EXHIBIT 2017

Certified English Translation of CN '361 Application

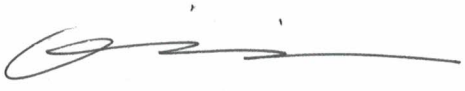
Certification of Accuracy

I, Qiang Li, hereby attest that I am a translator fluent in Chinese and English, that I have translated the attached document from Chinese to English, and that to the best of my knowledge, ability and belief this translation is a true, accurate and complete translation of the original Chinese document that was provided to me.

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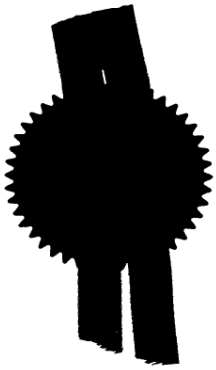
Date

NATIONAL INTELLECTUAL PROPERTY ADMINISTRATION, PRC

CERTIFICATION

This is to certify that annexed is a true copy from the records of this office of the patent application as originally filed which is identified hereunder:

Application No.: 201922118361.7
Application type: Utility Model Patent
Title of the Invention: BOX BODY INTERLOCKING STRUCTURE
Filing Date: November 27, 2019
Applicant: Shanghai Meirui Industrial Co., Ltd.
Inventors or designers: CAI Shujun



Commissioner: *SHEN Changyu*
SHEN Changyu
March 26, 2020

CLAIMS

1. A box body interlocking structure, which comprises a first box body and a second box body, the first box body being stacked on the second box body, characterized in that: the box body interlocking structure further comprises a sliding block arranged on the second box body in a horizontally slidable manner, the first box body is provided with a locking slot, and the sliding block is provided with an insertion portion aligned with the locking slot; when the insertion portion is inserted into the locking slot, the sliding block locks the first box body and the second box body together; when the insertion portion is withdrawn from the locking slot, the sliding block releases the locking of the first box body.

2. The box body interlocking structure according to claim 1, characterized in that: the locking slot is recessed on an outer side surface of a bottom end of the first box body.

3. The box body interlocking structure according to claim 1, characterized in that: the second box body is provided with a guide rib extending along a moving direction of the sliding block, and a lower surface of the sliding block is provided with a guide groove slidably connected with the guide rib.

4. The box body interlocking structure according to claim 3, characterized in that: the guide rib and the guide groove are configured to be T-shaped.

5. The box body interlocking structure according to claim 1, characterized in that: the second box body is provided with a stop block configured to prevent the sliding block from excessively sliding and disengaging from the second box body.

6. The box body interlocking structure according to claim 5, characterized in that: the sliding block is provided with a limiting slot; when the sliding block moves excessively, an inner wall of the limiting slot abuts against the stop block to prevent the sliding block from disengaging from the second box body.

7. The box body interlocking structure according to claim 1, characterized in that: a slot is provided at a connection between a top surface and a side surface of the second box body, and a support arm is located within the slot, the slot comprises two first side walls on opposing left and right sides, and a second side wall and a bottom wall connecting the two first side walls, the support arm is located above the bottom wall, the support arm connects the two first side walls and is spaced apart from the second side wall, and the sliding block is slidably disposed on the support arm.

8. The box body interlocking structure according to claim 7, characterized in that: the two first side walls are respectively provided with guiding grooves, and left and right ends of the sliding block are respectively provided with guiding portions slidably connected with the guiding grooves.

9. The box body interlocking structure according to claim 7, characterized in that: the support arm is provided with a first engaging slot and a second engaging slot spaced apart in a front-rear direction, and a lower surface of the sliding block is provided with an elastic arm, a distal end of the elastic arm is provided with an engaging protrusion; when the insertion portion is inserted into the locking slot, the engaging protrusion is engaged with the second engaging slot, and when the insertion portion is disengaged from the locking slot, the engaging protrusion is engaged with the first engaging slot.

10. The box body interlocking structure according to claim 1, characterized in that: a recessed portion is provided on an upper surface of the sliding block for receiving a finger or a tool, and the recessed portion is located between the two insertion portions spaced apart in a left and right direction.

DESCRIPTION

BOX BODY INTERLOCKING STRUCTURE

Technical Field

The present utility model relates to the technical field of box bodies, and particularly relates to a box body interlocking structure in which a plurality of box bodies are connected to each other.

