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(71) Applicant: **ZHONGSHAN OPIKE HARDWARE PRODUCTS CO., LTD**
Yongning Luosha District
Xiaolan Town, Zhongshan
Guangdong 528403 (CN)

(72) Inventor: **XU, Jiangde**
Zhongshan City, Guangdong 528403 (CN)

(74) Representative: **Petraz, Gilberto Luigi et al**
GLP S.r.l.
Viale Europa Unita, 171
33100 Udine (IT)

(54) COPLANAR DOOR TRACK-CHANGING SLIDING MECHANISM AND COPLANAR DOOR SYSTEM

(57) The invention discloses a coplanar door rail-changing sliding mechanism and a coplanar door system. The coplanar door rail-changing sliding mechanism includes a door plate fixing base, a sliding mechanism for realizing a displacement of the door plate fixing base, a limiting mechanism for realizing rail change of the door plate fixing base, and a limit toggling piece for triggering the limiting mechanism to generate a displacement, wherein the limiting mechanism is connected between the sliding mechanism and the door plate fixing base; the limit toggling piece is provided at an end of a moving path at which the door plate fixing base is closed by the sliding mechanism; and when the sliding mechanism drives the door plate fixing base to arrive at the end of the moving path, the limit toggling piece is connected with the limiting mechanism, so that the limiting mechanism drives the door plate fixing base to move, and the door plate fixing base generates a rail-changing displacement relative to the sliding mechanism. The coplanar door rail-changing sliding mechanism may realize rail change of the door plate fixing base on a straight rail, may realize rail cutting according to the actual size of furniture, is flexible to apply and convenient to prepare, may be produced in batches and has low application cost.

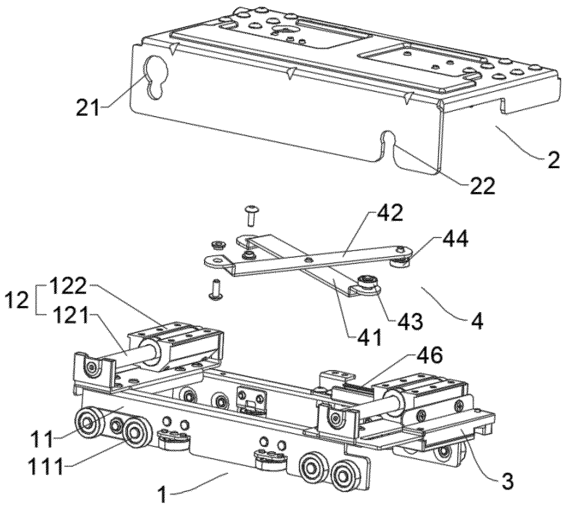

FIG. 1

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Description

Field of the invention

[0001] The present invention relates to the field of furniture, in particular to a coplanar door rail-changing sliding mechanism and a coplanar door system.

Background of the invention

[0002] Due to the limitation of space utilization, furniture with sliding doors, such as wardrobes or room doors, is increasingly widely used. In order to open one of the door panels in coplanar doors, the door panel must be separated from the adjacent door panel. When closing the door panel, it is necessary to use an arc-shaped curved rail to change the moving rail of the door panel so as to realize the coplanarity between the closed door panels. However, due to the arc-shaped curved rail, when current coplanar doors are mounted and used, customers cannot perform cutting according to the size of the furniture, resulting in non-flexible applications, inconvenient goods preparations. The production is difficult, and the application cost is too high.

Summary of invention

[0003] Against the deficiencies in the prior art, the present invention provides a coplanar door rail-changing sliding mechanism and a coplanar door system.

[0004] The technical solution used in the present invention to solve the problems is as follows:

a coplanar door rail-changing sliding mechanism includes a door plate fixing base, a sliding mechanism for realizing a displacement of the door plate fixing base, a limiting mechanism for realizing a rail change of the door plate fixing base, and a limit toggling piece for triggering the limiting mechanism to generate the displacement;

the limiting mechanism is connected between the sliding mechanism and the door plate fixing base;

the limit toggling piece is provided at an end of a moving path of the sliding mechanism for closing the door plate fixing base (that is, for closing a coplanar door); and

when the sliding mechanism drives the door plate fixing base to reach the end of the moving path, the limit toggling piece is connected to the limiting mechanism, so that the limiting mechanism drives the door plate fixing base to move and thus the door plate fixing base generates a displacement relative to the sliding mechanism, thereby realizing coplanar closing of the door plate fixing base.

[0005] According to the coplanar door rail-changing sliding mechanism provided by the present invention, through contact between the limit toggling piece and the limiting mechanism, the state of the limiting mechanism is changed, and the limiting mechanism drives the door plate fixing base to move and thus the door plate fixing base generates a displacement relative to the sliding mechanism, so that coplanar closing of the door plate fixing base is realized. The coplanar door rail-changing sliding mechanism may realize rail change of the door plate fixing base on a straight rail, may realize rail cutting according to the actual size of furniture, is flexible to apply and convenient to prepare, may be produced in batches and has low application cost.

[0006] Further, the limiting mechanism includes a limiting base fixedly connected to the sliding mechanism, a movable limiting piece movably connected to the limiting base, and a fixing piece relatively fixed to the door plate fixing base;

[0007] the limiting base is provided between the movable limiting piece and the fixing piece, and the movable limiting piece is rotatably connected to the fixing piece; and when the movable limiting piece is in contact with the limit toggling piece, the movable limiting piece rotates relative to the fixing piece, so that the movable limiting piece generates a displacement relative to the limiting base.

[0008] Further, the limit toggling piece includes a base provided on a rail of the sliding mechanism, and a toggling piece provided on the base.

[0009] Further, the toggling piece is a rotating wheel.

[0010] Further, the movable limiting piece is provided with a clamping piece for clamping the movable limiting piece; the fixing piece is provided with a connecting column;

the joint pin is rotatably connected to the movable limiting piece, the connecting column is rotatably connected to an elastic piece; and the elastic piece is elastically connected to the clamping piece.

[0011] Further, the limiting base is provided with a limiting hole for guiding a displacement of the movable limiting piece, and the limiting hole is provided with a clamping groove for clamping the movable limiting piece; and the connecting column and the clamping piece are respectively slidably connected with the limiting hole.

[0012] Further, the movable limiting piece is provided with a first arc-shaped groove, and a surface of the first arc-shaped groove is tangent to a wheel surface of the toggling piece.

[0013] Further, the limiting mechanism further includes a fixed limiting piece relatively fixed to the fixing piece, and a guide hole provided in the limiting base for guiding a displacement of the fixed limiting piece.

[0014] Further, the fixed limiting piece is provided with a straight groove and a second arc-shaped groove communicating with the straight groove, when the toggling member is in contact with the movable limiter, the movable limiter is driven to rotate, so that a groove surface of the first arc-shaped groove is correspondingly connected to a groove surface of the second arc-shaped groove.

[0015] Further, a separator is provided between the fixing piece and the movable limiting piece, and is relatively fixed to the movable limiting piece.

