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(54) **FILTER BOX ASSEMBLY FOR WASHING MACHINE AND WASHING MACHINE WITH SAME**

(57) A filter box assembly (200) for a washing machine and the washing machine with same. The filter box assembly (200) comprises a box cover (1) and a box body (2), wherein a lock bolt (11) is arranged on the box cover (1); and a lock buckle mechanism (3) is arranged on the box body (2); The lock buckle mechanism (3) is constructed so that when the box cover (1) is positioned in the opening position of box body (2), the lock bolt (11) and the lock buckle mechanism (3) are connected after the box cover (1) is pushed in the direction towards the box body (2), and when the box cover (1) is positioned in the closing position of box body (2), the lock bolt (11) is separated and disengaged from the lock buckle mechanism (3) after the box cover (1) is pushed in the direction towards the box body (2).

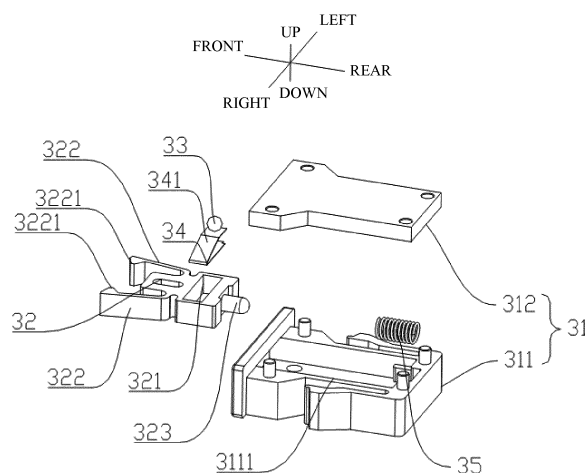


Fig. 15

Description

FIELD

[0001] The present disclosure relates to a field of washing machines, and more particularly, to a filter box assembly for a washing machine and a washing machine having the same.

BACKGROUND

[0002] It is pointed out in the related art that, during operation, a draining pump at a lower portion of a washing machine will collect accumulated small foreign matters such as fabric scraps, buttons, coins and the like. Generally, a user will periodically open a box cover of a filter box outside of the draining pump to clear the accumulated foreign matters. The box cover usually needs to be opened through a tool. For example, the tool (such as a key, a coin, a slotted screwdriver and the like) may be adopted to press the box cover down at a notch thereof, such that a snapping rib at the rear of the box cover opposite to the notch may be bent downwards, so as to depart from a snapping-rib position in the filter box, and thus the box cover may be opened. Then, a lid of the draining pump is unscrewed and those accumulated foreign matters are taken out, thereby ensuring the washing machine to drain water normally. However, this manner in which the box cover is opened may cause the snapping rib of the box cover to be deformed and damaged after a long time use, thus resulting in that the box cover cannot be closed, and thereby influencing an overall appearance of the washing machine.

SUMMARY

[0003] Embodiments of the present disclosure seek to solve at least one of the problems existing in the related art to at least some extent. Accordingly, a filter box assembly for a washing machine is provided by the present disclosure. The filter box assembly is convenient to open, not easy to damage and has a long service life.

[0004] A washing machine having the above filter box assembly is further provided by the present disclosure.

[0005] To achieve the above objectives, the filter box assembly for the washing machine according to a first aspect of embodiments of the present disclosure is provided and includes: a box cover provided with a lock tongue; and a box body provided with a lock catch mechanism, the lock catch mechanism being configured to locked and connected to the lock tongue if the box cover is pushed towards the box body, when the box cover is located at a position where the box body is opened, and to be separated and disengaged from the lock tongue if the box cover is pushed towards the box body, when the box cover is located at a position where the box body is closed.

[0006] In the filter box assembly for the washing ma-

chine according to embodiments of the present disclosure, by a fit between the locking tongue and the lock catch mechanism, a user just needs to adopt an action of pushing the box cover to achieve opening and closing of the box cover, thereby effectively improving operational convenience of the filter box assembly. Moreover, the fit between the locking tongue and the lock catch mechanism is high in reliability and not easy to damage, such that a service life of the filter box assembly and an aesthetic property of the overall washing machine are improved.

[0007] In addition, the filter box assembly according to embodiments of the present disclosure further includes following additional technical features.

[0008] According to an example of the present disclosure, the lock catch mechanism includes: a locking seat provided with a rolling groove therein, the rolling groove defining a closed loop; a locking block fitted in the locking seat in a retractable manner and provided with a slipping groove, the slipping groove extending in a direction perpendicular to a moving direction of the locking block; and a rolling member rollably clamped between the rolling groove and the sliding groove, in which during an unidirectional and circular rolling of the rolling member along the rolling groove, when the rolling member rolls to a first position in the rolling groove, the locking block is retracted in the locking seat to lock the locking tongue, and when the rolling member rolls to a second position in the rolling groove, at least part of the locking block extends out of the locking seat to release the locking tongue.

[0009] According to an example of the present disclosure, the rolling groove includes a first groove segment, a second groove segment, a third groove segment and a fourth groove segment which are connected in sequence end to end. The first groove segment and the fourth groove segment intersect at the first position, the second groove segment and the third groove segment intersect at the second position, the first groove segment and the second groove segment intersect at a third position, and the third groove segment and the fourth groove segment intersect at a fourth position. The second position is located a side of the first position adjacent to the box cover, the third position and the fourth position are located at a side of the first position away from the box cover, and the rolling member is configured to roll unidirectionally and circularly in the rolling groove along a direction from the first groove segment to the second groove segment.

[0010] According to an example of the present disclosure, a first step surface is provided between the second groove segment and the third groove segment, the first step surface extends inclinedly towards the locking block along a direction from the second groove segment to the third groove segment, and the second position is located at a side of the first step surface adjacent to the third groove segment.

[0011] According to an example of the present disclosure, a second step surface is provided between the third

groove segment and the fourth groove segment, the second step surface extends inclinedly towards the locking block along a direction from the third groove segment to the fourth groove segment, and the fourth position is located at a side of the second step surface adjacent to the fourth groove segment.

[0012] According to an example of the present disclosure, a position limiting groove is formed at the first position, and the position limiting groove is recessed in a direction running away from the locking block.

[0013] According to an example of the present disclosure, the sliding groove is provided with an elastic piece therein, a supporting surface of the elastic piece inclinedly extends towards the rolling groove in a direction from the third position to the fourth position, and the rolling member is clamped between the supporting surface and the rolling groove.

[0014] According to an example of the present disclosure, the locking block is provided with a locking claw, and the locking seat is provided with an accommodating groove. When the rolling member rolls to the first position, the locking claw is retracted in the accommodating groove to lock the locking tongue, and when the rolling member rolls to the second position, the locking claw extends out of the accommodating groove to release the locking tongue.

[0015] According to an example of the present disclosure, the lock catch mechanism further includes a tension spring, and the tension spring is disposed between the locking block and the locking seat and configured to constantly push the locking block to move in a direction of extending out of the locking seat.

[0016] A washing machine according to a second aspect of embodiments of the present disclosure is provided and includes a filter box assembly for a washing machine according to the first aspect of embodiments of the present disclosure.

[0017] The washing machine according to embodiments of the present disclosure has a good overall performance.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018]

Fig. 1 is a schematic view of a front sealing door and a filter box assembly of a washing machine according to an embodiment of the present disclosure, in which a box cover of the filter box assembly is closed; Fig. 2 is a schematic view of the front sealing door and the filter box assembly shown in Fig. 1, in which the box cover of the filter box assembly is open; Fig. 3 is a schematic view of the filter box assembly shown in Fig. 2, in which the box cover is closed; Figs. 4-8 are schematic views of the filter box assembly shown in Fig. 3, in which the box cover is open; Fig. 9 is a perspective view of a lock catch mechanism shown in Fig. 8;

nism shown in Fig. 8;

Fig. 10 is a front view of the lock catch mechanism shown in Fig. 9;

Fig. 11 is a right view of the lock catch mechanism shown in Fig. 10;

Fig. 12 is a left view of the lock catch mechanism shown in Fig. 10;

Fig. 13 is a bottom view of the lock catch mechanism shown in Fig. 10;

Fig. 14 is a top view of the lock catch mechanism shown in Fig. 10;

Fig. 15 is an exploded view of the lock catch mechanism shown in Fig. 10;

Figs. 16-21 are schematic views showing positions of a rolling member shown in Fig. 15 moving in a rolling groove;

Fig. 22 is a schematic view of a locking block, an elastic piece and a rolling member shown in Fig. 15;

Fig. 23 is a schematic view of the elastic piece and the rolling member shown in Fig. 22;

Fig. 24 is a schematic view of the rolling member shown in Fig. 23.

Reference numerals:

[0019]

100: front sealing door;

200: filter box assembly;

1: box cover; 11: lock tongue; 111: neck portion; 112: head portion;

2: box body;

3: lock catch mechanism;

31: locking seat; 311: seat body; 3111: accommodating groove; 312: cover body; 3121: rolling groove;

3121A: first groove segment; 3121B: second groove segment; 3121C: third groove segment; 3121D: fourth groove segment; 3121E: first position; 3121F: second position; 3121G: third position; 3121H: fourth position; 313: first step surface; 314: second step surface; 315: position limiting groove;

32: locking block; 321: slipping groove; 322: locking claw; 3221: clasp portion; 323: mounting column;

33: rolling member; 34: elastic piece; 341: supporting surface; 35: extension spring; 4: elastic buckle; 5: guide rail.

DETAILED DESCRIPTION

[0020] Reference will be made in detail to embodiments of the present disclosure. The same or similar elements and the elements having same or similar functions are denoted by like reference numerals throughout the descriptions. The embodiments described herein with reference to drawings are explanatory, illustrative, and used to generally understand the present disclosure. The embodiments shall not be construed to limit the present disclosure.

[0021] Various embodiments and examples are provided in the following description to implement different structures of the present disclosure. In order to simplify the present disclosure, certain elements and settings will be described. However, these elements and settings are only by way of example and are not intended to limit the present disclosure. In addition, reference numerals may be repeated in different examples in the present disclosure. This repeating is for the purpose of simplification and clarity and does not refer to relations between different embodiments and/or settings. Furthermore, examples of different processes and materials are provided in the present disclosure. However, it would be appreciated by those skilled in the art that other processes and/or materials may be also applied.

[0022] A filter box assembly 200 for a washing machine (not shown in the drawings) according to a first aspect of embodiments of the present disclosure will be described with reference to Figs. 1-24 in the following. Optionally, the washing machine may be a drum washing machine or a pulsator washing machine, and only the drum washing machine is taken as an example of the washing machine for explanations in the following. Certainly, after reading a technical solution below, those skilled in the art obviously understand a technical solution in which the washing machine is configured as the pulsator washing machine. Specifically, referring to Figs. 1 and 2, the washing machine (such as the drum washing machine) may include a machine body (not shown in the drawings) and a front sealing door 100, and the front sealing door 100 may be vertically covered over a front end of the machine body. The front sealing door 100 may have a mounting hole at a bottom right corner thereof, and the mounting hole runs through the front sealing door 100 along a front and rear direction. The filter box assembly 200 is mounted in the mounting hole.

[0023] As shown in Figs. 3-8, the filter box assembly 200 for the washing machine according to the first aspect of embodiments of the present disclosure includes: a box cover 1 and a box body 2. The box cover 1 is provided with a lock tongue 11, and the box body 2 is provided with a lock catch mechanism 3. The box body 2 is connected with or disconnected from the box cover 1 through the lock tongue 11 and the lock catch mechanism 3. Specifically, when the box cover 1 is located at a position where the box body 2 is open (as shown in Fig. 2 and Figs. 4-8), if the box cover 1 is pushed towards the box body 2, the lock tongue 11 and the lock catch mechanism 3 are locked and connected mutually, such that the box cover 1 may remain at a position where the box body 2 is closed (as shown in Figs. 1 and 3). When the box cover 1 is located at the position where the box body 2 is closed (as shown in Figs. 1 and 3), if the box cover 1 is pushed towards the box body 2, the lock tongue 11 and the lock catch mechanism 3 are separated and disengaged from each other, such that the box cover 1 may move in a direction of opening the box body 2 so as to open the box body 2 (as shown in Fig. 2 and Figs. 4-8).

[0024] For example, in examples shown in Figs. 3-8, the box body 2 is generally formed as a cuboid arranged vertically, and defines an accommodating space with an open front side therein. The box cover 1 is generally formed as a rectangle plate, and is vertically disposed at the front of the box body 2. A bottom portion of the box cover 1 is pivotably connected with a front side of a bottom portion of the box body 2. A rear side of a top portion of the box cover 1 may be provided with the lock tongue 11 and a top portion of the box body 2 may be provided with the lock catch mechanism 3. When the lock tongue 11 is well fitted with the lock catch mechanism 3, the top portion of the box cover 1 is closely fitted and connected with the top portion of the box body 2, and thus the box cover 1 may seal a front side of the box body 2 completely, so as to close the box body 2 (as shown in Figs. 1 and 3). When the lock tongue 11 is separated from and disengaged from the lock catch mechanism 3, the top portion of the box cover 1 is separated from the top portion of the box body 2, in which case the box cover 1 may be pivoted forwards, so as to open the box body 2 (as shown in Fig. 2 and Figs. 4-8).

[0025] Referring to Fig. 3, when the box cover 1 is located at the position where the box body 2 is closed, if the box cover 1 is pushed backwards, the lock tongue 11 may be disengaged from the lock catch mechanism 3, such that the box cover 1 may be opened forwards (as shown in Figs. 4-8), as shown in Figs. 4-8. When the box cover 1 is located at the position where the box body 2 is open, if the box cover 1 is pushed backwards, the lock tongue 11 may be well fitted with the lock catch mechanism 3, such that the box cover 1 may remain at the position where the box cover 2 is closed (as shown in Fig. 3). Thus, when the washing machine operates normally, the box cover 1 is located at the position where the box body 2 is closed (as shown in Figs. 1 and 3). When the box cover 1 of the filter box assembly 200 needs to be opened to clear debris, a user may open the box cover 1 just by slightly tapping the box cover 1 inwards manually at an outer side of the box cover 1. When the box cover 1 of the filter box assembly 200 needs to be closed, the user may close the box cover 1 and lock the box cover 1 to the box body 2 just by slightly pushing (pressing) the box cover 1 upwards and inwards.