Background Art

In order to facilitate user operation when carrying multiple box bodies (such as tool boxes), how to firmly interlock the box bodies with each other so as to facilitate movement and use by the user is an issue to be addressed. There are already some different types of implementation methods on the market:

A first implementation method is that a single plastic buckle is arranged on the box body, and the plastic buckle is rotatable and used to engage a protruding portion on another box body to achieve the purpose of interlocking. This implementation method has a simple structure, and only one component is required to realize the function of interlocking two box bodies. However, the tolerance rate is not high, because shrinkage and deformation inevitably occur after injection molding of the box body. This method relies on being forcibly clamped onto the protruding portion after flipping, that is, an interference position must be passed to achieve locking and prevent easy disengagement. It is difficult for such a structure to avoid the influence of plastic injection molding deformation and tolerances. After locking, it may be either loose or tight, resulting in poor user experience. For box bodies manufactured in large quantities by injection molding, it is inevitable that some will be loose while others will be tight after locking. The cause of this problem is the unavoidable shrinkage and deformation of plastic during injection molding.

A second method is a two-stage latch commonly used in box bodies to achieve locking between two box bodies. In principle, the two-stage latch can tolerate larger errors, so under the same condition of deformation of plastic parts caused by injection molding, the locking effect of the two-stage latch is better than that of the single plastic buckle in the first implementation

described above. However, the two-stage latch requires a relatively large movement space, and both the locking and unlocking positions require a relatively large structural arrangement space to be reserved. At the same time, since the two stages each require two rotating shafts, at least three components are required for the parts. Moreover, after unlocking, since it is a movable component, when a single box body is carried out separately, the component is often in a freely movable state and swings back and forth. When a single box body is placed on the ground, it may cause the latch to directly contact the ground or tilt to protrude on both sides relative to the entire box body.

Therefore, it is necessary to design a new box body interlocking structure to solve the above technical problems.

Summary of the Utility model

An object of the present utility model is to provide a box body interlocking structure with improved locking reliability.

To achieve the foregoing object, the present utility model adopts the following technical solutions: a box body interlocking structure is provided, which comprises a first box body and a second box body, the first box body being stacked on the second box body, the box body interlocking structure further comprises a sliding block arranged on the second box body in a horizontally slidable manner, the first box body is provided with a locking slot, and the sliding block is provided with an insertion portion aligned with the locking slot; when the insertion portion is inserted into the locking slot, the sliding block locks the first box body and the second box body together; when the insertion portion is withdrawn from the locking slot, the sliding block releases the locking of the first box body.

As a further improvement, the locking slot is recessed on an outer side surface of a bottom end of the first box body.

As a further improvement, the second box body is provided with a guide rib extending along a moving direction of the sliding block, and a lower surface of the sliding block is provided with a guide groove slidably connected with the guide rib.

As a further improvement, the guide rib and the guide groove are configured to be T-shaped.

As a further improvement, the second box body is provided with a stop block configured to prevent the sliding block from excessively sliding and disengaging from the second box body.

As a further improvement, the sliding block is provided with a limiting slot; when the sliding block moves excessively, an inner wall of the limiting slot abuts against the stop block to prevent the sliding block from disengaging from the second box body.

As a further improvement, a slot is provided at a connection between a top surface and a side surface of the second box body, and a support arm is located within the slot, the slot comprises two first side walls on opposing left and right sides, and a second side wall and a bottom wall connecting the two first side walls, the support arm is located above the bottom wall, the support arm connects the two first side walls and is spaced apart from the second side wall, and the sliding block is slidably disposed on the support arm.

As a further improvement, the two first side walls are respectively provided with guiding grooves, and left and right ends of the sliding block are respectively provided with guiding portions slidably connected with the guiding grooves.

As a further improvement, the support arm is provided with a first engaging slot and a second engaging slot spaced apart in a front-rear direction, and a lower surface of the sliding block is provided with an elastic arm, a distal end of the elastic arm is provided with an engaging protrusion; when the insertion portion is inserted into the locking slot, the engaging protrusion is engaged with the second engaging slot, and when the insertion portion is disengaged from the locking slot, the engaging protrusion is engaged with the first engaging slot.

As a further improvement, a recessed portion is provided on an upper surface of the sliding block for receiving a finger or a tool, and the recessed portion is located between the two insertion portions spaced apart in a left and right direction.