[0016] Therefore, through the connection of the toggling piece and the movable limiting piece, the clamping piece on the movable limiting piece is driven to overcome the elasticity of the elastic piece to slide out of the clamping groove. At the moment, the movable limiting piece slides relative to the limiting base, so that the limiting mechanism drives the door plate fixing base to move along the surface of the first arc-shaped groove and thus the door plate fixing base generates a displacement relative to the sliding mechanism, thereby realizing coplanar closing of the door plate fixing base.

[0017] Therefore, the movable limiting piece is in movable contact with the toggling piece and the fixed limiting piece in the use process. The plastic movable limiting piece reduces a collision impact force during contact and reduces noise.

[0018] Further, the limiting mechanism further includes an elastic reset piece, and the elastic reset piece is connected between the sliding mechanism and the door plate fixing base.

[0019] Further, the elastic reset piece is a spring.

[0020] Further, a roller is provided on the door plate fixing base, and is in sliding contact with the spring, so that the spring forms an "L"-shaped structure.

[0021] Further, the elastic reset piece is a reset elastic sheet.

[0022] Therefore, under the action of the elastic reset piece, it is beneficial for the limiting mechanism to drive the door plate fixing base to change rail smoothly.

[0023] Further, the sliding mechanism includes a sliding base for realizing a displacement of the door plate fixing base.

[0024] Further, the sliding base is provided with pulleys for realizing a displacement of the sliding mechanism.

[0025] Further, the sliding mechanism further includes a guide device for realizing a displacement of the door plate fixing base relative to the sliding base.

[0026] Further, the guide device includes a guide piece provided on the sliding base, and a guide base in a sliding connection with the guide piece; and the guide base is fixedly connected to the door plate fixing base.

[0027] Therefore, through the guide device on the sliding mechanism, the door plate fixing base generates a directional displacement relative to the sliding base.

[0028] Further, the coplanar door rail-changing sliding mechanism further includes a synchronization mechanism, wherein the synchronization mechanism is provided between the door plate fixing base and the sliding mechanism so as to guide a displacement of the door plate fixing base relative to the sliding mechanism.

[0029] Further, the synchronization mechanism includes a first connecting piece with a first rotating end and a first moving end, and a second connecting piece with a second rotating end and a second moving end, wherein the first connecting piece is movably connected to the second connecting piece.

[0030] Further, the first rotating end is movably connected to the sliding base, and the first moving end is in a sliding connection with the door plate fixing base; and the second rotating end is movably connected to the door plate fixing base, and is in a sliding connection with the sliding base.

[0031] Further, the door plate fixing base is provided with a first sliding groove, the first moving end is provided with a first sliding piece, and the first sliding piece is in a sliding connection with the first sliding groove; and
the sliding base is provided with a second sliding groove, the second moving end is provided with a second sliding piece, and the second sliding piece is in a sliding connection with the second sliding groove.

[0032] Alternatively, the door plate fixing base is provided with a first sliding piece, the first moving end is provided with a first sliding groove, and the first sliding piece is in a sliding connection with the first sliding groove; and
the sliding base is provided with a second sliding piece, the second moving end is provided with a second sliding groove, and the second sliding piece is in a sliding connection with the second sliding groove.

[0033] Therefore, when the door plate fixing base generates a displacement relative to the sliding mechanism, the synchronization mechanism guides a displacement of the door plate fixing base relative to the sliding mechanism, so that door panels are still in a parallel state.

[0034] In summary, the coplanar door rail-changing sliding mechanism provided by the present invention has the following beneficial effects.

(1) Through contact between the limit toggling piece and the limiting mechanism, the state of the limiting mechanism is changed, and the limiting mechanism drives the door plate fixing base to move and thus the door plate fixing base generates a displacement relative to the sliding mechanism, so that coplanar closing of the door plate fixing base is realized. The coplanar door rail-changing sliding mechanism may realize rail change of the door plate fixing base on the straight rail, may realize rail cutting according to the actual size of furniture, is flexible to apply and convenient to prepare, may be produced in batches and has low application cost.

(2) Through the connection of the toggling piece and the movable limiting piece, the clamping piece on the movable limiting piece is driven to overcome the elasticity of the elastic piece to slide out of the clamping groove. At the moment, the movable limiting piece slides relative to the limiting base, so that the limiting mechanism drives the door plate fixing base to move along the surface of the first arc-shaped groove and thus the door plate fixing base generates a displacement relative to the sliding mechanism, thereby realizing coplanar closing of the door plate fixing base.

(3) Through the guide device on the sliding mechanism, the door plate fixing base generates a directional displacement relative to the sliding base.
(4) When the door plate fixing base generates a displacement relative to the sliding mechanism, the synchronization mechanism guides a displacement of the door plate fixing base relative to the sliding mechanism, so that the door panels are still in a parallel state.

[0035] The present invention further provides a coplanar door system, including the coplanar door rail-changing sliding mechanism.

[0036] The coplanar door system further includes a rail for supporting a displacement of the sliding mechanism, the limit toggling piece is provided at an end of a rail of the sliding mechanism for closing the coplanar door; and when the sliding mechanism drives the door plate fixing base to reach the end of the rail, the limit toggling piece is connected to the limiting mechanism, so that the limiting mechanism drives the door plate fixing base to move and so that the door plate fixing base generates a displacement relative to the sliding mechanism, thereby realizing a coplanar closing of the coplanar door.

[0037] In summary, the coplanar door system provided by the present invention may perform cutting according to the actual size of the furniture, is flexible to apply and convenient to prepare, may be produced in batches and has low application cost.

Brief Description of the Drawings

[0038]

FIG. 1 is an exploded view of a structure of a coplanar door rail-changing sliding mechanism according to the present invention;
FIG. 2 is a structural diagram of a limiting mechanism according to the present invention;
FIG. 3 is an exploded view of a structure of a limiting mechanism according to the present invention;
FIG. 4 is a structural diagram of a limit toggling piece according to the present invention;
FIG. 5 is a structural diagram of a door plate fixing base according to the present invention;
FIG. 6 is a structural diagram when a coplanar door system is closed according to the present invention; and
FIG. 7 is a structural diagram when a coplanar door system is opened according to the present invention.

Description of reference numerals:

[0039] 1. sliding mechanism; 11. sliding base; 111. pulley; 12. guide device; 121. guide piece; 122. guide base; 2. door plate fixing base; 21. connecting hole; 22. connecting port; 23. roller; 3. limiting mechanism; 31. movable limiting piece; 311. first arc-shaped groove; 32. fixed limiting piece; 321. straight groove; 33. limiting base; 331. limiting hole; 3311. clamping groove; 332. guide hole; 34. fixing piece; 35. connecting column; 36. clamping piece; 37. elastic piece; 38. separator; 39. elastic reset piece; 4. synchronization mechanism; 41. first connecting piece; 42. second connecting piece; 43. first sliding piece; 44. second sliding piece; 45. first sliding groove; 46. second sliding groove; 5. limit toggling piece; 51. base; 52. toggling piece; 6. Door panel; 7. rail.

Detailed Description of Illustrated Embodiments

[0040] The specific implementation manners of the present invention are described in more detail below in combination with the accompanying drawings and embodiments. The following embodiments are used to illustrate the present invention, rather than limiting the scope of the present invention.