[0026] Thus, the box cover 1 may be opened and closed by an action of pushing the box cover 1 towards the box body 2, thereby improving operational convenience of the filter box assembly 200. Thus, the user may easily open and close the box cover 1 without adopting a tool. Moreover, a mechanical fit between the lock tongue 11 and the lock catch mechanism 3 has high reliability and is not easy to damage, thereby improving a service life of the filter box assembly 200 and an aesthetic property of the overall washing machine.

[0027] In the filter box assembly 200 for the washing machine according to embodiments of the present disclosure, by the fit between the locking tongue 11 and the lock catch mechanism 3, the user may open and close

the box cover 1 just by pushing the box cover 1, and thus the operational convenience of the filter box assembly 200 is effectively improved. Moreover, the fit between the locking tongue 11 and the lock catch mechanism 3 is high in reliability and not easy to damage, such that the service life of the filter box assembly 200 and the aesthetic property of the overall washing machine are improved.

[0028] In an embodiment of the present disclosure, the lock catch mechanism 3 may be mounted to the box body 2 by assembling. For example, in examples shown in Figs. 4-8, a top wall of the box body 2 may be provided with a through hole running therethrough in the front and rear direction, and the lock catch mechanism 3 may be mounted in the through hole. Optionally, as shown in Figs. 9-14, the lock catch mechanism 3 may be generally configured to have a cuboid shape, and a left side wall and a right side wall of the lock catch mechanism 3 each may be provided with an elastic buckle 4 respectively. A rear end of the elastic buckle 4 is a fixed end and may be fixedly connected with a rear end of a side wall of the lock catch mechanism 3, and a front end of the elastic buckle 4 is a free end and may extend in a direction running away from a center of the lock catch mechanism 3.

[0029] Referring to Figs. 8 and 9, when the lock catch mechanism 3 is mounted, the front ends of the two elastic buckles 4 may be clamped to the two side walls of the lock catch mechanism 3 respectively, and then the lock catch mechanism 3 may be pushed from front to rear to pass through the through hole in the box body 2. Subsequently, the two elastic buckles 4 recover their original shapes. That is, the front ends of the two elastic buckles 4 may spring in the direction running away from the center of the lock catch mechanism 3 respectively, such that a distance between the front ends of the two elastic buckles 4 in a left and right direction is larger than a width of a rear side of the through hole. In this way, even if the lock catch mechanism 3 is pushed forwards, the front ends of the two elastic buckles 4 may abut against wall surfaces at two sides of a rear end of the through hole, so as to prevent the lock catch mechanism 3 from moving forwards. Thus, by the two elastic buckles 4, the lock catch mechanism 3 may be firmly and easily mounted to the box body 2. Certainly, the present disclosure is not limited to this, and the lock catch mechanism 3 may be assembled with the box body 2 in other manners. In addition, the lock catch mechanism 3 may be integrally formed with the box body 2, which is not elaborated herein.

[0030] In an embodiment of the present disclosure, referring to Fig. 15, the lock catch mechanism 3 may include: a locking seat 31, a locking block 32 and a rolling member 33 (for example a ball). The locking block 32 may be fitted in the locking seat 31 in a retractable manner. That is, the locking block 32 may move between a position where the locking block 32 extends out of the locking seat 31 and a position where the locking block 32 is retracted in the locking seat 31. When the locking

block 32 is retracted in the locking seat 31, the lock tongue 11 may be locked. When at least part of the locking block 32 extends out of the locking seat 31, the lock tongue 11 may be released. For example, in an example shown in Fig. 15, the locking block 32 may slide forwards and backwards in the locking seat 31. When the locking block 32 slides backwards to be completely received in the locking seat 31, the locking block 32 may lock the locking tongue 11, such that the box cover 1 is closed to the box body 2. When the locking block 32 moves forwards to extend out of the locking seat 31, the locking block 32 releases the locking tongue 11, such that the box cover 1 opens the box body 2.

[0031] For example, in a specific example of the present disclosure, referring to Fig. 15, the locking seat 31 is provided with an accommodating groove 3111, and the locking block 32 may move forwards and backwards in the accommodating groove 3111. The locking block 32 is provided with a locking claw 322. When the locking block 32 drives the locking claw 322 to move until the locking claw 322 is retracted in the accommodating groove 3111, the locking claw 322 locks the locking tongue 11. When the locking block 32 drives the locking claw 322 to move until the locking claw 322 departs from the accommodating groove 3111, the locking claw 322 releases the locking tongue 11.

[0032] Referring to Fig. 15, the accommodating groove 3111 may be formed by being recessed backwards from a front end surface of the locking seat 31, and the locking block 32 may be fitted in the accommodating groove 3111. The locking block 32 may move backwards into the accommodating groove 3111 and move forwards out of the locking block 32. A left side and a right side of the locking block 32 each may be provided with one locking claw 322 respectively. The locking claw 322 is configured as an elastic member. A rear end of the locking claw 322 may be fixedly connected with the locking block 32, and a front end of the locking claw 322 is free and extends forwards and outwards (in a direction running away from a center axis of the locking block 32). A front end of each locking claw 322 is provided with a clasp portion 3221 at an inner side (a side adjacent to the center axis of the locking block 32) thereof. Referring to Fig. 8, the locking tongue 11 includes a neck portion 111 and a head portion 112. The neck portion 111 extends backwards from a rear-end surface of the box cover 1, and the head portion 112 extends backwards from a rear end of the neck portion 111. A width of the head portion 112 in the left and right direction is larger than a width of the neck portion 111 in the left and right direction.

[0033] Thus, referring to Figs. 8 and 15, when the locking block 32 drives the locking claw 322 to move backwards so as to be received into the accommodating groove 3111, the respective front ends of the two locking claws 322 are inclined towards the center axis of the locking block 32, and a distance between the two clasp portions 3221 in the left and right direction is reduced, such that the two clasp portions 3221 clasp the neck

portion 111 of the locking tongue 11, and thus the head portion 112 of the locking tongue 11 is restricted between the two clasping portions 3221 and a front end of the locking block 32, in which case the locking claws 322 lock the locking tongue 11. When the locking block 32 drives the locking claw 322 to move forwards out of the accommodating groove 3111, the respective front ends of the two locking claws 322 are inclined in the direction running away from the center axis of the locking block 32, so as to recover their original shapes, and the distance between the two clasping portions 3221 in the left and right direction is increased, such that the two clasping portions 3221 release the neck portion 111 of the locking tongue 11, and thus the head portion 112 of the locking tongue 11 escapes forwards out of the two clasping portions 3221 and the front end of the locking block 32, in which case the locking claws 322 release the locking tongue 11.

[0034] Herein, it should be noted that the locking claw 322 is simple in structure, easy to achieve, and high in reliability. Certainly, the present disclosure is not limited to this, and the locking tongue 11 may be locked and released by the locking block 32 by means of other mechanisms with a catching and releasing function, which is not elaborated herein.

[0035] Optionally, the lock catch mechanism may further include a tension spring 35. The tension spring 35 is disposed between the locking block 32 and the locking seat 31 and is configured to constantly push the locking block 32 to move in a direction of extending out of the locking seat 31. Referring to Fig. 15, the tension spring 35 may be mounted in the accommodating groove 3111, and the tension spring 35 is located between a rear wall of the accommodating groove 3111 and a rear wall of the locking block 32. The tension spring 35 may extend and retract freely in the front and rear direction, such that a front end of the tension spring 35 may be connected with the rear end of the locking block 32 (for example, the front end of the tension spring 35 may be fitted over a mounting column 323 at the rear end of the locking block 32 shown in Fig. 15), and a rear end of the tension spring 35 abuts against the rear wall of the accommodating groove 3111 and is connected thereto.

[0036] Thus, when the locking block 32 is locked in the accommodating groove 3111, the locking claw 322 locks the locking tongue 11, and the tension spring 35 is in a compressed state. In this case, the tension spring 35 has an elastic force capable of ejecting the locking block 32 forwards. When the locking block 32 is unlocked, the tension spring 35 ejects the locking block 32 forwards, and the locking claw 322 releases the locking tongue 11. Herein, it should be noted that the tension spring 35 is simple in structure, easy to achieve and high in reliability. Certainly, the present disclosure is not limited to this, and the tension spring 35 may further be replaced by other mechanism having an elasticity function, which is not elaborated herein.

[0037] Thus, when the box cover 1 is at an open posi-

tion, if the user pushes the box cover 1 towards the box body 2, the locking block 32 may be locked in the accommodating groove 3111, such that the lock catch mechanism 3 is locked with the locking tongue 11, in which case the box body 2 is closed by the box cover 1. When the user pushes the box cover 1 towards the box body 2 again, the locking block 32 may be unlocked, the lock catch mechanism 3 is separated from and disengaged from the locking tongue 11, and the tension spring 35 pushes the locking block 32 forwards, such that the box body 2 is opened by the box cover 1. By pushing the box cover 1 repeatedly like this, the box cover 1 may be opened and closed alternately. Referring to Figs. 15-24, a specific embodiment in which the locking block 32 can be locked in the accommodating groove 3111 and the locking block 32 can also be unlocked will be described in detail in the following.

[0038] Referring to Fig. 15, optionally, the locking seat 31 includes a seat body 311 and a cover body 312. The cover body 312 may be covered on a top portion of the seat body 311, and the seat body 311 may be connected with the cover body 312 by interference fit between four mounting pillars and four mounting holes. The accommodating groove 3111 may be recessed backwards from a front-end surface of the seat body 311. Certainly, a structure of the locking seat 31 is not limited to this.

[0039] Specifically, referring to Figs. 15 and 16, the locking seat 31 defines a rolling groove 3121 therein. For example, the rolling groove 3121 may be formed in a bottom portion of the cover body 312, and the rolling groove 3121 defines a closed loop therein, such that a rolling member 33 described below may circularly roll in the rolling groove 3121 along one direction (for example along a clockwise direction or a counterclockwise direction). The locking block 32 is provided with a slipping groove 321 which extends in a direction perpendicular to a moving direction of the locking block 32. For example, in an example shown in Fig. 15, the slipping groove 321 extends along the left and right direction, such that the rolling member 33 described in the following may slide in the slipping groove 321 along the left and right direction repeatedly. The rolling member 33 may be rollably clamped between the rolling groove 3121 and the sliding groove 321, such that the rolling member 33 may roll in the rolling groove 3121 circularly, meanwhile sliding in the slipping groove 321 along the left and right direction repeatedly.

[0040] Specifically, during an unidirectional and circular rolling of the rolling member 33 along the rolling groove 3121, when the rolling member 33 rolls to a first position 3121E (as shown in Fig. 16) in the rolling groove 3121, the locking block 32 moves into the locking seat 31 to lock the locking tongue 11, in which case the box cover 1 may remain at the position where the box body 2 is closed; when the rolling member 33 rolls to a second position 3121F (as shown in Fig. 18) in the rolling groove 3121, the locking block 32 moves out of the locking seat 31 to release the locking tongue 11, in which case the

box body 2 is opened by the box cover 1.

[0041] Thus, by the fit among the rolling groove 3121, the slipping groove 321 and the rolling member 33, the locking and unlocking of the locking block 32 may be achieved. Specifically, referring to Figs. 16-20, when the rolling member 33 remains at the first position 3121E (as shown in Fig. 16), the locking block 32 is locked in the accommodating groove 3111, the lock catch mechanism 3 is locked with the locking tongue 11, and the box cover 1 is at a state of closing the box body 2. When the box cover 1 is pushed backwards to allow the rolling member 33 to move away from the first position 3121E, the locking of the locking block 32 is relieved, and the rolling member 33 moves to the second position 3121F (as shown in Fig. 18) under a pushing action of the tension spring 35, in which case the locking claw 322 completely releases the locking tongue 11. In this case, the locking block 32 is locked at an extreme position outside of the accommodating groove 3111, and the box body 2 is opened by the box cover 1.

[0042] Referring to Figs. 16-20, when the box cover 1 is pushed backwards again to allow the rolling member 33 to move away from the second position 3121F, the locking of the locking block 32 is relieved again. When the rolling member 33 moves to the first position 3121E again, the locking block 32 is locked in the accommodating groove 3111 again, and the lock catch mechanism 3 is locked with the locking tongue 11 again. If released, the box cover 1 may remain at the position where the box body 2 is closed. As repeated in this way, the box cover 1 may achieve actions of opening and closing.

[0043] Specifically, referring to Fig. 16, the rolling groove 3121 includes a first groove segment 3121A, a second groove segment 3121B, a third groove segment 3121C and a fourth groove segment 3121D, which are connected in sequence end to end. The first groove segment 3121A and the fourth groove segment 3121D intersect at the first position 3121E, the second groove segment 3121B and the third groove segment 3121C intersect at the second position 3121F, the first groove segment 3121A and the second groove segment 3121B intersect at a third position 3121G, and the third groove segment 3121C and the fourth groove segment 3121D intersect at a fourth position 3121H. The rolling member 33 is configured to roll unidirectionally and circularly in the rolling groove 3121 along a direction from the first groove segment 3121A to the second groove segment 3121B. That is, the rolling member 33 may roll circularly along a direction from the first groove segment 3121A to the second groove segment 3121B to the third groove segment 3121C to the fourth groove segment 3121D to the first groove segment 3121A in sequence. In other words, the rolling member 33 may roll circularly along a direction from the first position 3121E to the third position 3121G to the second position 3121F to the fourth position 3121H to the first position 3121E.

[0044] The second position 3121F is located a side of the first position 3121E adjacent to the box cover 1. For

example, in an example shown in Fig. 16, the second position 3121F is located at a front side of the first position 3121E. The third position 3121G and the fourth position 3121H are located at a side of the first position 3121E away from the box cover 1. For example, in the example shown in Fig. 16, the third position 3121G and the fourth position 3121H are located at a rear side of the first position 3121E.