The box body interlocking structure of the present utility model further includes a sliding block that is horizontally slidably arranged on the second box body. The first box body is provided with a locking slot, and the sliding block is provided with an insertion portion aligned with the locking slot. When the insertion portion is inserted into the locking slot, the sliding block locks the first box body and the second box body together; when the insertion portion is withdrawn from the locking slot, the sliding block releases the locking of the first box body. The sliding block can realize locking and unlocking within a very short distance, thereby greatly improving reliability. Sufficient tolerance clearance can be provided in the cooperation between

the first box body and the second box body to prevent dimensional changes caused by plastic injection molding deformation. The box body interlocking structure of the present utility model only requires proper dimensional matching in the horizontal direction, thereby avoiding the defect of poor user experience due to looseness or tightness of the product. The structure is simple, the number of parts is small, and the cost is reduced while the occupied space is also reduced.

Brief Description of the Drawings

FIG. 1 is a perspective view of the box body interlocking structure of the present utility model.

FIG. 2 is an enlarged view of portion A in FIG. 1.

FIG. 3 is a partial cross-sectional view of the box body interlocking structure of the present utility model.

FIG. 4 is a perspective view of the first box body of the box body interlocking structure of the present utility model.

FIG. 5 is an enlarged view of portion B in FIG. 4.

FIG. 6 is a perspective view of the second box body and the sliding block of the box body interlocking structure of the present utility model.

FIG. 7 is an enlarged view of portion C in FIG. 6.

FIG. 8 is a perspective view of the second box body of the box body interlocking structure of the present utility model.

FIG. 9 is an enlarged view of portion D in FIG. 8.

FIG. 10 is a perspective view of the sliding block of the box body interlocking structure of the present utility model.

FIG. 11 is a perspective view of the sliding block of the box body interlocking structure of the present utility model from another angle.

Description of the Embodiments

With reference to FIG. 1 to FIG. 5, the present utility model provides a box body interlocking structure, which includes a first box body 10, a second box body 20, and a sliding

block 30. The first box body 10 is stacked on the second box body 20, and the sliding block 30 is slidably arranged on the second box body 20.

Considering the symmetrical structure of the box bodies, only the interlocking structure on one side of the first box body 10 and the second box body 20 is described below.

The outer side surface of the first box body 10 is recessed with two locking slots 12 spaced apart from each other in a left-right horizontal direction, and the locking slots 12 are located close to the bottom end of the first box body 10.

With reference to FIG. 3 to FIG. 9, a slot 21 is provided at a connection between a top surface and a side surface of the second box body 20, and a horizontal support arm 22 located in the slot 21 is provided. The sliding block 30 is located in the slot 21 and partially protrudes upward from the second box body 20. The slot 21 includes two first side walls 211 opposite to each other in the left-right direction, a second side wall 212 vertically connected to inner ends of the two first side walls 211, and a bottom wall 213 vertically connected to bottom ends of the two first side walls 211. The support arm 22 is located above the bottom wall 213 and is vertically connected to the two first side walls 211; the support arm 22 is located in front of the second side wall 212 and is spaced apart from the second side wall 212. The height of the upward extension of the two first side walls 211 exceeds the height of the support arm 22 relative to the bottom wall 213. The two first side walls 211 respectively extend from the connection positions with the support arm 22 in directions away from each other to form opposing inverted L-shaped guiding grooves 2110, and the two guiding grooves 2110 further extend in a direction toward the second side wall 212 to form recessed holes.

The front surface of the support arm 22 is coplanar with the side surface of the second box body 20. The upper surface of the support arm 22 is provided with two T-shaped guide ribs 221 spaced apart in the left-right direction, a reinforcing rib 222 vertically connected to the guide ribs 221, a first engaging slot 2231 and a second engaging slot 2232 located between the two guide ribs 221, and two stop blocks 224 located on outer sides of the two guide ribs 221. The reinforcing rib 222 is located at a rear edge of the support arm 22 and extends upward from the upper surface of the support arm 22 by a certain height, and its two ends are respectively vertically connected to the first side walls 211. The first engaging slot 2231 and the second engaging slot 2232 extend in the left-right direction and are spaced apart in the front-rear direction, and are used for fixing the sliding block 30 and facilitating a user to confirm whether

the sliding block 30 has been slid into position. The first engaging slot 2231 corresponds to an unlocking position, and the second engaging slot 2232 corresponds to a locking position. The stop block 224 is provided with an inclined surface 2240 facing forward.

With reference to FIG. 7 to FIG. 11, a recessed portion 31 is provided on an upper surface of the sliding block 30, and insertion portions 32 are provided on left and right sides of the recessed portion 31. The insertion portions 32 are configured as horizontal plate-shaped structures and are horizontally aligned with the locking slots 12 of the first box body 10. The recessed portion 31 is used to provide access for a finger or a tool, so as to facilitate pushing the sliding block 30 to slide. Guide portions 330 cooperating with the guiding grooves 2110 of the second box body 20 are provided at left and right ends of the sliding block 30.

