located on the inner side of the guide rail (**604**), the guide rail support plane (**604**) is located on the outer side of the guide rail (**604**);

The guide rail support plane includes a support upper surface (**6041**) and a support lower surface (**6042**), the support upper surface (**6041**) is attached to the lower pressing and bending surface (**504**), the first guide rail rubber strip (**605**) includes an rubber strip top surface (**6051**) and a rubber strip gluing surface (**6052**), the rubber strip top surface (**6051**) is glued to the support lower surface (**6042**), the rubber strip gluing surface (**6052**) is glued to the guide rail groove (**6043**);

The lock bolt arching surface (**6044**) is connected to the guide rail groove (**6043**) by an adhesive surface (**6045**), the adhesive surface (**6045**) is provided with a positioning strip (**6046**), the adhesive surface (**6045**) is bonded with a second guide rail rubber strip (**606**), the second guide rail rubber strip (**606**) is provided along the positioning strip (**6046**). the guide rail support surface is located on the outer side of the guide rail (**604**).

16. An ultra-thin embedded hard cover without joints according to any one of claim **15**, wherein, the guide rail groove (**6043**) is connected to a front plate fixing clamp (**601**), the front plate fixing rod (**208**) includes a threaded rod (**2081**), one end of the threaded rod (**2081**) is connected to a square head (**2082**), which is used to clamp with the front plate front plate groove (**2021**), the threaded rod (**2081**) passes through the front plate fixing clamp (**601**) and is connected to a plum nut (**602**) and butterfly nut (**603**).

17. An ultra-thin embedded rigid cover without joints according to claim **16**, wherein, the front bar fixing clamp (**601**) includes a front and rear groove (**6011**), a snap-in notch (**6012**) and a slide-in opening (**6013**), the slide-in opening (**6013**) is connected to the guide rail groove (**6043**), the snap-in notch (**6012**) is connected to the front and rear grooves (**6011**), the snap-in notch (**6012**) and the front and rear grooves (**6011**) are used to connect a threaded rod (**2081**).

18. An ultra-thin embedded rigid cover without joints according to any one of claims **1-6**, wherein, at least one of the first intermediate plate (**3**A) or the second intermediate plate (**3**B) is connected with a fixing lock bolt (**8**).

19. An ultra-thin embedded rigid cover without joints according to any one of claims **1-6**, wherein, the front plate (**2**) is connected with a fixing lock bolt (**8**), the fixing lock bolt (**8**) is connected to the end of the front plate, the front bar fixing rod (**208**) is connected to the front of the front plate (**2**).

20. An ultra-thin embedded rigid cover without joints according to any one of claims **1-6**, wherein, the profile frame around the front plate (**2**), the first intermediate plate (**3**A), the second intermediate plate (**3**B) and the small plate (**4**) are all glued to the plate, the side rails for threading the rubber strips **5** are connected to the plate by means of rivets punched at the bottom surface of the side rails.

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