[0045] Referring to Figs. 15 and 16, since the rolling groove 3121 is located at the locking seat 31 which is fixedly provided, and the sliding groove 321 is located at the locking block 32 which is movably provided, when the rolling member 33 remains at the first position 3121E, the locking block 32 is subject to a forward thrust exerted by the tension spring 35, and has a tendency to drive the rolling member 33 to move forwards through the sliding groove 321. However, since the rolling member 33 is also fitted at the first position 3121E in the fixed rolling groove 3121, and the third position 3121G and the fourth position 3121H both adjacent to the first position 3121E are disposed at the rear side of the first position 3121E, the rolling member 33 is stuck at the first position 3121E and cannot move forwards. That is, the rolling member 33 is locked at the first position 3121E, and the locking block 32 is involved and hence cannot move forwards either. Thus, the locking block 32 is locked at the current position, i.e., the locking block 32 is locked in the accommodating groove 3111, so as to lock the locking tongue 11 and thus allow the box cover 1 to be at a closed position.

[0046] Referring to Fig. 15 and Figs. 16-18, when the rolling member 33 is pushed backwards, for example when the box cover 1 is pushed backwards, the box cover 1 pushes the locking block 32 backwards through the locking tongue 11 and the locking block 32 pushes the rolling member 33 backwards through the sliding groove 321, the rolling member 33 may move backwards to the second groove segment 3121B where the third position 3121G is (herein, the reason why the rolling member 33 at the first position 3121E does not move to the fourth position 3121H will be described in the following), and thus the rolling member 33 is unlocked. Then, under an action of the elastic force of the tension spring 35, the tension spring 35 pushes the locking block 32 to move forwards, and the locking block 32 drives the rolling member 33 to move forwards to the second position 3121F (as shown in Fig. 18) through the sliding groove 321. In this case, since the second position 3121F is located at a forefront end of the fixed rolling groove 3121, the rolling member 33 cannot move forwards any more. Thus, the rolling member 33 is locked at the second position 3121F, and the locking block 32 is involved and hence cannot move forwards either. That is, the locking block 32 is locked at the current position, i.e., the locking block 32 is locked outside of the accommodating groove 3111, so as to release the locking tongue 11 and thus allow the box cover 1 be at an open position.

[0047] Referring to Figs. 15 and 18-20, when the rolling member 33 is pushed backwards again, for example,

when the box cover 1 is pushed backwards, the box cover 1 pushes the locking block 32 backwards through the locking tongue 11 and the locking block 32 pushes the rolling member 33 backwards through the sliding groove 321, the rolling member 33 may move backwards from the second position 3121F to the fourth position 3121H (herein, the reason why the rolling member 33 located at the second position 3121F does not move to the third position 3121G will be described in the following). In this case, if the box cover 1 is released, the locking block 32 and the rolling member 33 may move to the first position 3121E again (herein, the reason why the rolling member 33 located at the fourth position 3121H does not move to the second position 3121F will be described in the following) under the action of the elastic force of the tension spring 35, such that the rolling member 33 is locked at the first position 3121E again, the locking block 32 is also locked in the accommodating groove 3111, the locking claw 322 locks the locking tongue 11 and the box body 2 is closed by the box cover 1. As repeated in this way, the box cover 1 may be opened and closed alternately.

[0048] Referring to Figs. 15 and 22-24, the sliding groove 231 extends along the moving direction of the locking block 32. For example, in the example shown in Fig. 15, the locking block 32 moves along the front and rear direction, and the sliding groove 321 extends along the left and right direction. The sliding groove 321 is provided with an elastic piece 34 (for example a metal elastic piece) therein, and in a direction from the third position 3121G to the fourth position 3121H (for example a direction from right to left shown in Fig. 15), a supporting surface 341 of the elastic piece 34 inclinedly extends towards the rolling groove 3121 (for example, upwards shown in the Fig. 15). That is, in a direction from the fourth position 3121H to the third position 3121G, the supporting surface 341 of the elastic piece 34 has a tendency of extending downhill. The rolling member 33 is clamped between the supporting surface 341 of the elastic piece 34 and the rolling groove 3121.

[0049] Thus, referring to Figs. 15 and 16, when the rolling member 33 located at the first position 3121E moves backwards, the rolling member 33 located on the elastic piece 34 in the sliding groove 321 tends to roll along a downhill direction of the elastic piece 34 under an action of gravity. That is, the rolling member 33 has a tendency to move towards the third position 3121G from left to right. Accordingly, this may explain why the rolling member 33 located at the first position 3121E just moves towards the third position 3121G, rather than the fourth position 3121H. Certainly, the present disclosure is not limited to this, and other unidirectional position-limiting mechanisms may be provided to ensure that the rolling member 33 may just move from the first position 3121E to the third position 3121G unidirectionally.

[0050] Optionally, referring to Figs. 16 and 21, a first step surface 313 is provided between the second groove segment 3121B and the third groove segment 3121C,

and the first step surface 313 extends inclinedly towards the locking block 32 (for example, downwards shown in Fig. 21) along a direction from the second groove segment 3121B to the third groove segment 3121C (for example, frontwards-leftwards shown in Fig. 21). The second position 3121F is located at a side of the first step surface 313 adjacent to the third groove segment 3121C. Thus, when the rolling member 33 locked at the second position 3121F is subject to a backward thrust, since the rolling member 33 is pressed tightly on a top portion of the supporting surface 341 and hence has no capability of moving downwards to cross the first step surface 313, the rolling member 33 may just roll and slide backwards and towards the fourth position 3121H along the smooth third groove segment 3121C. Accordingly, this may explain why the rolling member 33 located at the second position 3121F just moves towards the fourth position 3121H, rather than the third position 3121G. Certainly, the present disclosure is not limited to this, and other unidirectional position-limiting mechanisms may be provided to ensure that the rolling member 33 may just move from the second position 3121F to the fourth position 3121H unidirectionally.

[0051] Optionally, referring to Figs. 16 and 21, a second step surface 314 is provided between the third groove segment 3121C and the fourth groove segment 3121D, and the second step surface 314 extends inclinedly towards the locking block 32 (for example, downwards shown in Fig. 21) along a direction from the third groove segment 3121C to the fourth groove segment 3121D (for example, backwards shown in Fig. 21). The fourth position 3121H is located at a side of the second step surface 314 adjacent to the fourth groove segment 3121D. Thus, when the rolling member 33 locked at the fourth position 3121H is subject to a forwards thrust, since the rolling member 33 is pressed tightly on the top portion of the supporting surface 341 and hence has no capability of moving downwards to cross the second step surface 314, the rolling member 33 may just roll and slide forwards and towards the first position 3121E along the smooth fourth groove segment 3121D. Thus, this may explain why the rolling member 33 located at the fourth position 3121H just moves towards the first position 3121E, rather than the second position 3121F. Certainly, the present disclosure is not limited to this, and other unidirectional position-limiting mechanisms may be provided to ensure that the rolling member 33 may just move from the fourth position 3121H to the first position 3121E unidirectionally.

[0052] Preferably, a position limiting groove 315 may be formed at the first position 3121E, and the position limiting groove 315 is recessed in a direction running away from the locking block 32. For example, in examples shown in Figs. 17-21, the position limiting groove 315 is recessed upwards. When the rolling member 33 remains at the first position 3121E, the rolling member 33 may be caught in the position limiting groove 315, such that the position limiting groove 315 may ensure stability and re-

liability of the rolling member 33 remaining at the first position 3121E, and further ensure that the box cover 1 may steadily remain at the position where the box body 2 is closed.

[0053] Referring to Figs. 1-24, an action process of opening and closing of the filter box assembly 200 according to embodiments of the present disclosure will be briefly described in the following.

[0054] Referring to Figs. 1 and 3, when the washing machine is used normally, the box cover 1 is at the position where the box body 2 is closed. In this case, the locking block 32 shown in Fig. 15 is located in the accommodating groove 3111, the two locking claws 322 of the locking block 32 clasp the neck portion 111 of the locking tongue 11 shown in Fig. 8, the rolling member 33 remains at the first position 3121E in the rolling groove 3121 shown in Fig. 16, and the tension spring 35 is at the compressed state.

[0055] When the box cover 1 needs to be opened, the box cover 1 may be pushed backwards, then the box cover 1 drives the locking tongue 11 to push the locking block 32 backwards, and the locking block 32 pushes the rolling member 33 to move backwards through the sliding groove 321, such that the rolling member 33 may slide towards the third position 3121G along the first groove segment 3121A and the downhill direction of the supporting surface 341. When the rolling member 33 moves to the second groove segment 3121B where the third position 3121G is, the backward thrust exerted on the box cover 1 is withdrawn, and under the action of the elastic force of the tension spring 35 recovering its original shape, the tension spring 35 pushes the locking block 32 to move forwards. During the forward movement of the locking block 32, through the sliding groove 321, the locking block 32 drives the rolling member 33 to move to the second position 3121F in the rolling groove 3121 and stop thereat. In this case, the locking claw 322 completely moves out of the accommodating groove 3111 to release the locking tongue 11. Under an action of an inertia force of the locking tongue 11 which is pushed to move forwards, the box cover 1 may continue moving forwards. Preferably, the box cover 1 may slide along an arc guide rail 5 shown in Fig. 5, so as to open the box body 2 completely.

[0056] When the box cover 1 needs to be closed, the box cover 1 may be pushed backwards again, the box cover 1 drives the locking tongue 11 to push the locking block 32 backwards, and the locking block 32 pushes the rolling member 33 to move backwards through the sliding groove 321, such that the rolling member 33 may slide from the second position 3121F to the fourth position 3121H along the third groove segment 3121C. When the rolling member 33 moves to the fourth groove segment 3121D where the fourth position 3121H is, the backward thrust exerted on the box cover 1 is withdrawn, and under the action of the elastic force of the tension spring 35 recovering its original shape, the tension spring 35 pushes the locking block 32 to move forwards. During the

forward movement of the locking block 32, through the sliding groove 321, the locking block 32 drives the rolling member 33 to move towards the first position 3121E along the fourth groove segment 3121D and stop in the position limiting groove 315 at the first position 3121E. In this case, the locking claw 322 is retracted in the accommodating groove 3111 to lock the locking tongue 11 and hence the box body 2 is closed by the box cover 1. As repeated in this way, the opening and closing of the box cover 1 may be achieved.

[0057] The washing machine (not shown in the drawings) according to a second aspect of embodiments of the present disclosure includes the filter box assembly 200 for the washing machine according to the first aspect of embodiments of the present disclosure. Other components of the washing machine according to embodiments of the present disclosure, such as an electric motor (not shown in the drawings) and a washing drum (not shown in the drawings), and operations are known by those skilled in the art, which thus will not be elaborated herein.

[0058] In the washing machine according to embodiments of the present disclosure, by providing the filter box assembly 200 for the washing machine according to the first aspect of embodiments of the present disclosure, an overall performance of the washing machine is improved.

[0059] In the specification, it is to be understood that terms such as "upper," "lower," "front," "rear," "left," and "right" should be construed to refer to the orientation as then described or as shown in the drawings under discussion. These relative terms are for convenience of description and do not require that the present disclosure be constructed or operated in a particular orientation.

[0060] In addition, terms such as "first" and "second" are used herein for purposes of description and are not intended to indicate or imply relative importance or significance or to imply the number of indicated technical features. Thus, the feature defined with "first" and "second" may comprise one or more of this feature. In the description of the present disclosure, "a plurality of" means two or more than two, unless specified otherwise.

[0061] In the present disclosure, unless specified or limited otherwise, the terms "mounted," "connected," "coupled," "fixed" and the like are used broadly, and may be, for example, fixed connections, detachable connections, or integral connections; may also be mechanical or electrical connections; may also be direct connections or indirect connections via intervening structures; may also be inner communications of two elements, which can be understood by those skilled in the art according to specific situations.

[0062] In the present disclosure, unless specified or limited otherwise, a structure in which a first feature is "on" or "below" a second feature may include an embodiment in which the first feature is in direct contact with the second feature, and may also include an embodiment in which the first feature and the second feature are not in direct contact with each other, but are contacted via

an additional feature formed therebetween.

[0063] Reference throughout this specification to "an embodiment," "some embodiments," "one embodiment," "another example," "an example," "a specific example," or "some examples," means that a particular feature, structure, material, or characteristic described in connection with the embodiment or example is included in at least one embodiment or example of the present disclosure. Thus, the appearances of the phrases such as "in some embodiments," "in one embodiment," "in an embodiment," "in another example," "in an example," "in a specific example," or "in some examples," in various places throughout this specification are not necessarily referring to the same embodiment or example of the present disclosure. Furthermore, the particular features, structures, materials, or characteristics may be combined in any suitable manner in one or more embodiments or examples.

[0064] Although explanatory embodiments have been shown and described, it would be appreciated by those skilled in the art that the above embodiments cannot be construed to limit the present disclosure, and changes, alternatives, and modifications can be made in the embodiments without departing from spirit, principles and scope of the present disclosure.

Claims

1. A filter box assembly for a washing machine, comprising:

a box cover provided with a lock tongue; and
a box body provided with a lock catch mechanism, the lock catch mechanism being configured to be locked and connected to the lock tongue if the box cover is pushed towards the box body, when the box cover is located at a position where the box body is opened, and to be separated and disengaged from the lock tongue if the box cover is pushed towards the box body, when the box cover is located at a position where the box body is closed.

2. The filter box assembly according to claim 1, wherein the lock catch mechanism comprises:

a locking seat provided with a rolling groove therein, the rolling groove defining a closed loop;
a locking block configured to be fitted in the locking seat in a retractable manner and provided with a slipping groove, the slipping groove extending in a direction perpendicular to a moving direction of the locking block; and
a rolling member rollably clamped between the rolling groove and the sliding groove, wherein during an unidirectional and circular rolling of the rolling member along the rolling

groove, when the rolling member rolls to a first position in the rolling groove, the locking block is retracted in the locking seat to lock the locking tongue, and when the rolling member rolls to a second position in the rolling groove, at least part of the locking block extends out of the locking seat to release the locking tongue.

3. The filter box assembly according to claim 2, wherein the rolling groove comprises a first groove segment, a second groove segment, a third groove segment and a fourth groove segment which are connected in sequence end to end, the first groove segment and the fourth groove segment intersect at the first position, the second groove segment and the third groove segment intersect at the second position, the first groove segment and the second groove segment intersect at a third position, and the third groove segment and the fourth groove segment intersect at a fourth position, wherein the second position is located a side of the first position adjacent to the box cover, the third position and the fourth position are located at a side of the first position away from the box cover, and the rolling member is configured to roll unidirectionally and circularly in the rolling groove along a direction from the first groove segment to the second groove segment.