The lower surface of the sliding block 30 is provided with two T-shaped guide grooves 34 spaced apart in the left-right direction, an elastic arm 35 located between the two guide grooves 34, and two limiting grooves 36 located on outer sides of the guide grooves 34. The two guide grooves 34 are respectively slidably connected with the two guide ribs 221, thereby on one hand providing a guiding function for the sliding block 30, and on the other hand increasing the force-bearing contact between the sliding block 30 and the second box body 20 to provide a supporting effect, thereby preventing the sliding block 30 from being disengaged upward from the second box body 20. The elastic arm 35 is capable of elastic upward and downward swinging, and a distal end thereof is provided with an engaging protrusion 350, which is used to engage with the first engaging slot 2231 or the second engaging slot 2232 of the second box body 20, thereby facilitating fixation of the sliding block 30 and enabling a user to confirm whether the sliding block 30 has been slid into an unlocking position or a locking position. The two limiting grooves 36 are open toward a side facing the stop block 224 and are provided with an opening. When the sliding block 30 is mounted to the second box body 20, the stop block 224 can enter the limiting grooves 36 through the side opening, and the inclined surface 2240 of the stop block 224 is used to guide the stop block 224 into the limiting grooves 36. The opposite side is configured as a closed side, and when the sliding block 30 is slid from the locking position to the unlocking position, the side wall on this side can abut against the stop block 224, thereby preventing excessive sliding of the sliding block 30 and preventing it from being disengaged from the second box body 20. It is readily understood that the limiting structure capable of abutting against the stop block 224 may also be provided in other forms than the limiting grooves

36, such as limiting ribs, limiting stop plates, or the like, as long as it can achieve the mutual abutment between the sliding block 30 and the stop block 224 when the sliding block 30 is in an unlocked state, thereby preventing excessive sliding and disengagement of the sliding block 30 from the second box body 20.

Preferably, in the present embodiment, the depth of the recessed holes formed by extending the two guiding grooves 2110 of the second box body 20 toward the second side wall 212 is greater than the extension length of the support arm 22 in this direction. Correspondingly, the extension length of the two guiding portions 330 of the sliding block 30 is also greater than the extension length of the two insertion portions 32, so that the sliding block 30 can be more stably mounted on the second box body 20. It can be understood that, in other embodiments, the extension depth and length of the guiding grooves 2110 and the guiding portions 330 may also be equal to or smaller than the extension length of the support arm 22, as long as the mounting and sliding of the sliding block 30 can be ensured without disengagement from the box body. Similarly, the extension length of the guide ribs 221 only needs to ensure that the guide ribs 221 and the guide grooves 34 will not disengage from each other whether the sliding block 30 is in the unlocking position or the locking position.

It is worth noting that, in the present embodiment, as shown in FIG. 9, the two guiding grooves 2110 on the second box body 20 are configured in an inverted L-shape bent downward. Correspondingly, the two guiding portions 330 on the sliding block 30 are also of a correspondingly matching shape. In other embodiments, the guiding grooves 2110 and the corresponding guiding portions 330 may also be designed in other matching shapes, such as an inverted L-shape bent upward, as long as the mutual fixation and sliding between the sliding block 30 and the second box body 20 can be achieved. Similarly, the guide ribs 221 and the guide grooves 34 may also be designed in other matching shapes, such as a wedge shape with an upper portion larger and a lower portion smaller, as long as mutual sliding between the two can be ensured and upward disengagement of the sliding block 30 can be prevented.

It can be understood that, in the present embodiment, two pairs are provided for the guide ribs 221 and their corresponding guide grooves 34, the stop blocks 224 and their corresponding limiting grooves 36, as well as the insertion portions 32 and their corresponding locking slots 12. In other embodiments, the number of each may be adjusted according to actual conditions such as the size of the box body.