[0041] As shown in FIG. 1 to FIG. 5, the present invention provides a coplanar door rail-changing sliding mechanism, which is used to realize a rail change of a coplanar door. The coplanar door rail-changing sliding mechanism includes a door plate fixing base 2, a sliding mechanism 1 for realizing a displacement of the door plate fixing base 2, a limiting mechanism 3 for realizing a rail change of the door plate fixing base 2, and a limit toggling piece 5 for triggering the limiting mechanism 3 to generate the displacement, wherein the limiting mechanism 3 is connected between the sliding mechanism 1 and the door plate fixing base 2; the limit toggling piece 5 is provided at an end of a moving path of the sliding mechanism 1 for closing the door plate fixing base 2 ; and when the sliding mechanism 1 drives the door plate fixing base 2 to reach the end of the moving path, the limiting mechanism 3 drives the door plate fixing base 2 to move and thus the door plate fixing base 2 generates a displacement relative to the sliding mechanism 1, thereby realizing a coplanar closing of the door plate fixing base 2.

[0042] As shown in FIG. 2 to FIG. 3, the limiting mechanism 3 includes a limiting base 33 fixedly connected to the sliding mechanism 1, a movable limiting piece 31 movably connected to the limiting base 33, and a fixing piece 34 relatively fixed to the door plate fixing base 2; the limiting base 33 is provided between the movable limiting piece 31 and the fixing piece 34, and the movable limiting piece 31 is rotatably connected to the fixing piece 34; and when the movable limiting piece 31 is in contact with a toggling piece 52, the movable limiting piece 31 rotates relative to the fixing piece 34, so that the movable limiting piece 31 generates a displacement relative to the limiting base 33. The limit toggling piece 5 includes a base 51, and a toggling piece 52 provided on the base 51. The toggling piece 52 is a rotating wheel. The movable limiting piece 31 is provided with a clamping piece 36 for clamping the movable limiting piece 31; the fixing piece 34 is provided with a connecting column 35; the connecting column 35 is rotatably connected to the movable limiting piece 31, and the connecting column 35 is

rotatably connected to the elastic piece 37; and the elastic piece 37 is elastically connected to the clamping piece 36. The limiting base 33 is provided with a limiting hole 331 for guiding a displacement of the movable limiting piece 31, the limiting hole 331 is provided with a clamping groove 3311 for clamping the movable limiting piece 31; and the connecting column 35 and the clamping piece 37 are respectively slidably connected with the limiting hole 331. The movable limiting piece 31 is provided with a first arc-shaped groove 311, and a surface of the first arc-shaped groove 311 is tangent to a wheel surface of the toggling piece 52.

[0043] When the coplanar door is opened, the elastic piece 37 clamps the clamping piece 36 in the clamping groove 3311; and when the coplanar door is closed, the toggling piece 52 is connected to the movable limiting piece 31, the clamping piece 36 overcomes the elasticity of the elastic piece 37 to slide out of the clamping groove 3311, so that the limiting mechanism 3 drives the door plate fixing base 2 to move along the surface of the first arc-shaped groove 311 and thus the door plate fixing base 2 generates a displacement relative to the sliding mechanism 1, thereby realizing coplanar closing of the coplanar door.

[0044] In the embodiment, the limiting mechanism 3 further includes a fixed limiting piece 32 relatively fixed to the fixing piece 34, and a guide hole 322 provided in the limiting base 33 for guiding a displacement of the fixed limiting piece 32. The fixed limiting piece 32 is provided with a straight groove 321 and a second arc-shaped groove 322 communicating with the straight groove 321. When the toggling member 52 is in contact with the movable limiter 31, the movable limiter 31 is driven to rotate, so that the surface of the first arc-shaped groove 311 is correspondingly connected to a surface of the second arc-shaped groove 322. The movable limiting piece 31 is provided with a sharp corner, and the sharp corner moves in the second arc-shaped groove 322 in the rotating process of the movable limiting piece 31 and does not collide with the fixed limiting piece 32. When the clamping piece 36 is in contact with a wall of the limiting hole 331, the movable limiting piece 31 stops rotating. At the moment, a groove surface of the first arc-shaped groove 311 is correspondingly connected to a groove surface of the second arc-shaped groove 322, so that the first arc-shaped groove 311 and the second arc-shaped groove 322 are connected to form a complete arc-shaped groove passing through the toggling piece 52. A separator 38 for preventing the elastic piece 37 from being clamped in the limiting hole 331 is provided between the fixing piece 34 and the movable limiting piece 31, and the separator 38 is relatively fixed to the movable limiting piece 31.

[0045] The movable limiting piece 31 is in movable contact with the toggling piece 52 and the fixed limiting piece 32 in the use process. The plastic movable limiting piece 31 may reduce a collision impact force during contact and reduce noise.

[0046] Therefore, through the contact of the toggling piece 52 and the movable limiting piece 31, the clamping piece 36 on the movable limiting piece 31 is driven to overcome the elasticity of the elastic piece 37 to slide out of the clamping groove 3311. At the moment, the movable limiting piece 31 slides relative to the limiting base 33, so that the limiting mechanism 3 drives the door plate fixing base 2 to move along the surface of the first arc-shaped groove 311 and thus the door plate fixing base 2 generates a displacement relative to the sliding mechanism 1, thereby realizing coplanar closing of the coplanar door.

[0047] Referring to FIG. 5, the limiting mechanism 3 further includes an elastic reset piece 39, and the elastic reset piece 39 is connected between the sliding mechanism 1 and the door plate fixing base 2. The elastic reset piece 39 is a spring. A roller 23 is provided on the door plate fixing base 2, and is in sliding contact with the spring, so that the spring forms an "L"-shaped structure. In another case, the elastic reset piece 39 is a reset elastic sheet, and two ends of the reset elastic sheet are connected to the door plate fixing base 2 and a sliding base 11 respectively.

[0048] Therefore, under the action of the elastic reset piece 39, it is beneficial for the limiting mechanism 3 to drive the door plate fixing base 2 to change rail smoothly.

[0049] In the present invention, the sliding mechanism 1 includes a sliding base 11 for realizing a displacement of the door plate fixing base 2, and pulleys 111 provided on the sliding base 11.

[0050] In addition, the sliding mechanism 1 further includes a guide device 12 for realizing a displacement of the door plate fixing base 2 relative to the sliding base 11; the guide device 12 includes a guide piece 121 provided on the sliding base 11, and a guide base 122 in a sliding connection with the guide piece 121, and is fixedly connected to the door plate fixing base 2.

[0051] Therefore, through the guide device 12 on the sliding mechanism 1, the door plate fixing base 2 generates a directional displacement relative to the sliding base 11.

[0052] As shown in FIG. 1, in the present invention, the coplanar door rail-changing sliding mechanism further includes a synchronization mechanism 4, wherein the synchronization mechanism 4 is provided between the door plate fixing base 2 and the sliding mechanism 1 so as to guide a displacement of the door plate fixing base 2 relative to the sliding mechanism 1.