4. The filter box assembly according to claim 3, wherein a first step surface is provided between the second groove segment and the third groove segment, the first step surface extends inclinedly towards the locking block along a direction from the second groove segment to the third groove segment, and the second position is located at a side of the first step surface adjacent to the third groove segment.

5. The filter box assembly according to claim 3 or 4, wherein a second step surface is provided between the third groove segment and the fourth groove segment, the second step surface extends inclinedly towards the locking block along a direction from the third groove segment to the fourth groove segment, and the fourth position is located at a side of the second step surface adjacent to the fourth groove segment.

6. The filter box assembly according to any one of claims 3-5, wherein a position limiting groove is formed at the first position, and the position limiting groove is recessed in a direction running away from the locking block.

7. The filter box assembly according to any one of claims 3-6, wherein the sliding groove is provided with an elastic piece therein, a supporting surface of the elastic piece inclinedly extends towards the roll-

ing groove in a direction from the third position to the fourth position, and the rolling member is clamped between the supporting surface and the rolling groove.

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8. The filter box assembly according to any one of claims 2-7, wherein the locking block is provided with a locking claw, and the locking seat is provided with an accommodating groove, wherein when the rolling member rolls to the first position, the locking claw is retracted in the accommodating groove to lock the locking tongue, wherein when the rolling member rolls to the second position, the locking claw extends out of the accommodating groove to release the locking tongue. 10 15
9. The filter box assembly according to any one of claims 2-8, wherein the lock catch mechanism further comprises a tension spring, and the tension spring is disposed between the locking block and the locking seat and configured to constantly push the locking block to move in a direction of extending out of the locking seat. 20
10. A washing machine, comprising a filter box assembly for a washing machine according to any one of claims 1-9. 25

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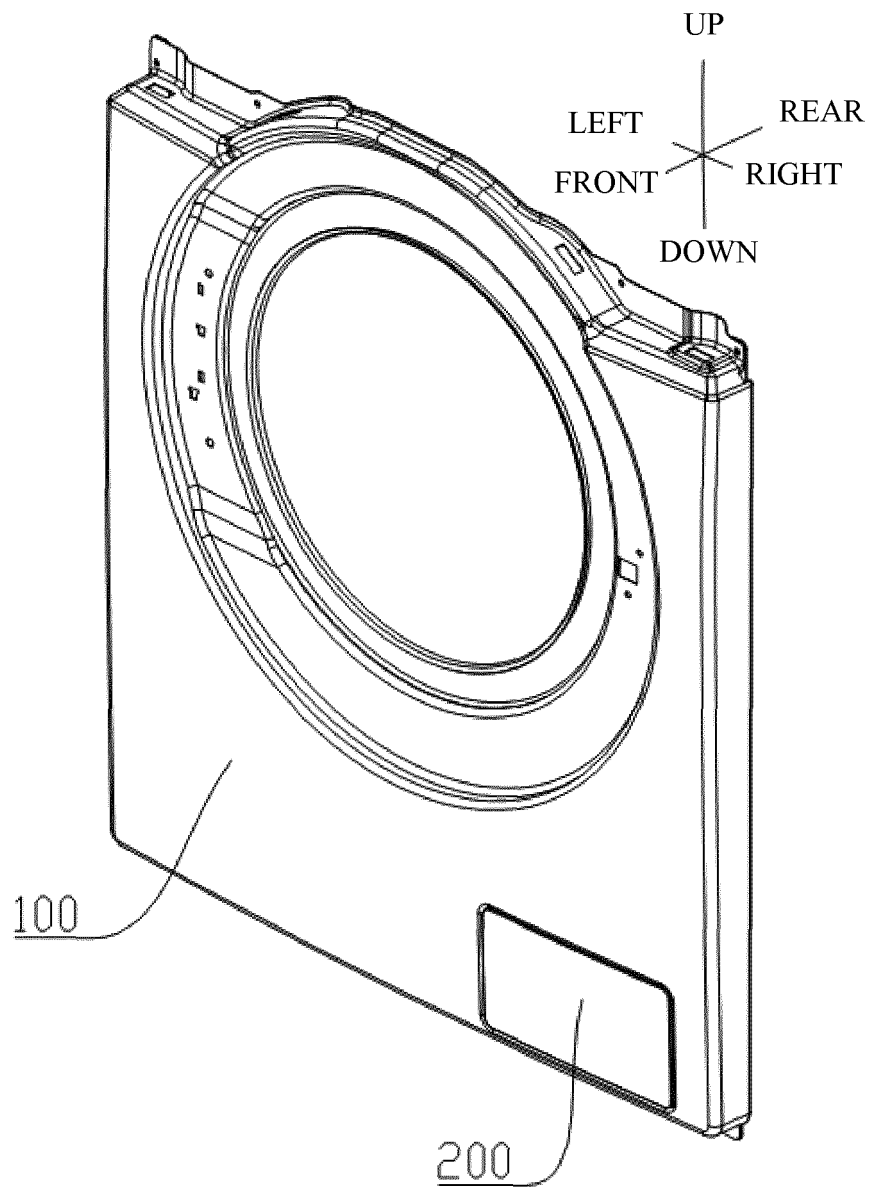