When the first box body 10 and the second box body 20 need to be connected to each other, the first box body 10 is stacked above the second box body 20. The user moves the sliding block 30 inward, so that the engaging protrusion 350 disengages from the first engaging slot 2231 and engages with the second engaging slot 2232. The insertion portion 32 is inserted into the locking slot 12 of the first box body 10, thereby realizing mutual locking between the first box body 10 and the second box body 20. At this time, the side surface of the second box body 20 is coplanar with the outer side surface of the sliding block 30, and a highly reliable interlocking connection between the first box body 10 and the second box body 20 is achieved. When unlocking is required, it is only necessary to use the recessed portion 31 to reversely, i.e., outwardly, push the sliding block 30, so that the insertion portion 32 exits the locking slot 12. The engaging protrusion 350 disengages from the second engaging slot 2232 and engages with the first engaging slot 2231. In addition, due to the mutual abutment between the stop block 24 and the limiting groove 36, even if the sliding block 30 is pushed outward, the sliding block 30 will not be disengaged from the second box body 20. When the second box body 20 is used alone, the engaging protrusion 350 on the sliding block 30 can be engaged with the second engaging slot 2232. At this time, the sliding block 30 will not protrude from the side surface of the second box body 20 to affect use. Meanwhile, the gap between the support arm 22 and the sliding block 30 and the bottom wall 213 and the second side wall 212 can also allow a user's fingers to be inserted, serving as a handle to facilitate movement of the box body by the user.

It is worth noting that, in the present embodiment, the first box body 10 and the second box body 20 are both tool boxes with lids. In order to facilitate stacking and locking between the two box bodies, the locking slots 12 on the first box body 10 are provided at the lower end of a side surface of the first box body 10, and the corresponding support arm 22, sliding block 30, and guiding grooves 2110 on the second box body 20 are all provided at the upper end of a side surface of the box lid, thereby enabling stacking interlocking between the first box body 10 and the second box body 20. In other embodiments, the first box body 10 and/or the second box body 20 may also be storage tools without lids, such as storage baskets. When the second box body located below is a storage tool without a lid, the support arm, sliding block, and guiding grooves may be provided at the upper end of a side surface of the box body, as long as mutual locking and unlocking with the locking slot at the lower end of the side surface of the first box body located above can be achieved. It can be understood that, in the present embodiment, only the

case of stacking two box bodies vertically is described. For ease of understanding, only the interlocking connection structure between two box bodies is described, namely the support arm 22, sliding block 30, and guiding grooves 2110 on the lower box body, i.e., the second box body 20, and the locking slot 12 on the upper box body, i.e., the first box body 10. However, in other stacking systems, three or even more storage tools may also be included, each being provided with similarly matching interlocking structures. The storage tools herein include, but are not limited to, tool boxes, tool cases, and storage baskets.

The box body interlocking structure of the present utility model utilizes the sliding block 30 to realize locking and unlocking within a very short distance, thereby greatly improving reliability. Sufficient tolerance clearance can be provided in the cooperation between the first box body 10 and the second box body 20 to prevent dimensional changes caused by plastic injection molding deformation. The box body interlocking structure of the present utility model only requires proper dimensional matching in the horizontal direction, thereby avoiding the defect of poor user experience due to looseness or tightness of the product. The structure is simple, the number of parts is small, and the cost is reduced while the occupied space is also reduced.

Although preferred embodiments of the present utility model have been disclosed for illustrative purposes, a person skilled in the art will appreciate that various modifications, additions, and substitutions are possible without departing from the scope and principles of the present utility model as disclosed in the appended claims.