[0053] In the embodiment, the synchronization mechanism 4 includes a first connecting piece 41 with a first rotating end and a first moving end, and a second connecting piece 42 with a second rotating end and a second moving end; and the first connecting piece 41 is movably connected to the second connecting piece 42. The first rotating end is movably connected to the sliding base 11, and the first moving end is in a sliding connection with the door plate fixing base 2; and the second rotating end is movably connected to the door plate fixing base 2, and

the second moving end is in a sliding connection with the sliding base 11.

[0054] Specifically, the door plate fixing base 2 is provided with a first sliding groove 45, the first moving end is provided with a first sliding piece 43, and the first sliding piece 43 is in a sliding connection with the first sliding groove 45; and the sliding base 11 is provided with a second sliding groove 46, the second moving end is provided with a second sliding piece 44, and the second sliding piece 44 is in a sliding connection with the second sliding groove 46.

[0055] Alternatively, the door plate fixing base 2 is provided with a first sliding piece 43, the first moving end is provided with a first sliding groove 45, and the first sliding piece 43 is in a sliding connection with the first sliding groove 45; and the sliding base 11 is provided with a second sliding piece 44, the second moving end is provided with a second sliding groove 46, and the second sliding piece 44 is in a sliding connection with the second sliding groove 46.

[0056] Therefore, when the door plate fixing base 2 generates a displacement relative to the sliding mechanism 1, the synchronization mechanism 4 guides the displacement of the door plate fixing base 2 relative to the sliding mechanism 1, so that door panels 6 are still in a parallel state.

[0057] In the present invention, the door plate fixing base 2 is provided with a connecting hole 21 for connecting the door panels 6, and a connecting port 22.

[0058] In summary, the coplanar door rail-changing sliding mechanism provided by the present invention has the following beneficial effects.

(I) Through contact between the limit toggling piece 5 and the limiting mechanism 3, the state of the limiting mechanism 3 is changed, and the limiting mechanism 3 drives the door plate fixing base 2 to move and thus the door plate fixing base 2 generates a displacement relative to the sliding mechanism 1, so that coplanar closing of the door plate fixing base 2 is realized. The coplanar door rail-changing sliding mechanism may realize rail change of the door plate fixing base 2 on the straight rail, may realize rail cutting according to the actual size of furniture, is flexible to apply and convenient to prepare, may be produced in batches and has low application cost.

(II) Through contact of the toggling piece 52 and the movable limiting piece 31, the clamping piece 36 on the movable limiting piece 31 is driven to overcome the elasticity of the elastic piece 37 to slide out of the clamping groove 3311. At the moment, the movable limiting piece 31 slides relative to the limiting base 33, so that the limiting mechanism 3 drives the door plate fixing base 2 to move along the surface of the first arc-shaped groove 311 and thus the door plate fixing base 2 generates a displacement relative to the sliding mechanism 1, thereby realizing coplanar closing of the door plate fixing base 2.

(III) Through the guide device 12 on the sliding mechanism 1, the door plate fixing base 2 generates a directional displacement relative to the sliding base 11.

(IV) When the door plate fixing base 2 generates a displacement relative to the sliding mechanism 1, the synchronization mechanism 4 guides a displacement of the door plate fixing base 2 relative to the sliding mechanism 1, so that the door panels 6 are still in a parallel state.

[0059] Referring to FIG. 6 to FIG. 7, the present invention further provides a coplanar door system, including the coplanar door rail-changing sliding mechanism.

[0060] In the present invention, the coplanar door system further includes a rail 7 for supporting a displacement of the sliding mechanism 1. Since the coplanar door rail-changing sliding mechanism may change rail by itself, that is, the door plate fixing base 2 generates a relative displacement relative to the sliding mechanism 1, so that the rail 7 does not need to be provided with a curved rail for rail change of the coplanar door rail-changing sliding mechanism. Therefore, the rail 7 may be optionally cut according to the actual length requirement when being applied to the coplanar door system. The limit toggling piece 5 is provided at an end of a rail 7 of the sliding mechanism 1for closing the coplanar door ; and when the sliding mechanism 1 drives the door plate fixing base 2 to reach the end of the rail 7, the limit toggling piece 5 is in contact with the limiting mechanism 3, so that the limiting mechanism 3 drives the door plate fixing base 2 to move and so that door plate fixing base 2 generates a displacement relative to the sliding mechanism 1, thereby realizing a coplanar closing of the coplanar door.

[0061] In summary, according to the coplanar door system provided by the present invention, the rail may be cut according to the actual size of the furniture, the application is flexible, the preparation is convenient, batch production is achieved, and the application cost is low.

[0062] According to the disclosure and teaching of the specification, those skilled in the art may also change and modify the implementation manners. Therefore, the present invention is not limited to the specific implementation manners disclosed and described above, and some modifications and changes should also fall within the protection scope of the claims of the present invention. In addition, although some specific terms are used in the specification, these terms are only for the convenience of description and do not constitute any limitation to the present invention.

Claims

1. A coplanar door rail-changing sliding mechanism, **characterized in that** comprising a door plate fixing base (2), a sliding mechanism (1) for realizing a displacement of the door plate fixing base (2), a limiting

mechanism (3) for realizing a rail change of the door plate fixing base (2), and a limit toggling piece (5) for triggering the limiting mechanism (3) to generate the displacement, wherein

the limiting mechanism (3) is connected between the sliding mechanism (1) and the door plate fixing base (2);
the limit toggling piece (5) is provided at an end of a moving path of the sliding mechanism (1) for closing a coplanar door; and
when the sliding mechanism (1) drives the door plate fixing base (2) to reach the end of the moving path, the limit toggling piece (5) is in contact with the limiting mechanism (3), so that the limiting mechanism (3) drives the door plate fixing base (2) to move, and the door plate fixing base (2) generates a rail-changing displacement relative to the sliding mechanism (1).

2. The coplanar door rail-changing sliding mechanism according to claim 1, **characterized in that** the limiting mechanism (3) comprises a limiting base (33) fixedly connected to the sliding mechanism (1), a movable limiting piece (31) movably connected to the limiting base (33), and a fixing piece (34) relatively fixed to the door plate fixing base (2);

the limiting base (33) is provided between the movable limiting piece (31) and the fixing piece (34), and the movable limiting piece (31) is rotatably connected to the fixing piece (34); and
when the movable limiting piece (31) is in contact with the limit toggling piece (5), the movable limiting piece (31) rotates relative to the fixing piece (34), so that the movable limiting piece (31) generates a displacement relative to the limiting base (33).

3. The coplanar door rail-changing sliding mechanism according to claim 2, **characterized in that** the limit toggling piece (5) comprises a base (51), and a toggling piece (52) provided on the base (51).

4. The coplanar door rail-changing sliding mechanism according to claim 2 or 3, **characterized in that** the toggling piece (52) is a rotating wheel.

5. The coplanar door rail-changing sliding mechanism according to claim 4, **characterized in that** the movable limiting piece (31) is provided with a clamping piece (36) for clamping the movable limiting piece (31); the fixing piece (34) is provided with a connecting column (35); and
the connecting column (35) is rotatably connected to the movable limiting piece (31), and the connecting column (35) is rotatably connected to an elastic piece (37); the elastic piece (37) is elastically connected to the clamping piece (36).