Fig. 1

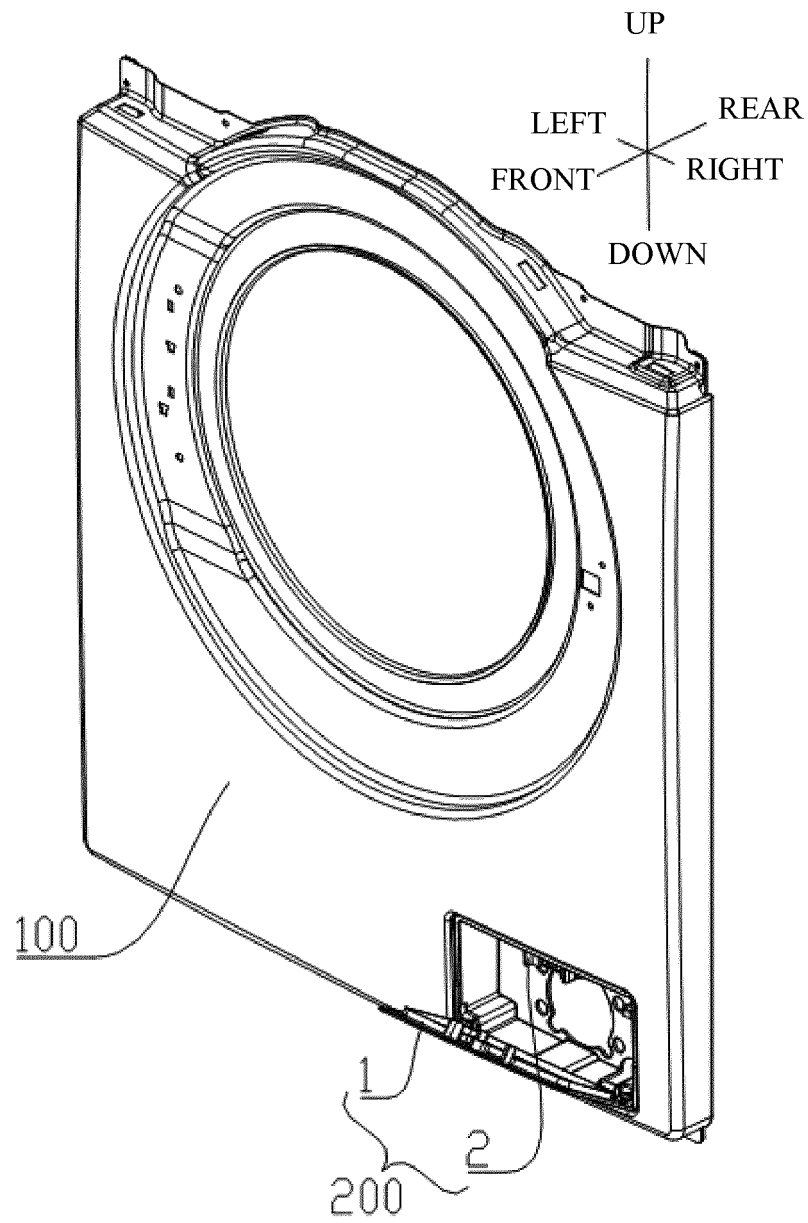


Fig. 2

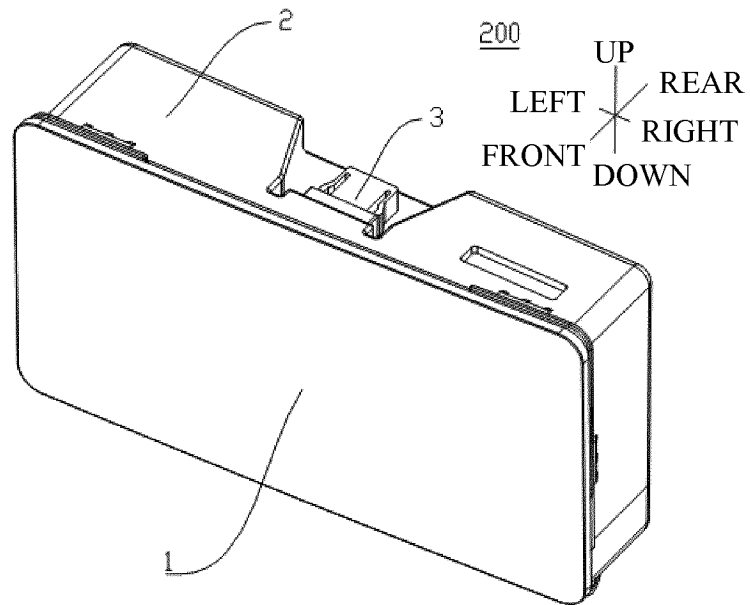


Fig. 3

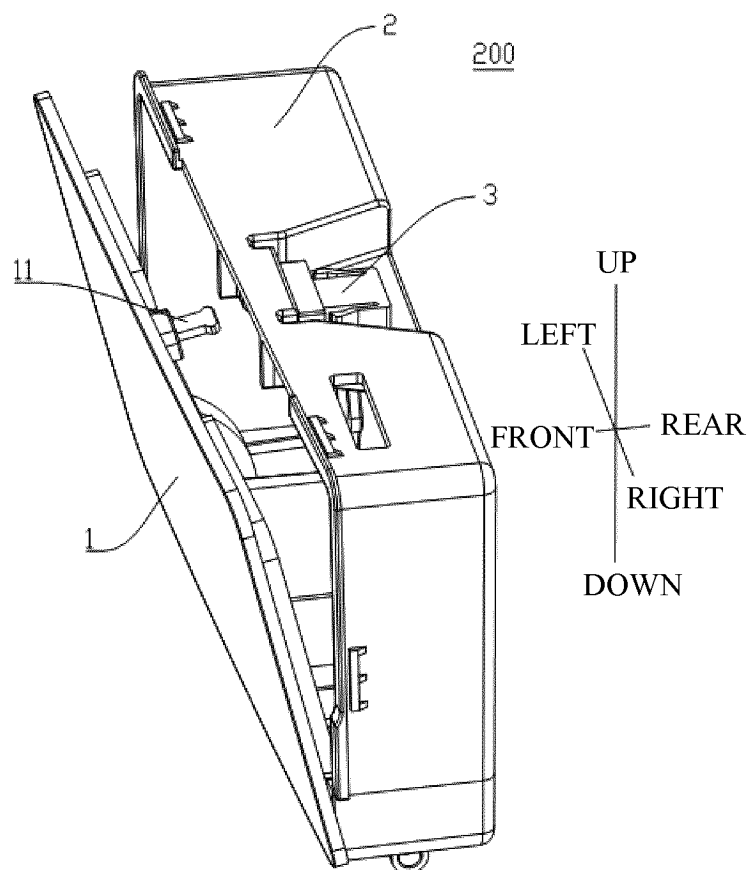


Fig. 4

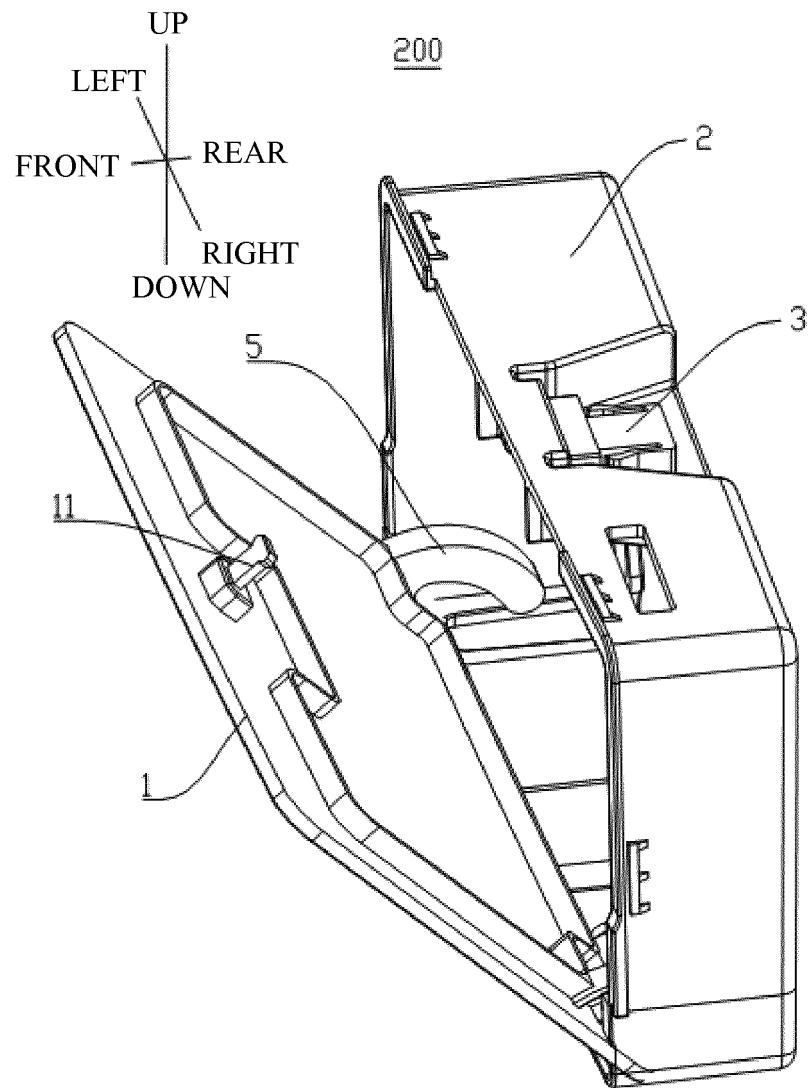


Fig. 5

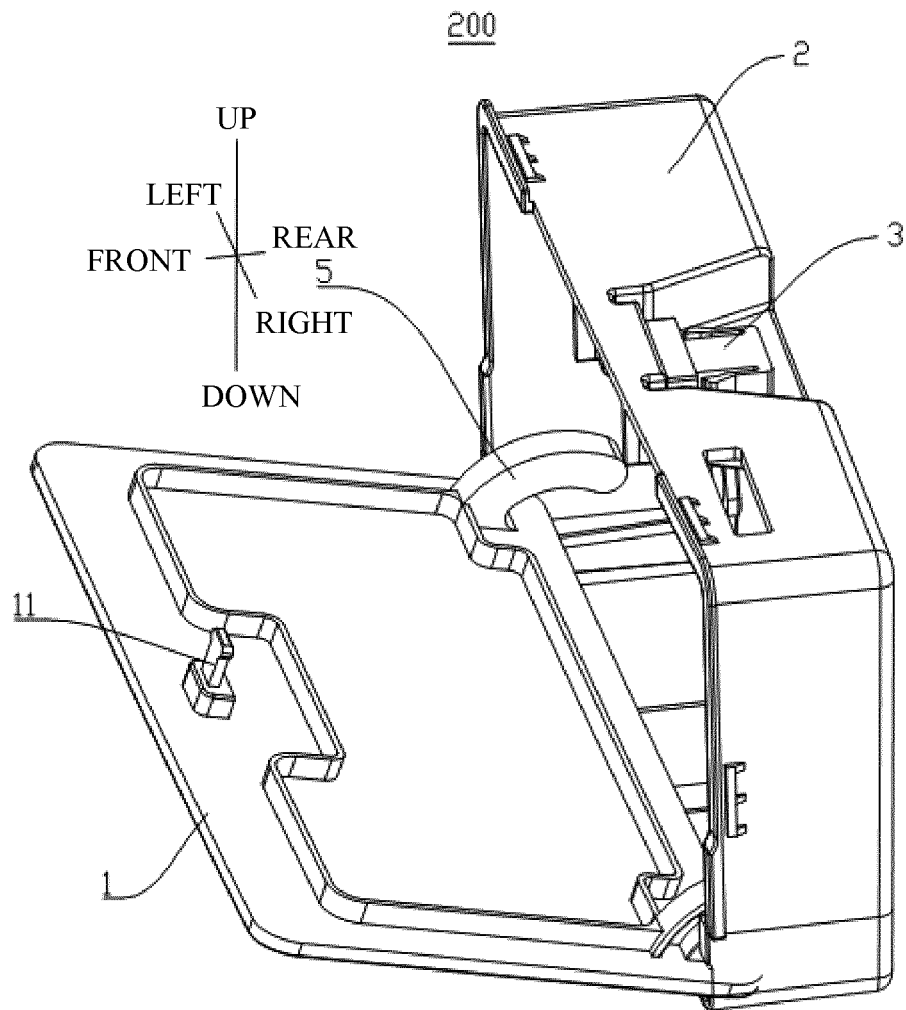


Fig. 6

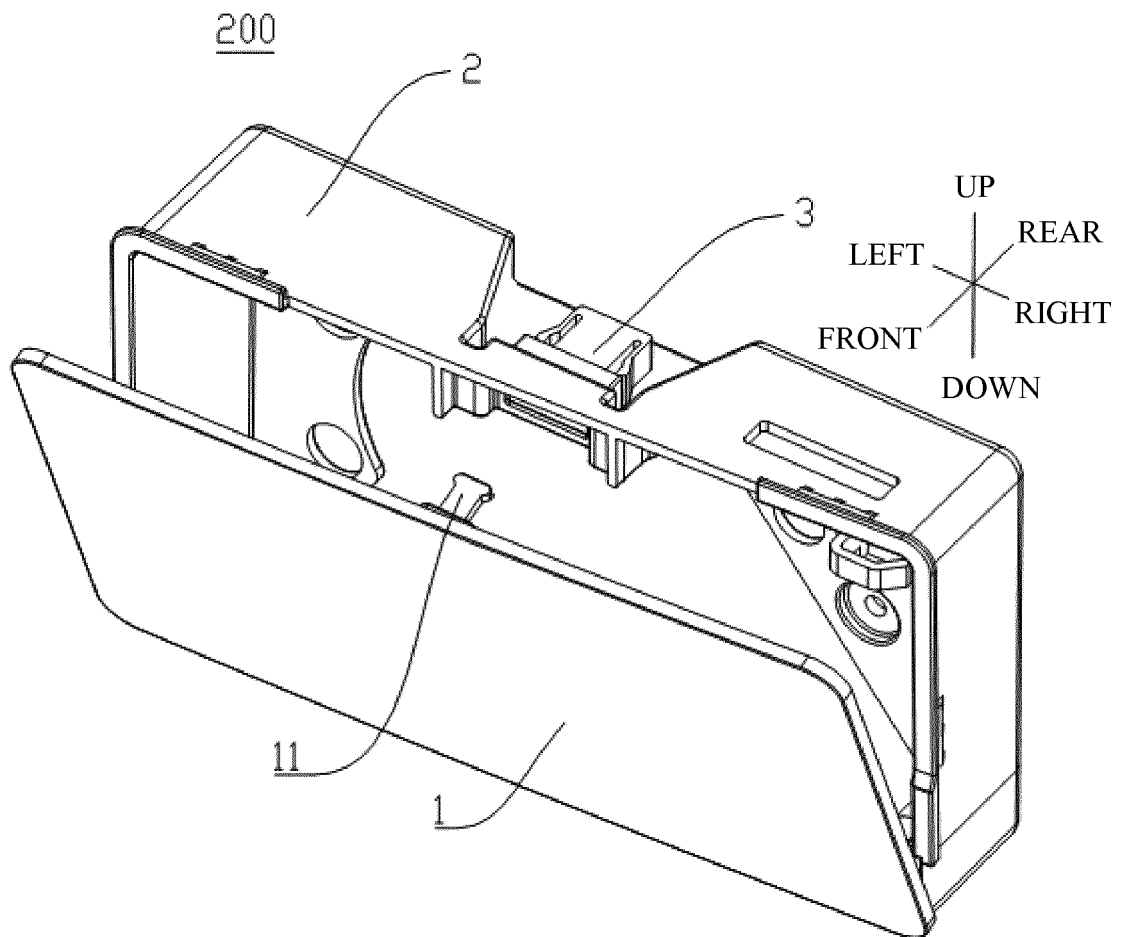


Fig. 7

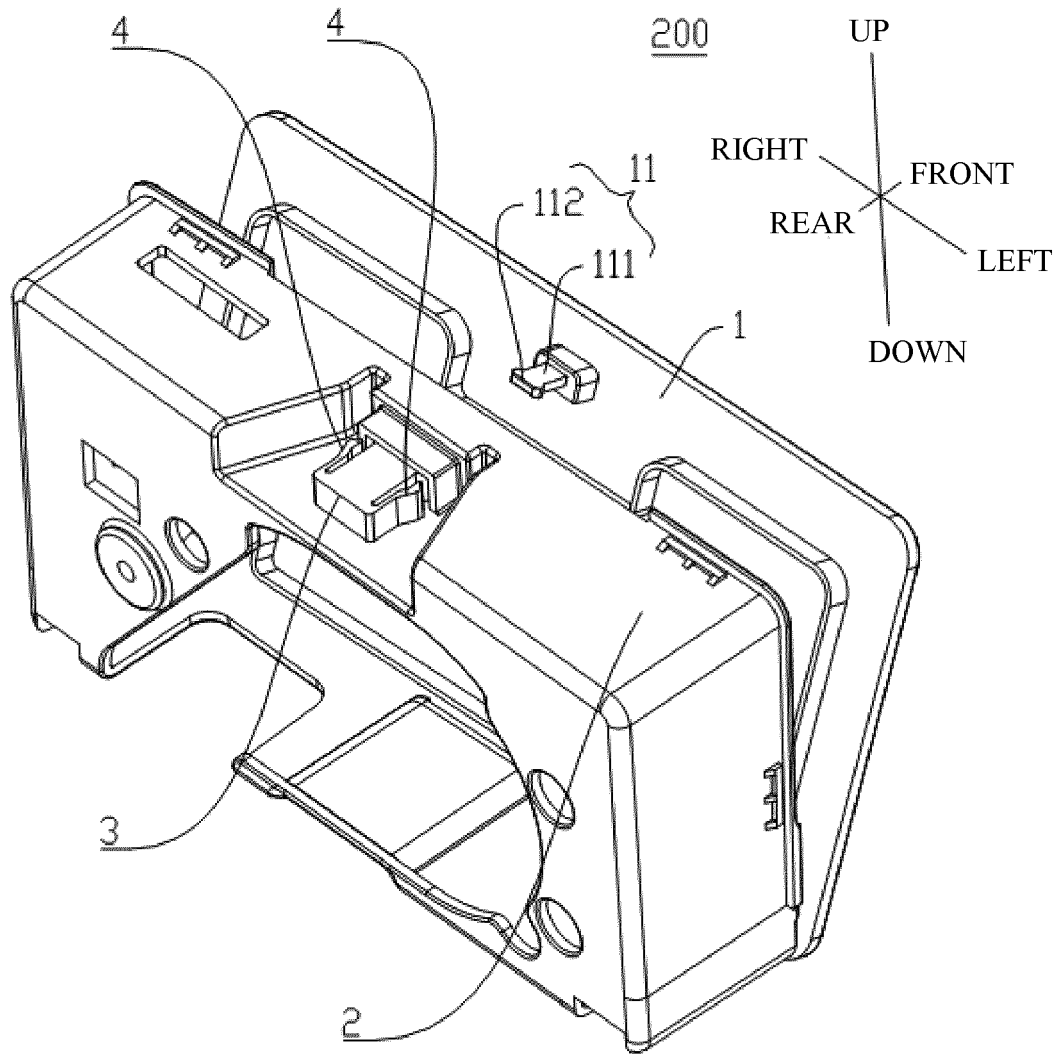


Fig. 8

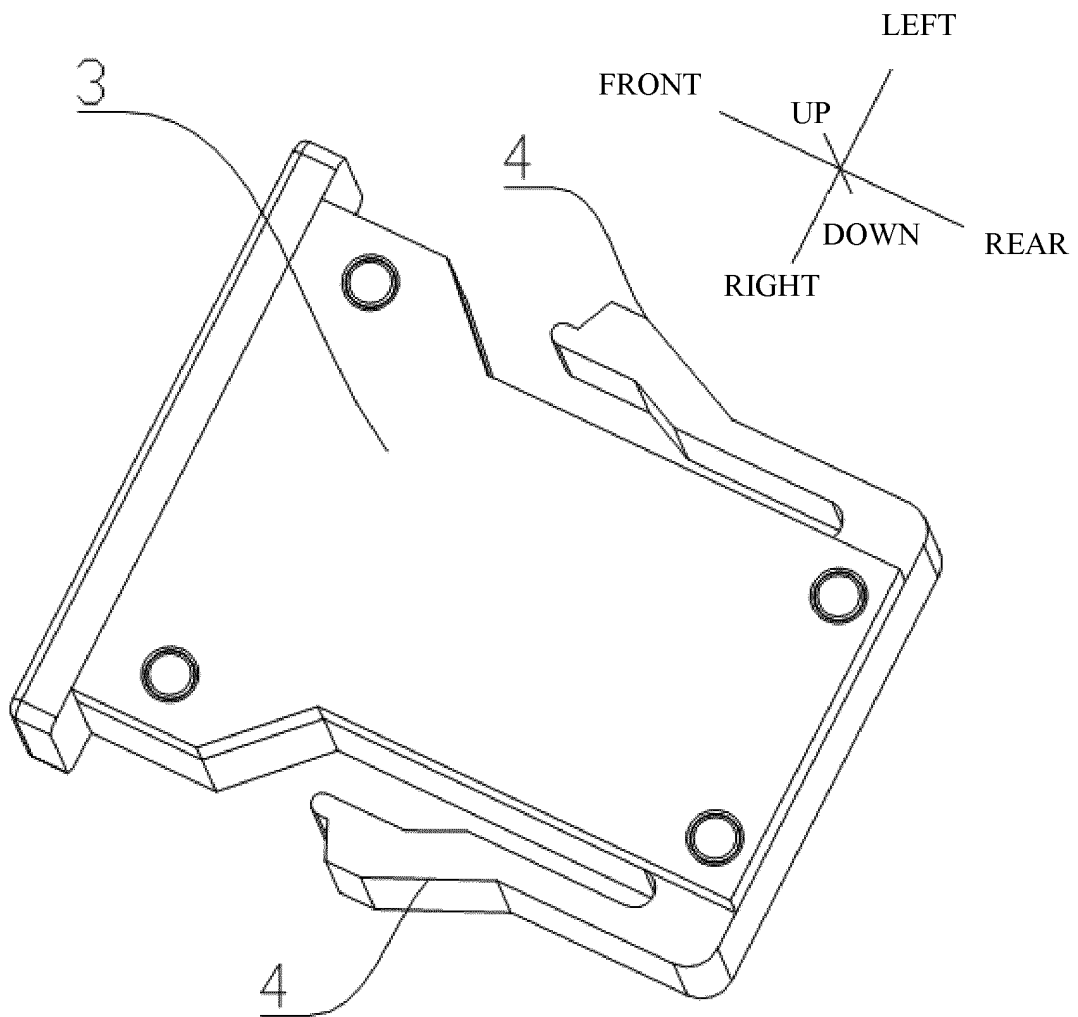


Fig. 9

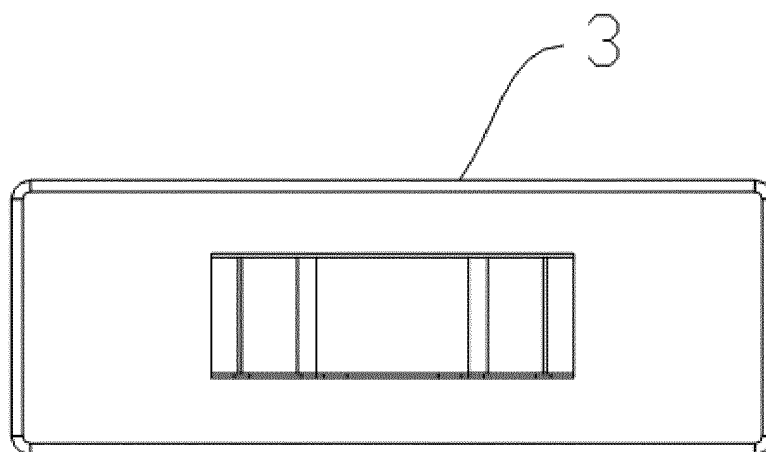


Fig. 10

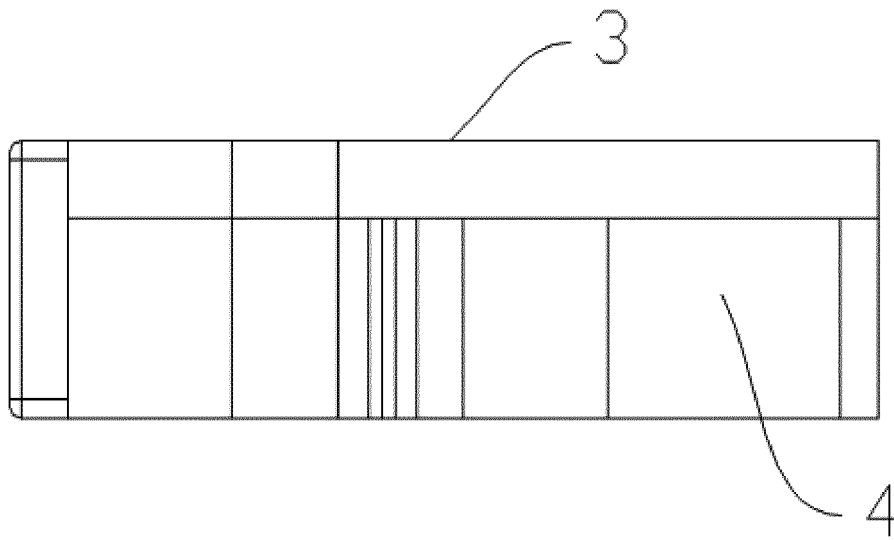


Fig. 11

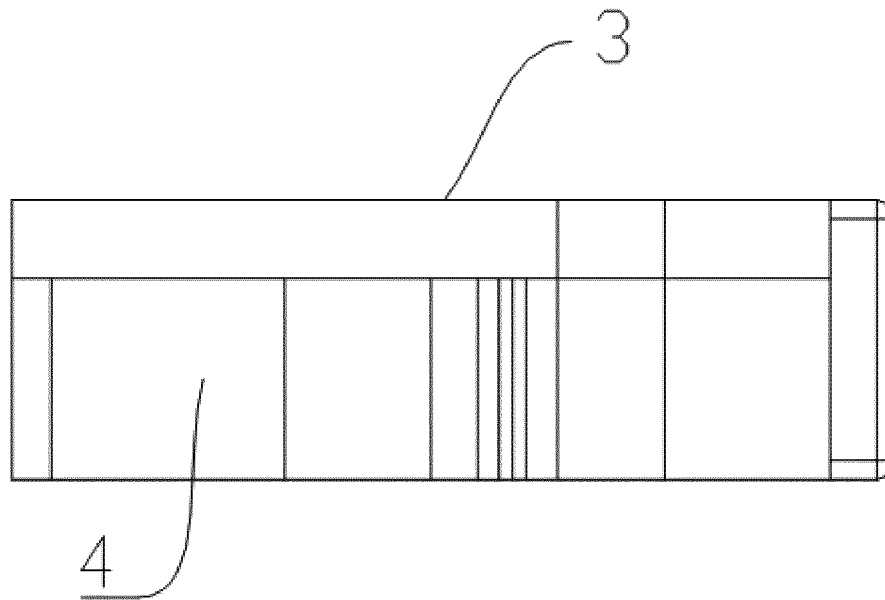


Fig. 12

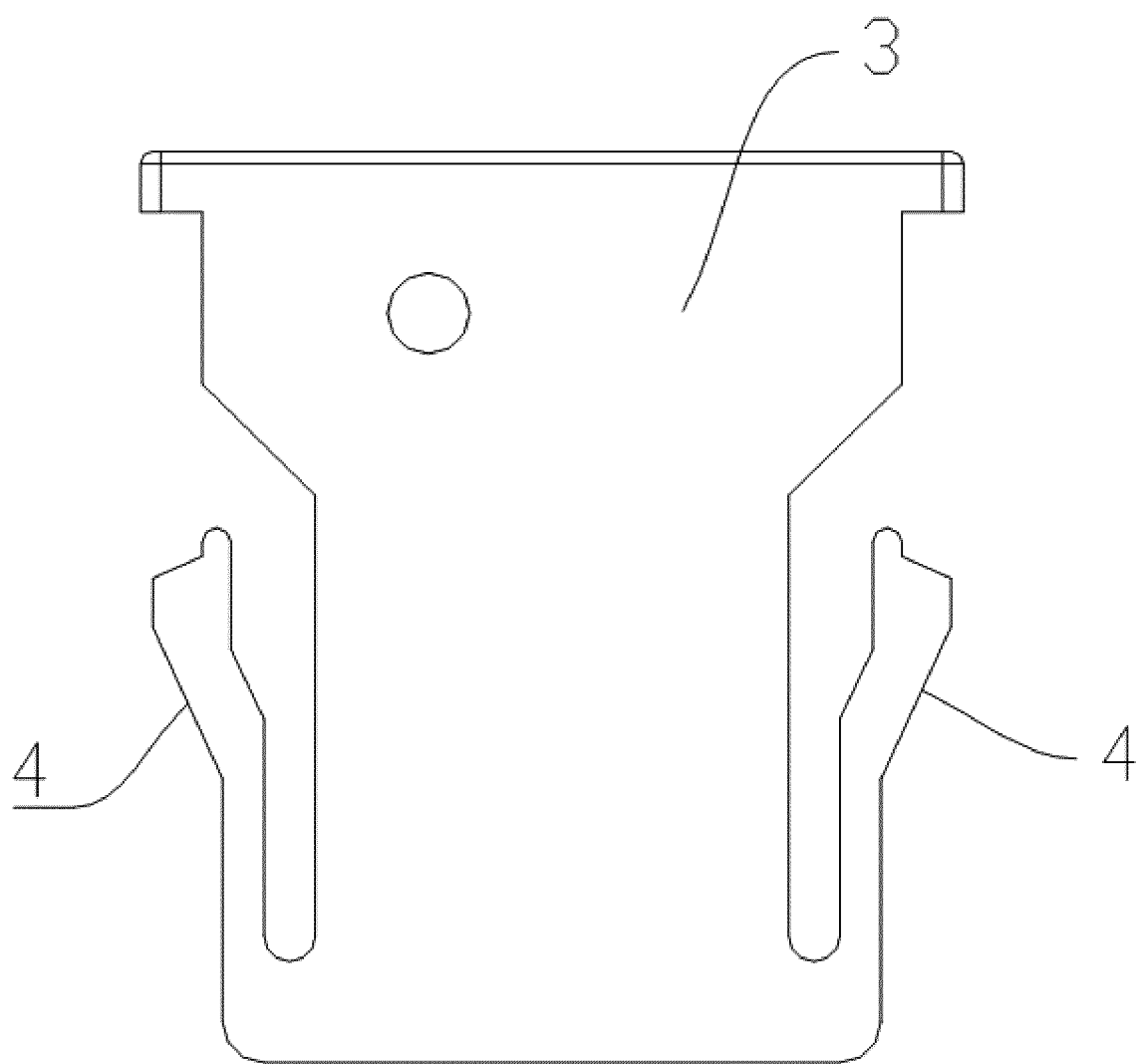


Fig. 13

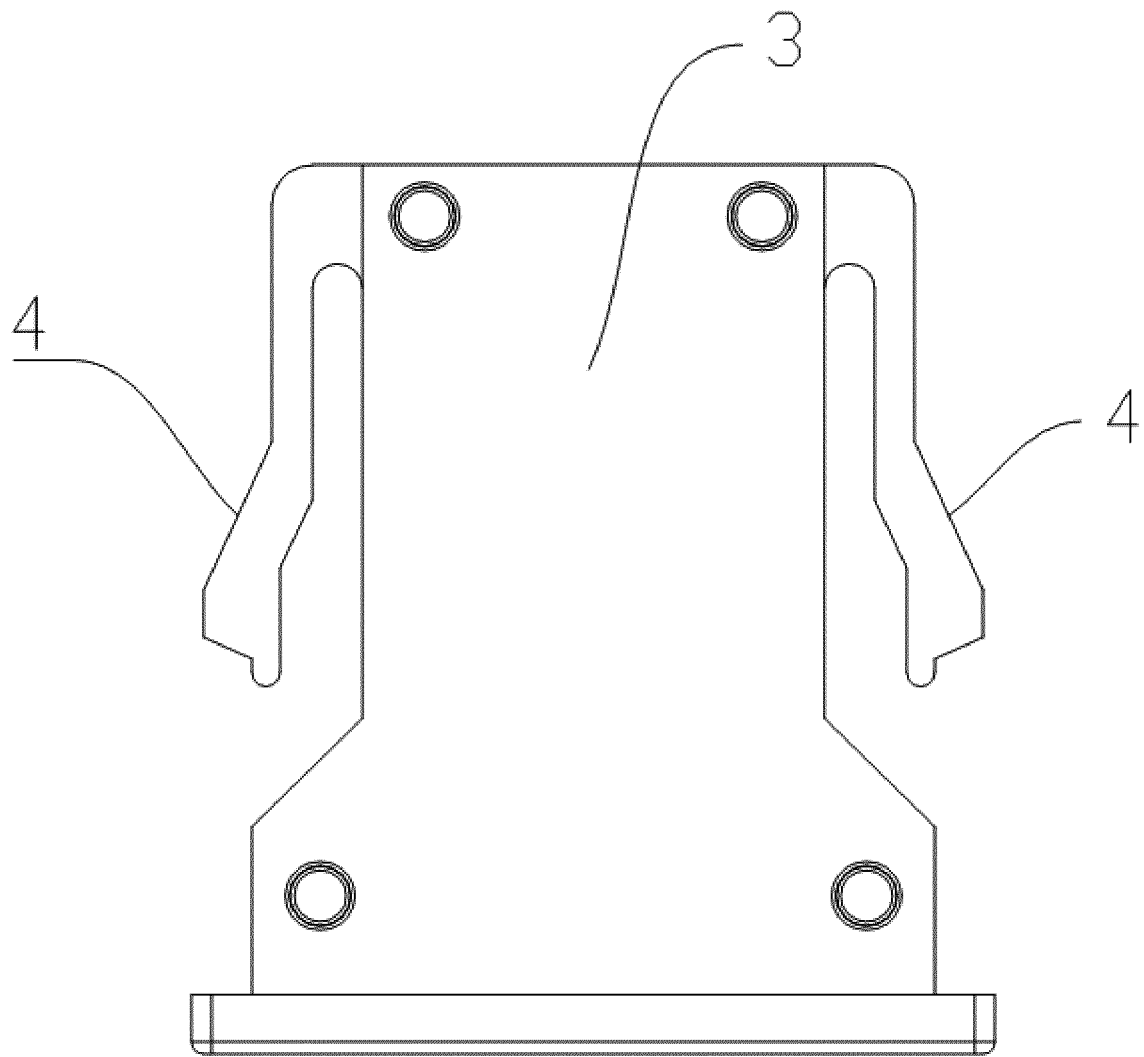


Fig. 14

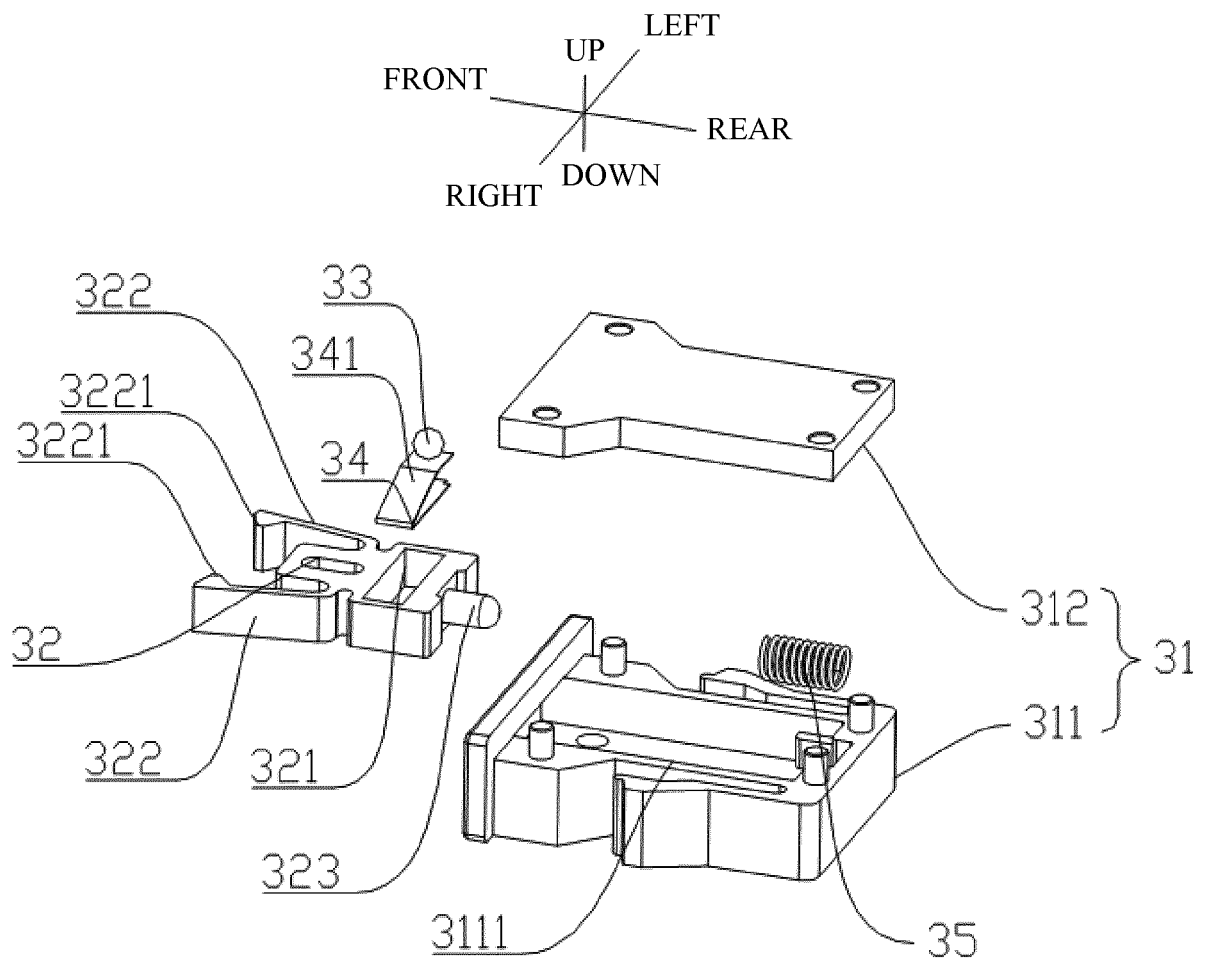


Fig. 15

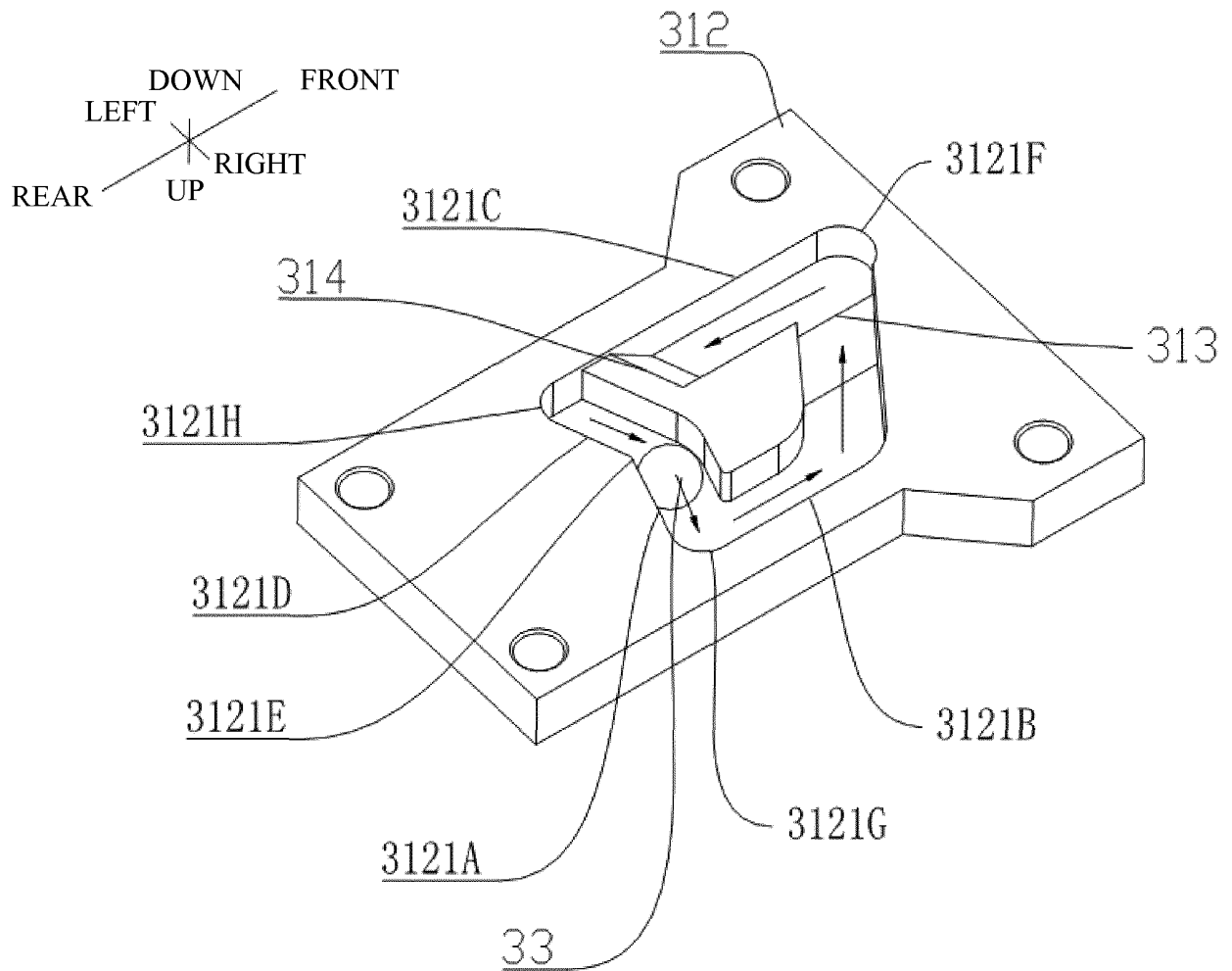


Fig. 16

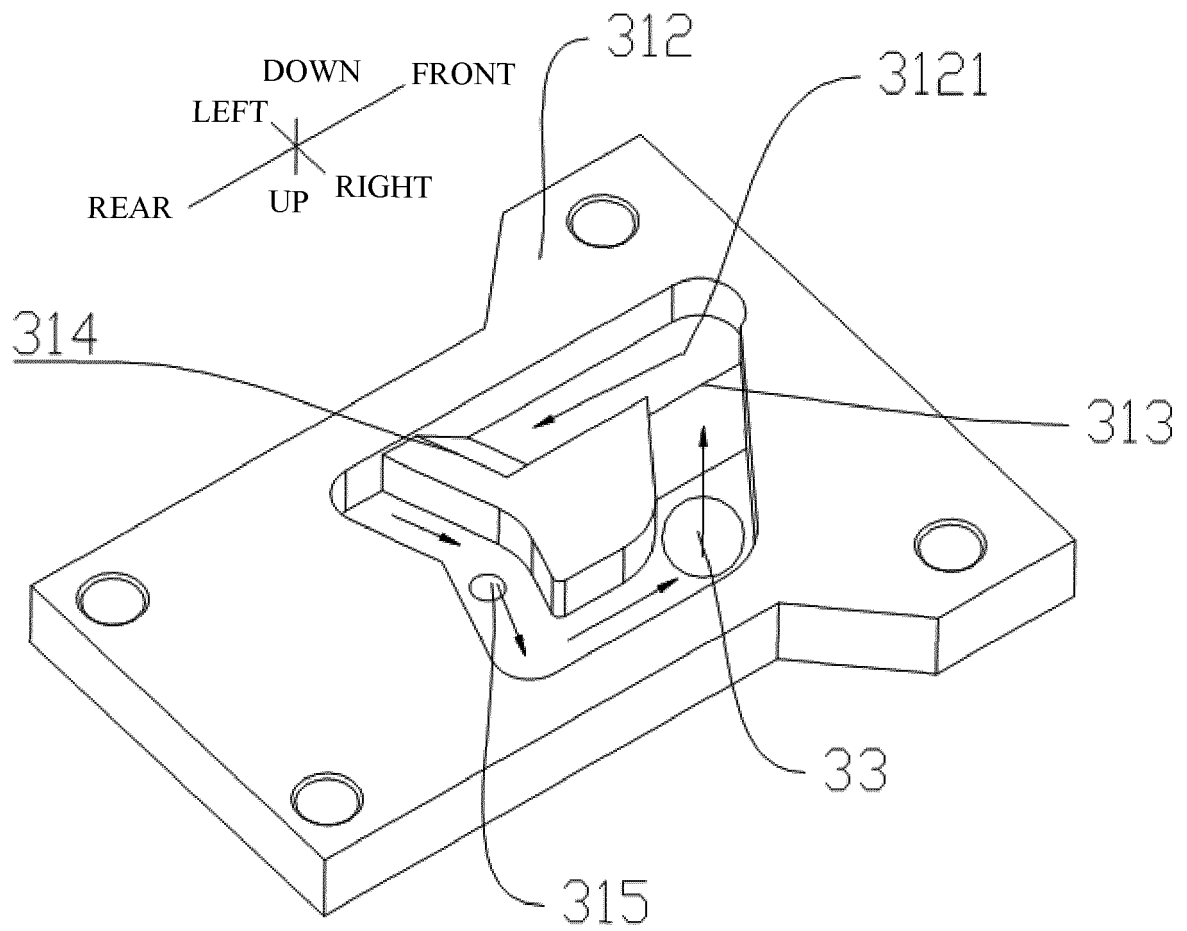