DRAWINGS

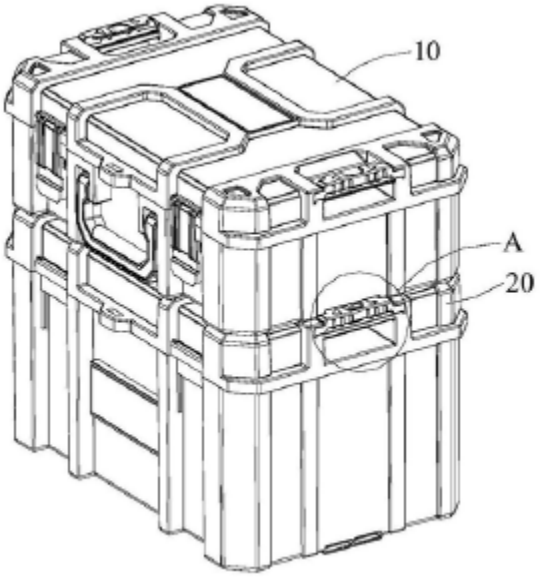


FIG. 1

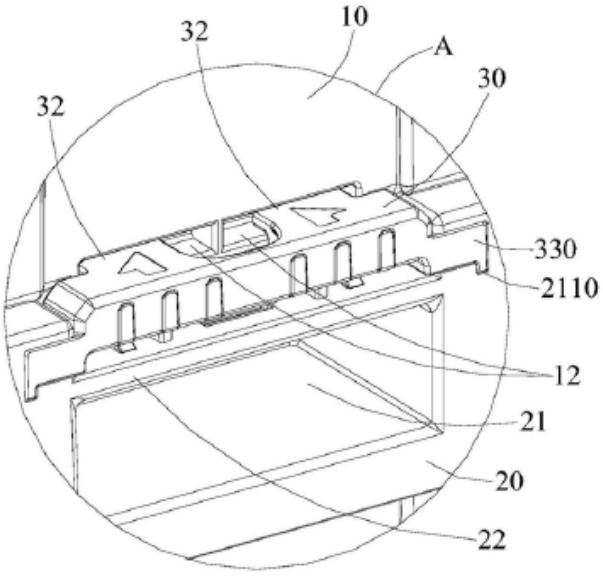


FIG. 2

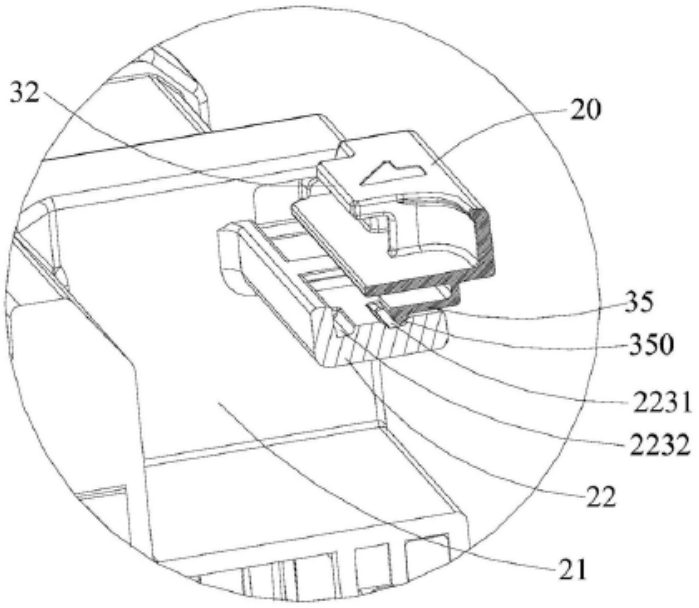


FIG. 3

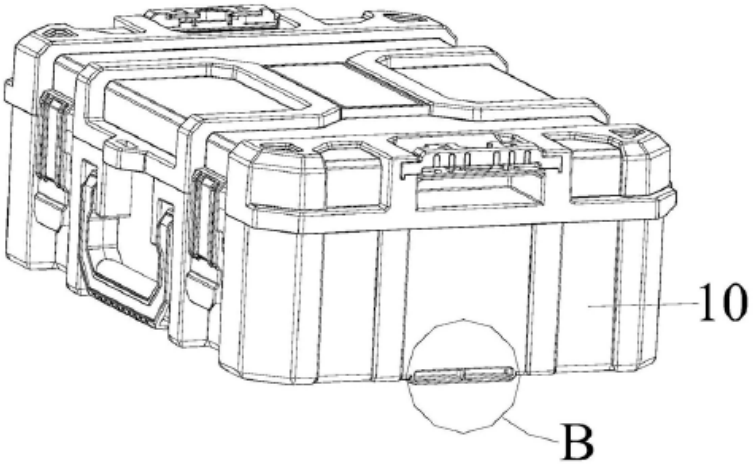