6. The coplanar door rail-changing sliding mechanism according to claim 5, **characterized in that** the limiting base (33) is provided with a limiting hole (331) for guiding a displacement of the movable limiting piece (31), the limiting hole (331) is provided with a clamping groove (3311) for clamping the movable limiting piece (31); and
the connecting column (35) and the clamping piece (37) are respectively slidably connected with the limiting hole (331).

7. The coplanar door rail-changing sliding mechanism according to claim 5 or 6, **characterized in that** the movable limiting piece (31) is provided with a first arc-shaped groove (311), and a surface of the first arc-shaped groove (311) is tangent to a wheel surface of the toggling piece (52).

8. The coplanar door rail-changing sliding mechanism according to claim 7, **characterized in that** the limiting mechanism (3) further comprises a fixed limiting piece (32) relatively fixed to the fixing piece (34), and a guide hole (332) provided on the limiting base (33) for guiding a displacement of the fixed limiting piece (32).

9. The coplanar door rail-changing sliding mechanism according to claim 8, **characterized in that** the fixed limiting piece (32) is provided with a straight groove (321) and a second arc-shaped groove (322) communicating with the straight groove (321), when the toggling member (52) is in contact with the movable limiter (31), the movable limiter (31) is driven to rotate, so that a groove surface of the first arc-shaped groove (311) is correspondingly connected to a groove surface of the second arc-shaped groove (322).

10. The coplanar door rail-changing sliding mechanism according to claim 9, **characterized in that** a separator (38) is provided between the fixing piece (34) and the movable limiting piece (31), and is relatively fixed to the movable limiting piece (31).

11. The coplanar door rail-changing sliding mechanism according to any one of claims 9-10, **characterized in that** the limiting mechanism (3) further comprises an elastic reset piece (39), and the elastic reset piece (39) is connected between the sliding mechanism (1) and the door plate fixing base (2).

12. The coplanar door rail-changing sliding mechanism according to claim 11, **characterized in that** the elastic reset piece (39) is a spring.

13. The coplanar door rail-changing sliding mechanism

according to claim 12, **characterized in that** a roller (23) is provided on the door plate fixing base (2), and is in sliding contact with the spring, so that the spring forms an "L"-shaped structure.

14. The coplanar door rail-changing sliding mechanism according to claim 11, **characterized in that** the elastic reset piece (39) is a reset elastic sheet.

15. The coplanar door rail-changing sliding mechanism according to any one of claims 12-14, **characterized in that** the sliding mechanism (1) comprises a sliding base (11) for realizing a displacement of the door plate fixing base (2), and a pulley (111) provided on the sliding base (11).

16. The coplanar door rail-changing sliding mechanism according to claim 15, **characterized in that** the sliding mechanism (1) further comprises a guide device (12) for realizing a relative displacement of the door plate fixing base (2).

17. The coplanar door rail-changing sliding mechanism according to claim 16, **characterized in that** the guide device (12) comprises a guide piece (121) provided on the sliding base (11), and a guide base (122) in a sliding connection with the guide piece (121), and the guide base (122) is fixedly connected to the door plate fixing base (2).

18. The coplanar door rail-changing sliding mechanism according to claim 16 or 17, **characterized by** further comprising a synchronization mechanism (4), wherein the synchronization mechanism (4) is provided between the door plate fixing base (2) and the sliding mechanism (1) so as to guide a displacement of the door plate fixing base (2) relative to the sliding mechanism (1).

19. The coplanar door rail-changing sliding mechanism according to claim 18, **characterized in that** the synchronization mechanism (4) comprises a first connecting piece (41) with a first rotating end and a first moving end, and a second connecting piece (42) with a second rotating end and a second moving end; and the first connecting piece (41) is movably connected to the second connecting piece (42).

20. The coplanar door rail-changing sliding mechanism according to claim 19, **characterized in that** the first rotating end is movably connected to the sliding base (11), and the first moving end is in a sliding connection with the door plate fixing base (2); and the second rotating end is movably connected to the door plate fixing base (2), and the second moving end is in a sliding connection with the sliding base (11).

21. The coplanar door rail-changing sliding mechanism according to claim 20, **characterized in that** the door plate fixing base (2) is provided with a first sliding groove (45), the first moving end is provided with a first sliding piece (43), and the first sliding piece (43) is in a sliding connection with the first sliding groove (45);

the sliding base (11) is provided with a second sliding groove (46), the second moving end is provided with a second sliding piece (44), and the second sliding piece (44) is in a sliding connection with the second sliding groove (46);
or, the door plate fixing base (2) is provided with a first sliding piece (43), the first moving end is provided with a first sliding groove (45), and the first sliding piece (43) is in a sliding connection with the first sliding groove (45); and
the sliding base (11) is provided with a second sliding piece (44), the second moving end is provided with a second sliding groove (46), and the second sliding piece (44) is in a sliding connection with the second sliding groove (46).

22. A coplanar door system, **characterized by** comprising the coplanar door rail-changing sliding mechanism according to any one of claims 1-21.

23. The coplanar door system according to claim 22, **characterized by** further comprising a rail (7) for supporting a displacement of the sliding mechanism (1), the limit toggling piece (5) is provided at an end of a rail (7) of the sliding mechanism (1) for closing the coplanar door; and when the sliding mechanism (1) drives the door plate fixing base (2) to reach the end of the rail (7), the limit toggling piece (5) is connected to the limiting mechanism (3), so that the limiting mechanism (3) drives the door plate fixing base (2) to move so that the door plate fixing base (2) generates a displacement relative to the sliding mechanism (1), thereby realizing a coplanar closing of the coplanar door.