Fig. 17

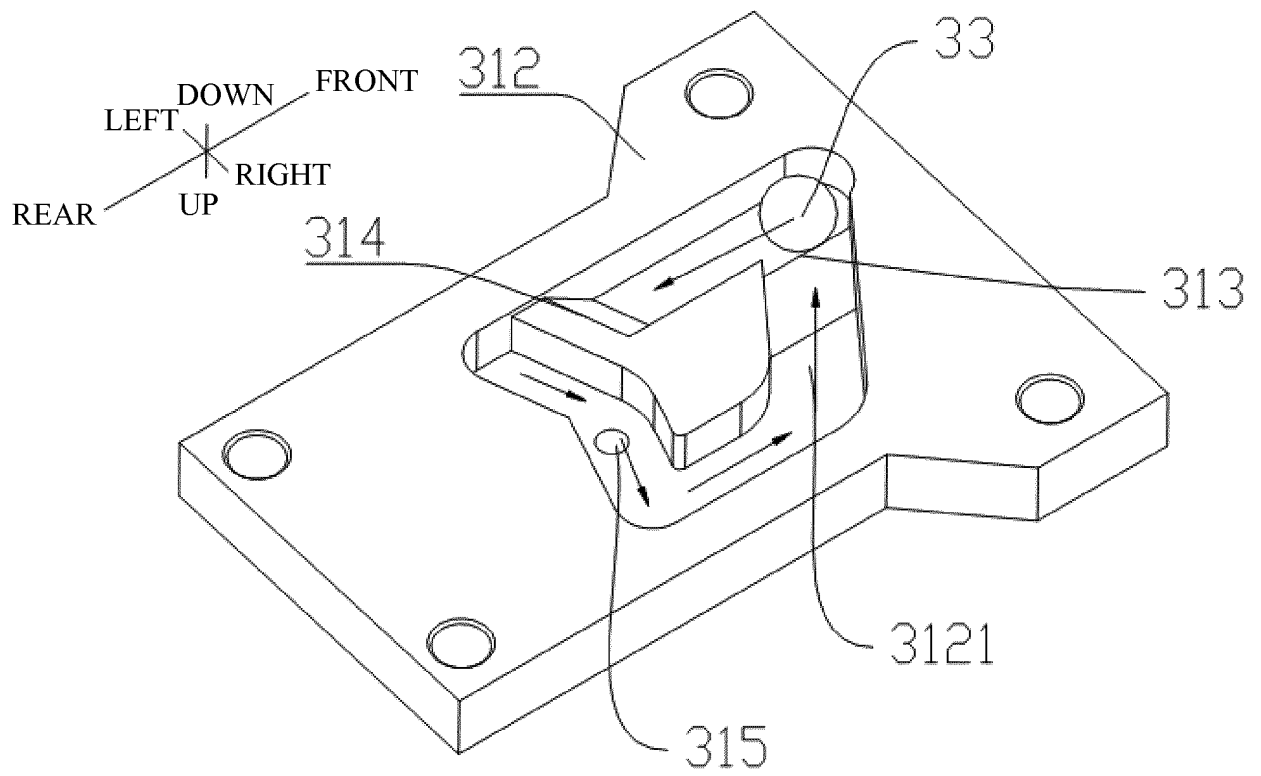


Fig. 18

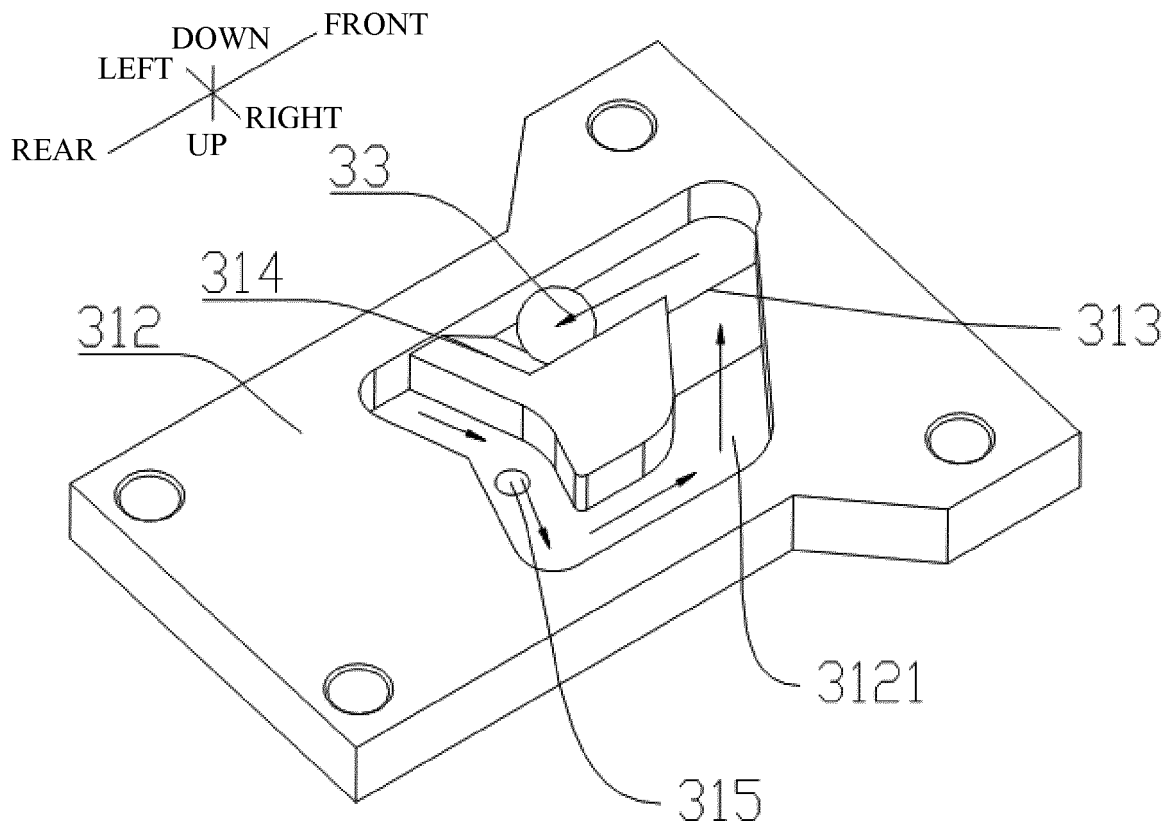


Fig. 19

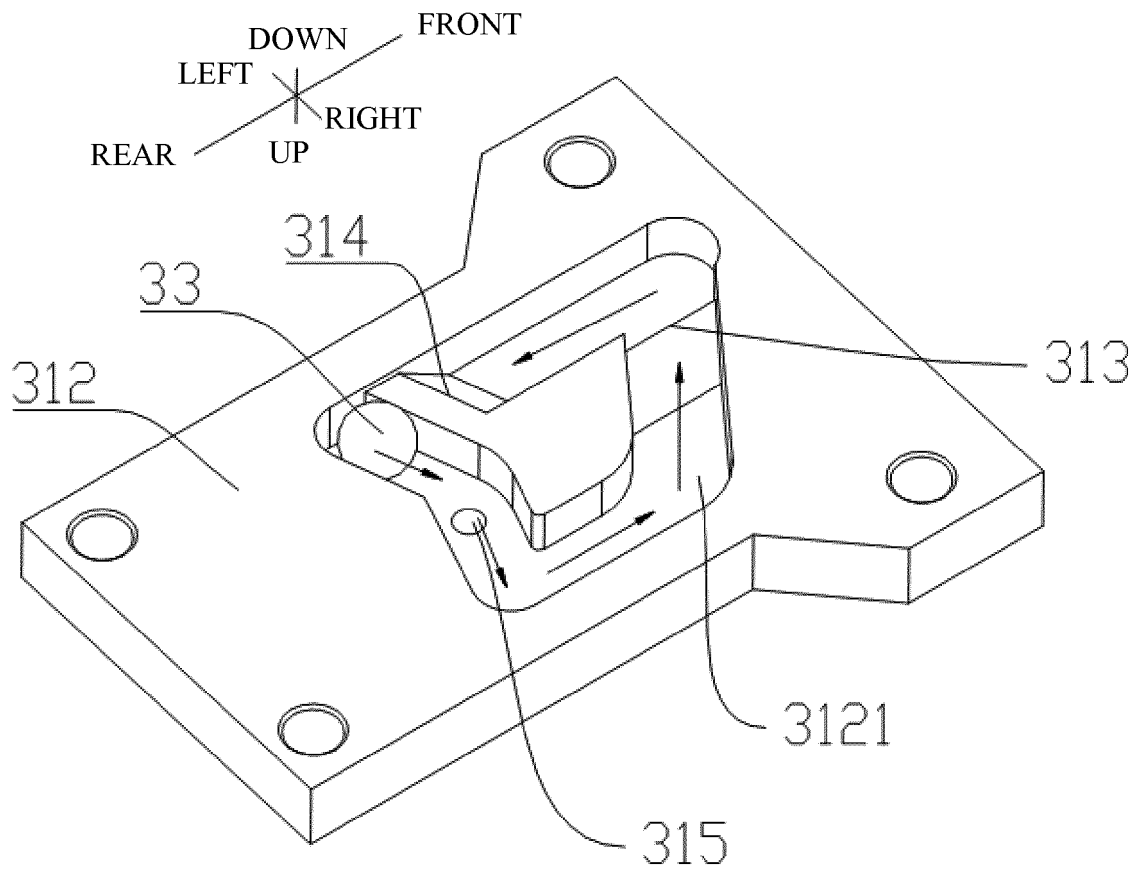


Fig. 20

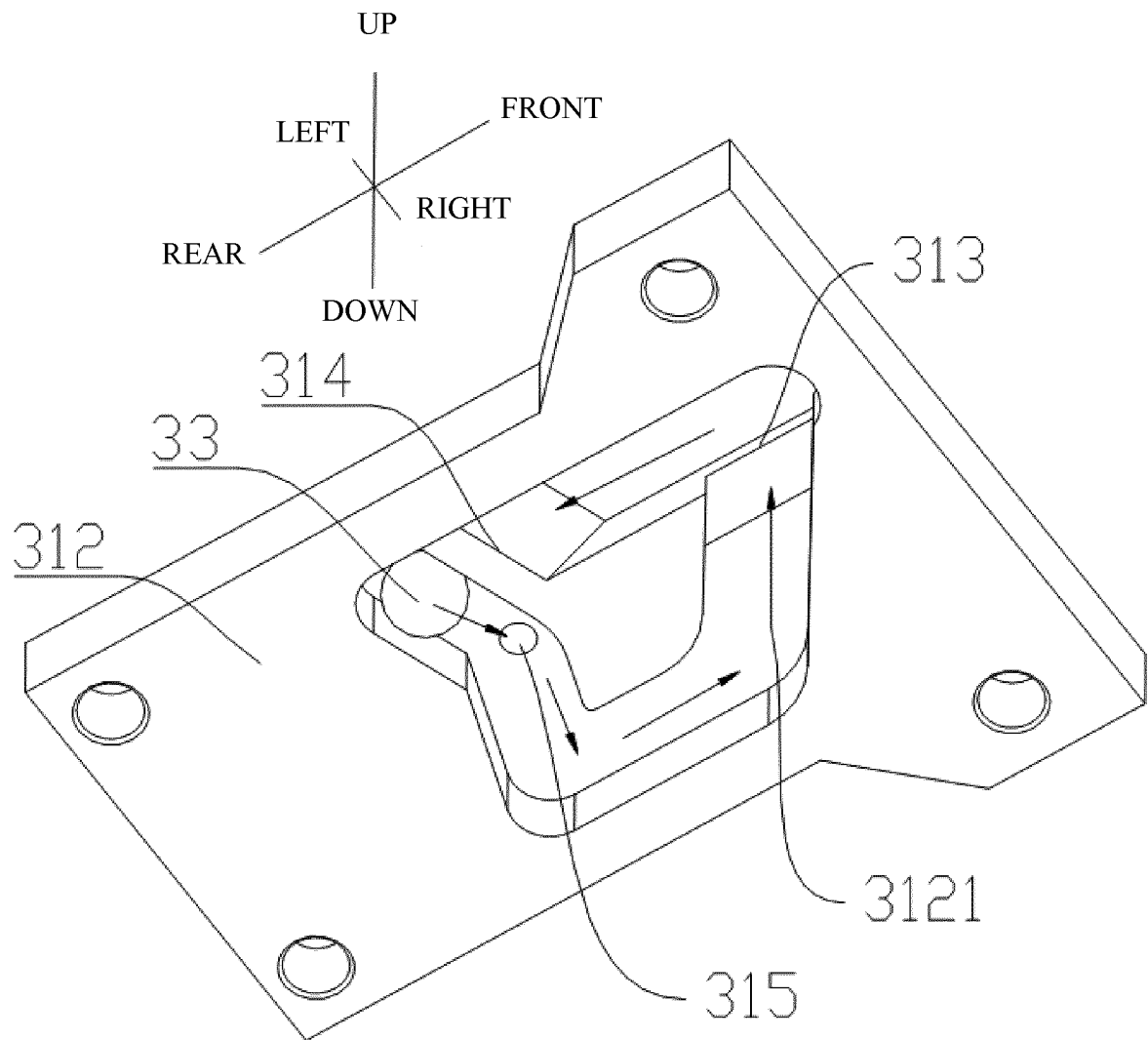


Fig. 21

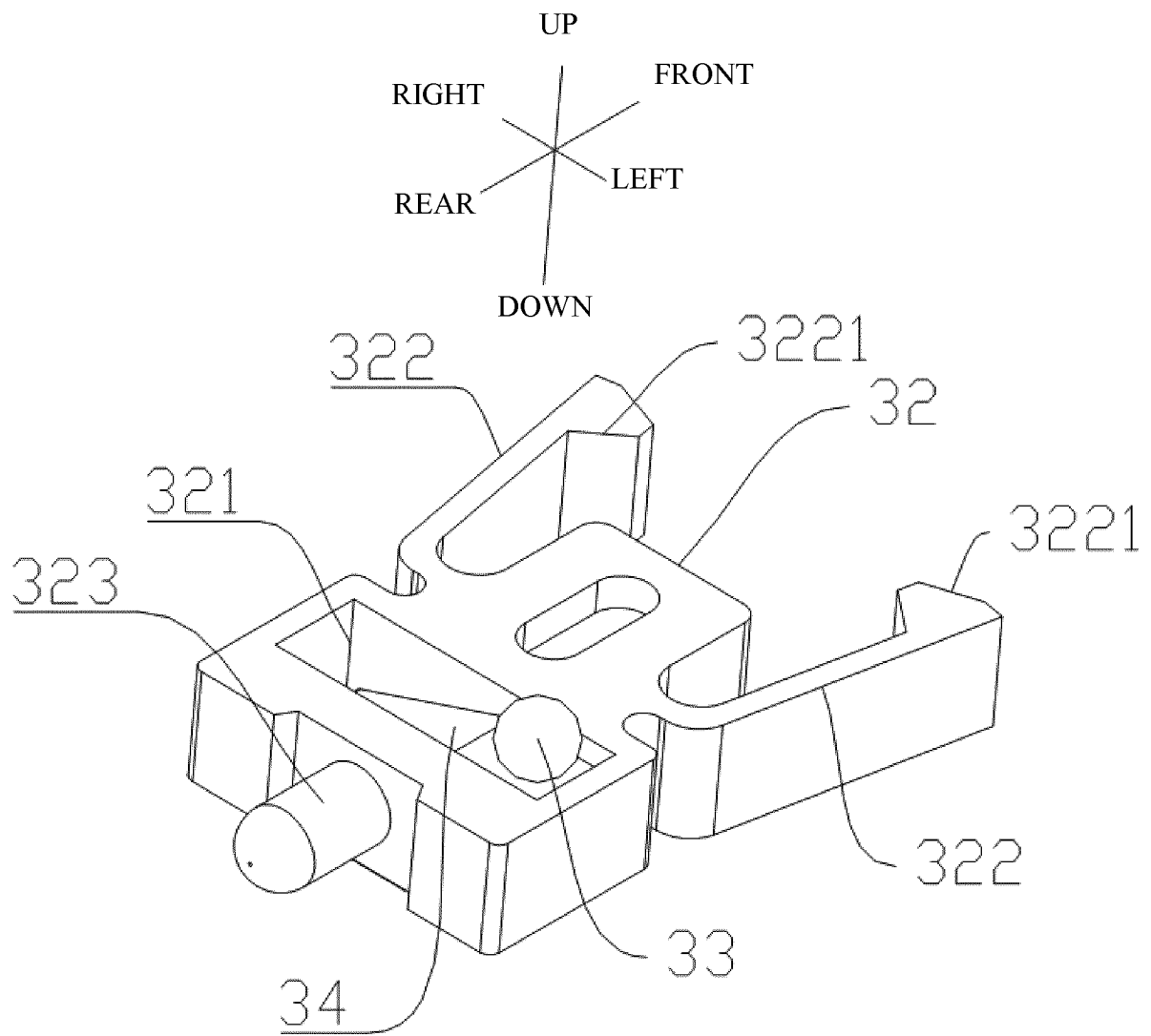


Fig. 22

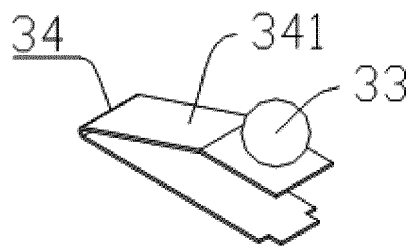


Fig. 23



Fig. 24

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2015/077599

A. CLASSIFICATION OF SUBJECT MATTER

D06F 39/10 (2006.01) i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

D06F

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

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

CNABS; VEN: box, lock, door, lid, flick???, push???, clip, block, filter, filtrat+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 2840800 Y (HAIER GROUP CORPORATION et al.), 29 November 2006 (29.11.2006), claims 1-6	1
A	CN 2498188 Y (HAIER GROUP CORPORATION et al.), 03 July 2002 (03.07.2002), the whole document	1-10
A	JP 2000051567 A (HITACHI LTD.), 22 February 2000 (22.02.2000), the whole document	1-10

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

“A” document defining the general state of the art which is not considered to be of particular relevance

“E” earlier application or patent but published on or after the international filing date

“L” document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

“O” document referring to an oral disclosure, use, exhibition or other means

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

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

“X” document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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

“&” document member of the same patent family

Date of the actual completion of the international search

23 December 2015 (23.12.2015)

Date of mailing of the international search report

12 January 2016 (12.01.2016)

Name and mailing address of the ISA/CN:
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Authorized officer

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Telephone No.: (86-10) 62084627

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2015/077599

5	Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
	CN 2840800 Y	29 November 2006	None	
10	CN 2498188 Y	03 July 2002	None	
	JP 2000051567 A	22 February 2000	None	
15				
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Form PCT/ISA/210 (patent family annex) (July 2009)