FIG. 4

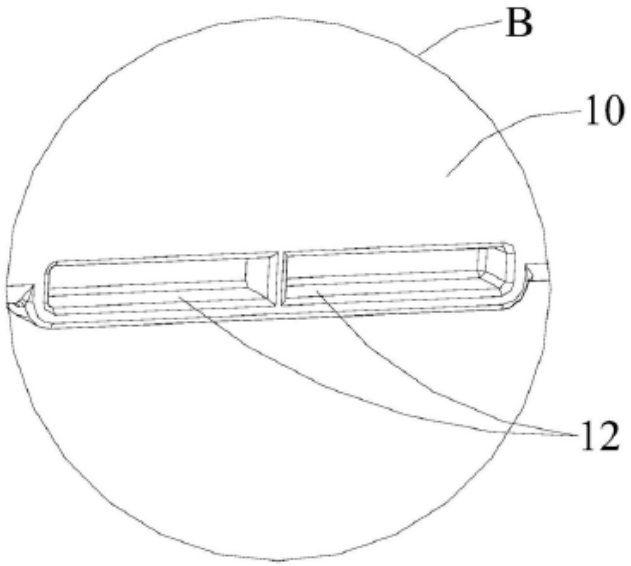


FIG. 5

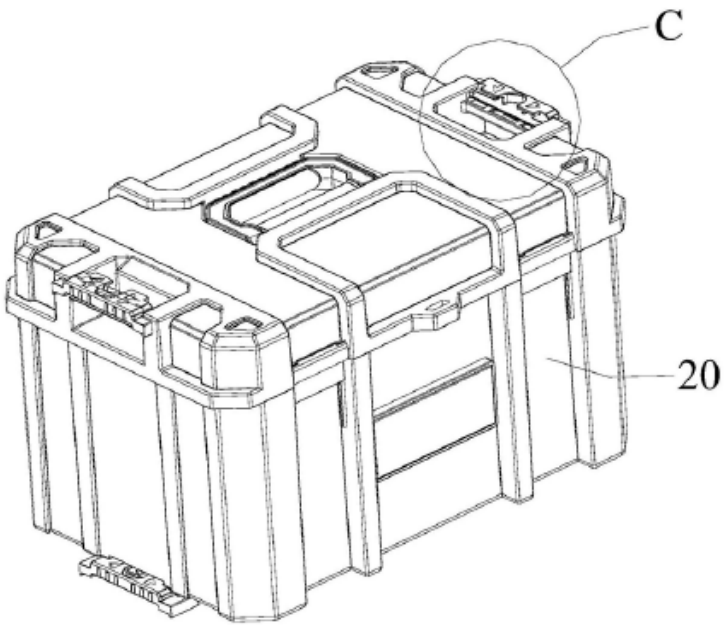


FIG. 6

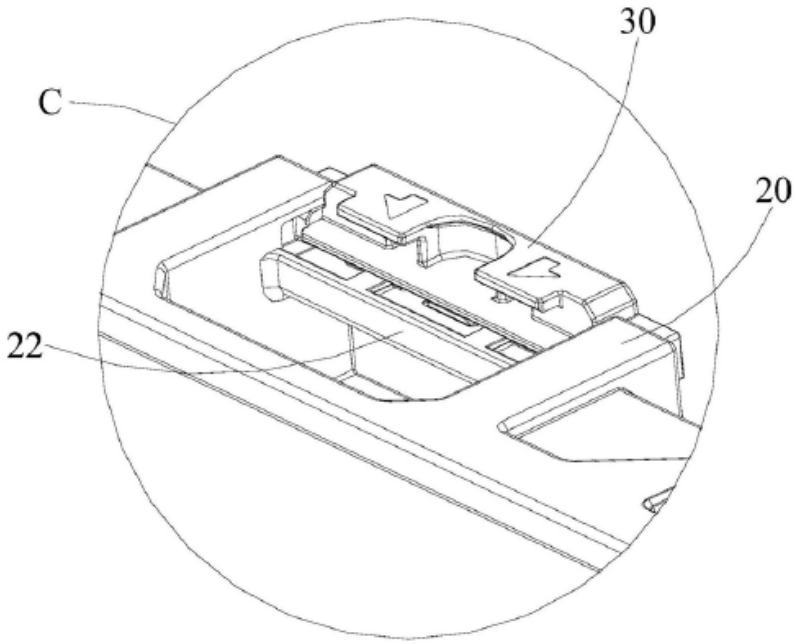


FIG. 7