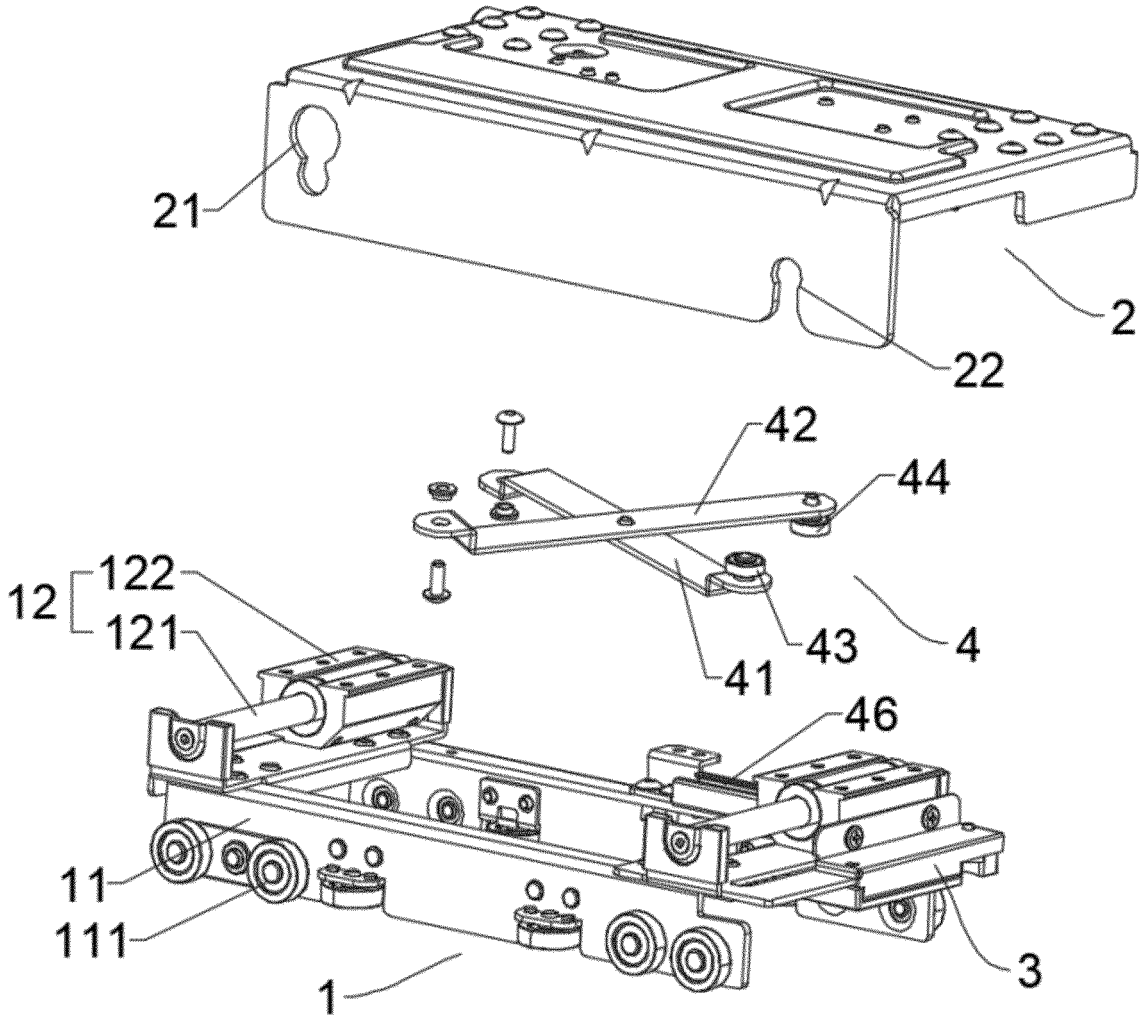

FIG. 1

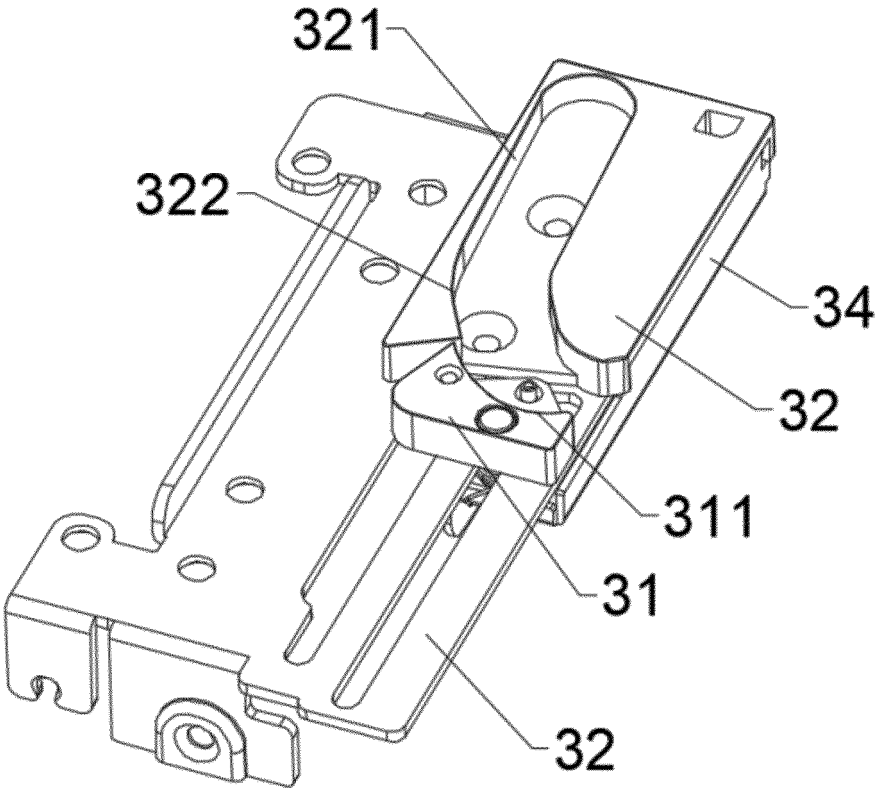

FIG. 2

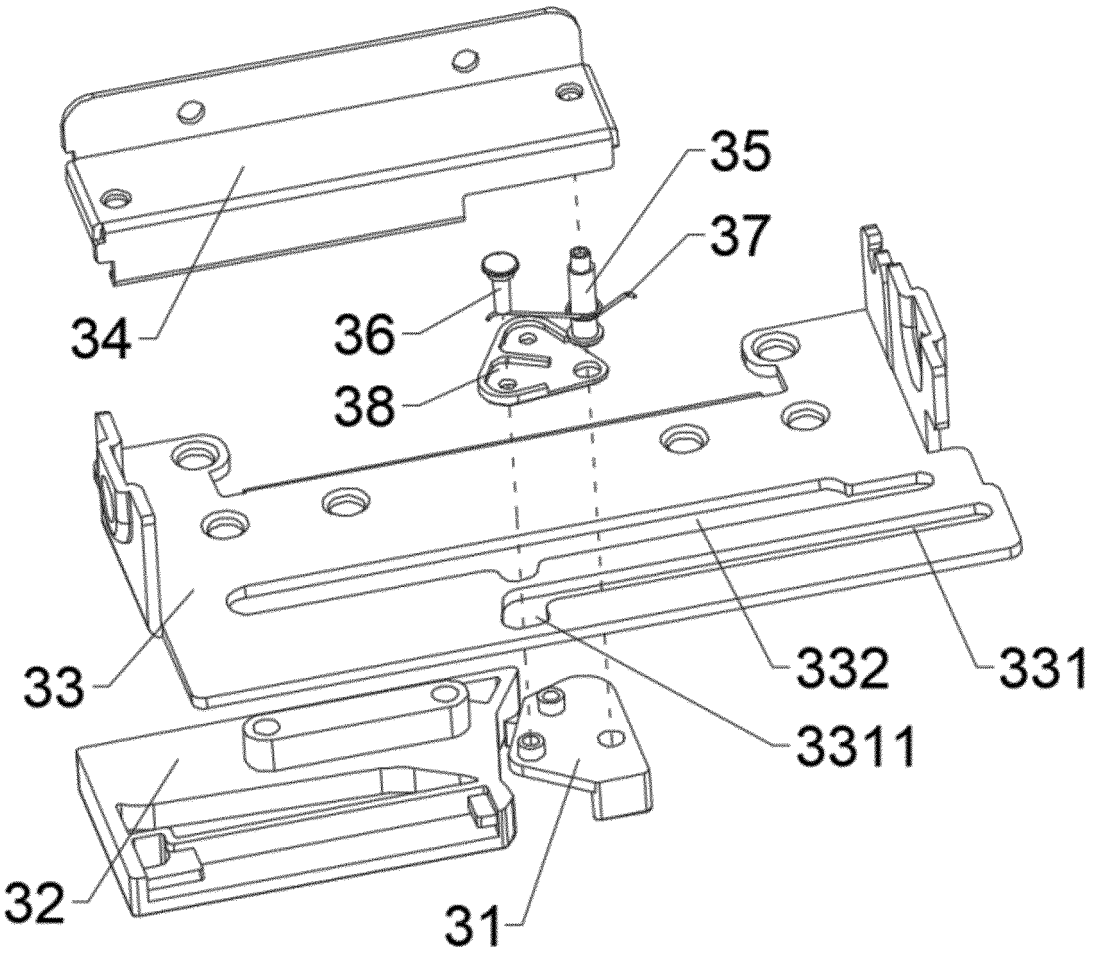

FIG. 3

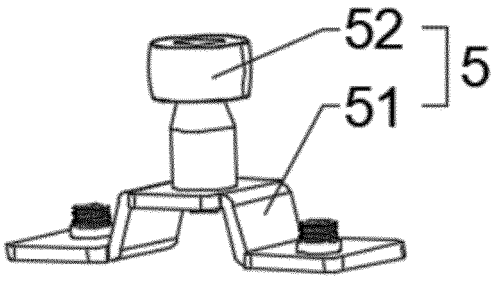

FIG. 4

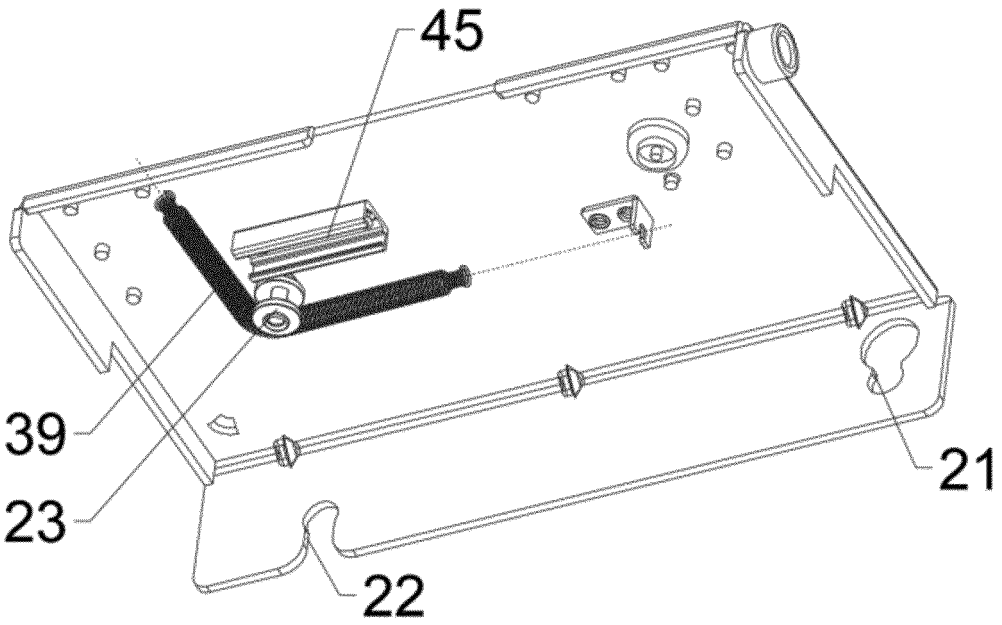

FIG. 5

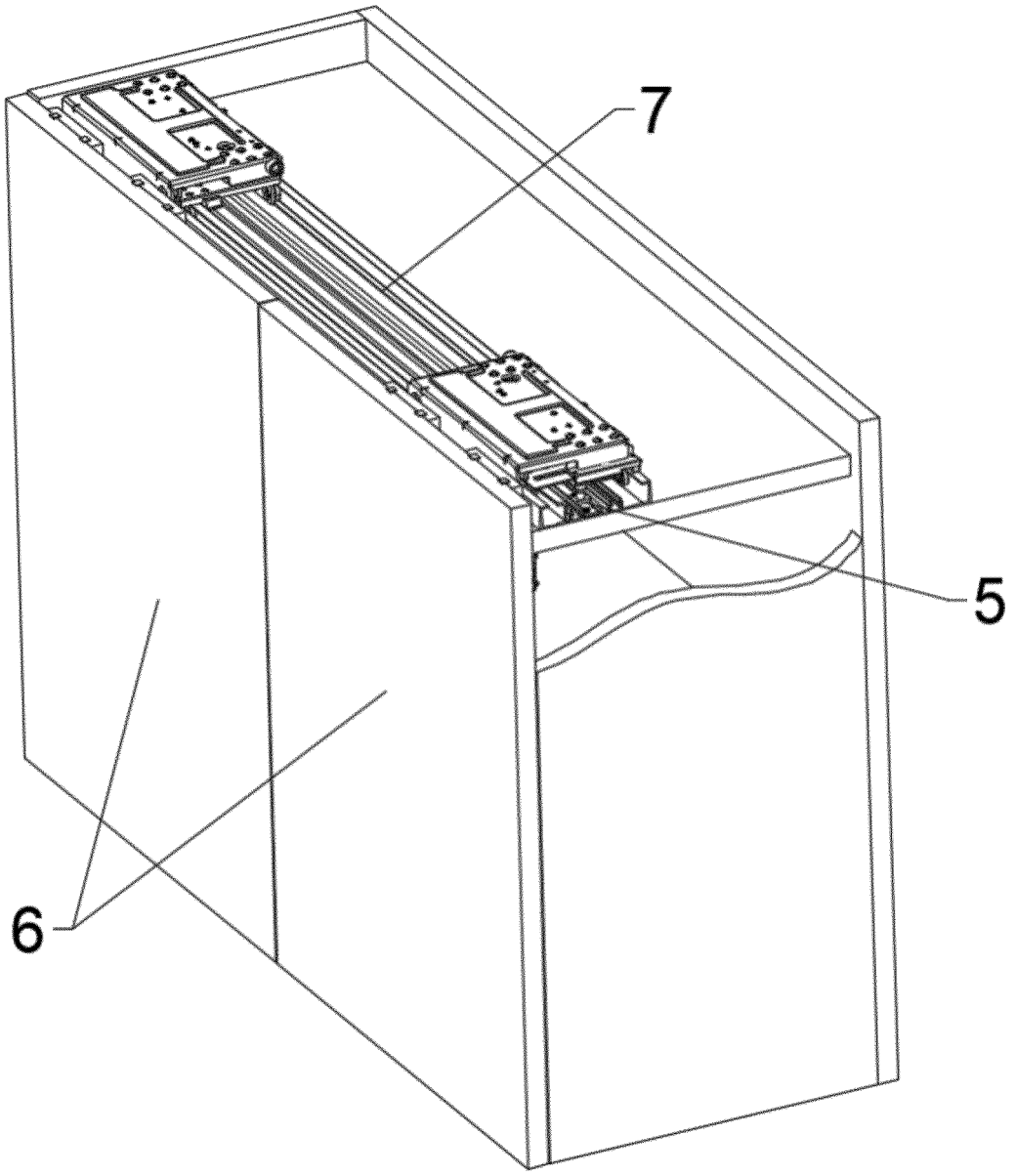

FIG. 6

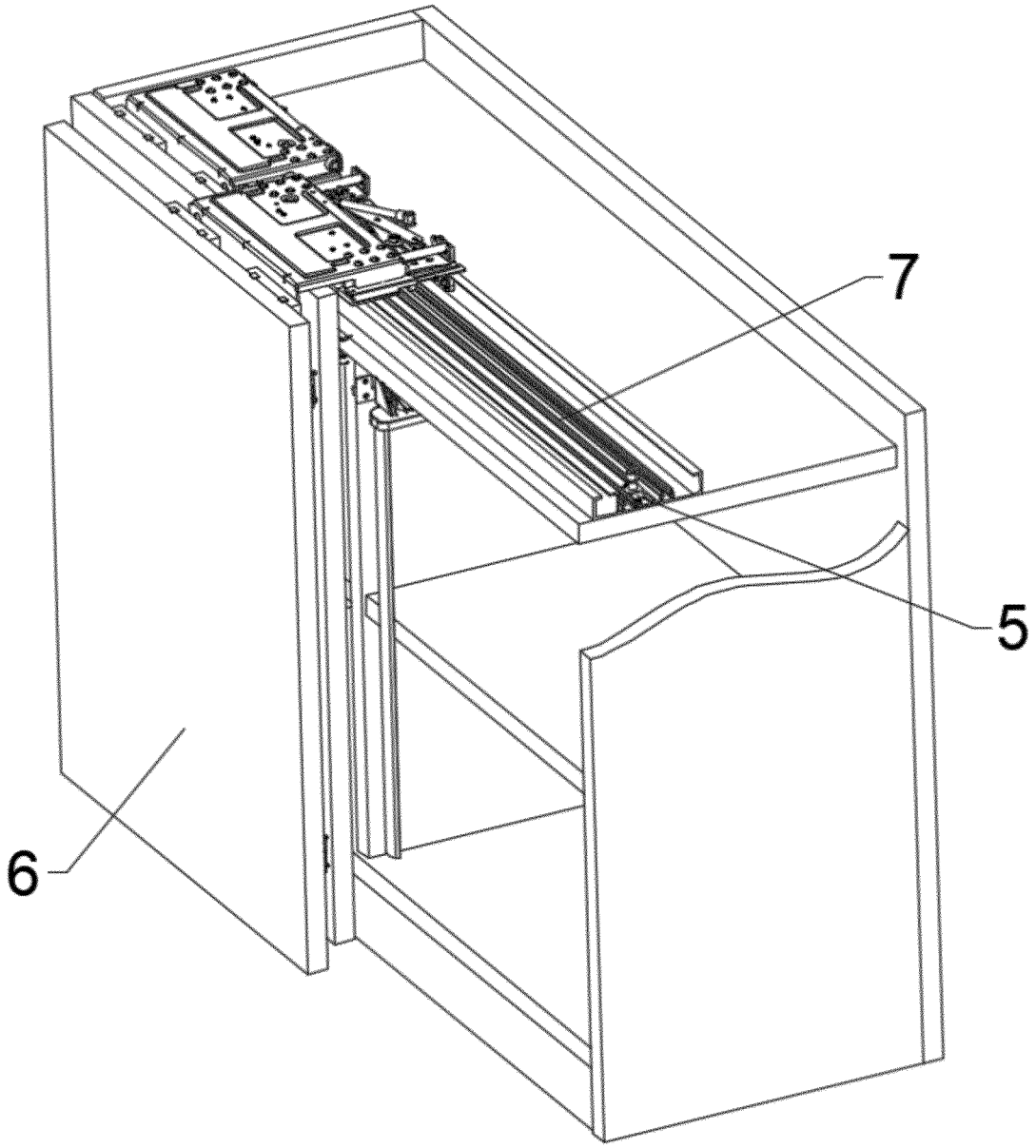

FIG. 7

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2021/075701

A. CLASSIFICATION OF SUBJECT MATTER

E05D 15/06(2006.01)i; E06B 3/46(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)

E05D;E06B;A47B

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, CNTXT, 中国期刊网全文数据库, DWPI, SIPOABS, USTXT, WOTXT, JPTXT, KRTXT: 中山市欧派克五金制品有限公司, 许姜德, 门, 滑, 轨, 共面, 同平面, 变轨, 平趟, 限位, 定位, 导向, 触, 碰, 拨, 旋转, 转动, 槽, 卡, 柱, 杆, 弧形, 弹性件, 弹簧, 轮, DOOR?, CUPBOARD, CABINET, WARDROBE, CLOSET, COPLAN+, SAME, PLANE, COLLINEAR, SLID+, SPAC+, ORIENT+, LIMIT+, PUSH+, DIAL+, CONTACT+, ROTAT+, GUID+, RAIL+, SPRING

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	KR 102072147 B1 (CHUL, S.J.) 31 January 2020 (2020-01-31) description, specific embodiments, and figures 1-5	1, 22-23
A	CN 110114544 A (CINETTO F.LLI S.R.L.) 09 August 2019 (2019-08-09) entire document	1-23
A	CN 205387893 U (DONGGUAN JIADAO HARDWARE PRODUCTS CO., LTD.) 20 July 2016 (2016-07-20) entire document	1-23
A	CN 111140120 A (GUANGDONG JUSEN HARDWARE PRECISION MANUFACTURING CO., LTD.) 12 May 2020 (2020-05-12) entire document	1-23
A	CN 111021863 A (GUANGDONG TUTTI HARDWARE CO., LTD.) 17 April 2020 (2020-04-17) entire document	1-23
A	WO 2020074994 A1 (S.I. S.R.L.et al.) 16 April 2020 (2020-04-16) entire document	1-23

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

* Special categories of cited documents:
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"E" earlier application or patent but published on or after the international filing date
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"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	Date of mailing of the international search report
12 October 2021	**01 November 2021**
Name and mailing address of the ISA/CN **China National Intellectual Property Administration (ISA/CN)** **No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088, China**	Authorized officer
Facsimile No. **(86-10)62019451**	Telephone No.

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2021/075701

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
KR 102072147 B1	31 January 2020	KR 20190122931 A	31 October 2019
CN 110114544 A	09 August 2019	WO 2018073777 A1	26 April 2018
		EP 3529441 A1	28 August 2019
CN 205387893 U	20 July 2016	None	
CN 111140120 A	12 May 2020	None	
CN 111021863 A	17 April 2020	CN 111021863 B	04 June 2021
WO 2020074994 A1	16 April 2020	None	

Form PCT/ISA/210 (patent family annex) (January 2015)