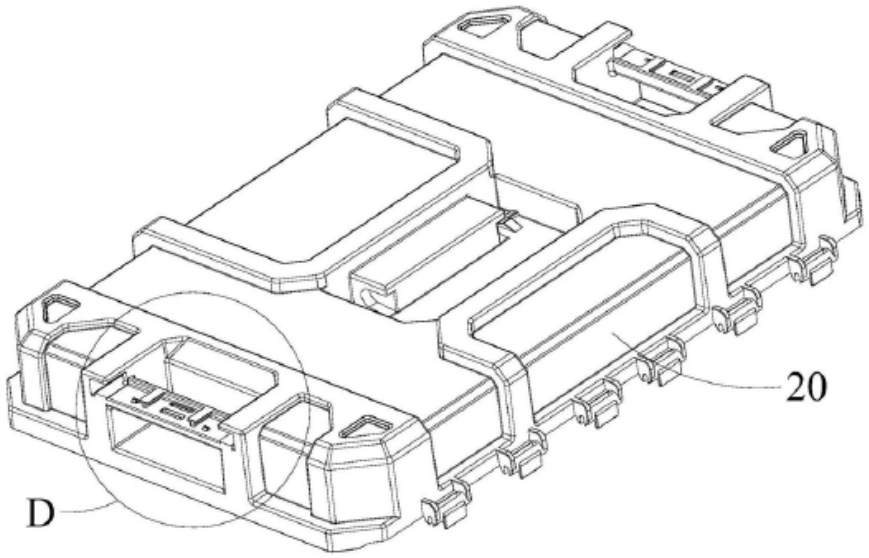


FIG. 8

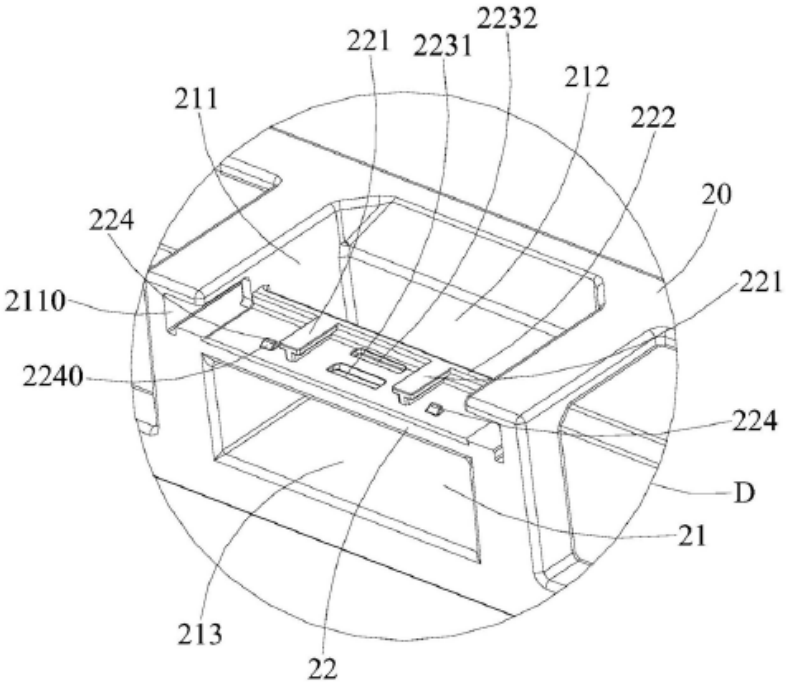


FIG. 9

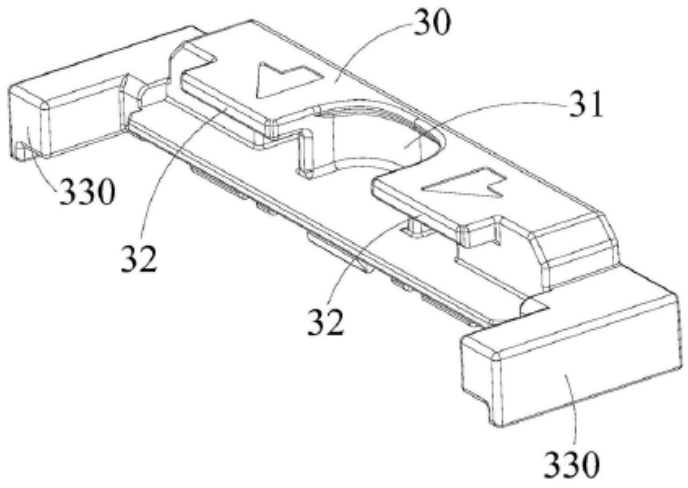


FIG. 10

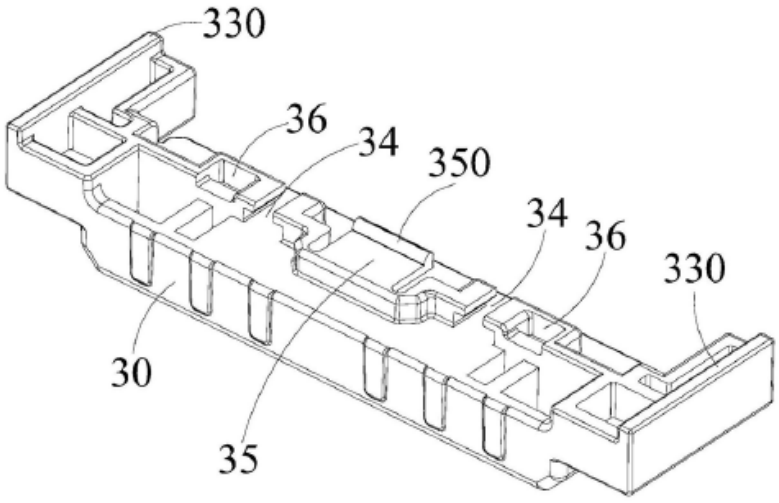


FIG. 11