

(19)



(11)

EP 4 524 353 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
19.03.2025 Bulletin 2025/12

(51) International Patent Classification (IPC):
E05F 5/00^(2017.01)

(21) Application number: **24156041.6**

(52) Cooperative Patent Classification (CPC):
E05F 5/006; E05D 11/1021; E05Y 2201/264;
E05Y 2201/484; E05Y 2201/686; E05Y 2900/20

(22) Date of filing: **06.02.2024**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL
NO PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA
Designated Validation States:
GE KH MA MD TN

(72) Inventor: **HUANG, Liebiao
JIEYANG, 522000 (CN)**

(74) Representative: **Zaboliene, Reda
Metida
Business center Vertas
Gyneju str. 16
01109 Vilnius (LT)**

(30) Priority: **18.09.2023 CN 202311209174**

Remarks:
Amended claims in accordance with Rule 137(2)
EPC.

(71) Applicant: **Jieyang Biaozhi Hardware Precision
Manufacture
Co., Ltd.
Jieyang Testing Zone
Jieyang, Guangdong 522000 (CN)**

(54) **BUFFERING DEVICE FOR A DOOR HINGE AND DOOR HINGE**

(57) The present application relates to a buffering device for a door hinge, the door hinge includes a hinge base (11), the buffering device includes a linkage (21), an oil cylinder liner (23), a connecting plate (26) and an oil cylinder (27); one end of the linkage (21) is rotatably connected to the hinge base (11), and the other end is rotatably provided in the oil cylinder liner (23); the connecting plate (26) is arranged on the oil cylinder liner (23), and is driven by the linkage (21) to perform a planar movement close to or away from the hinge base (11); and the oil cylinder (27) includes a cylinder body (271) and a piston rod (272), the cylinder body (271) is fixedly installed in the oil cylinder liner (23), and the connecting plate (26) is able to contact with the piston rod (272) with

the planar movement of the connecting plate (26). The buffering unit connects the linkage to the oil cylinder through adding a connecting plate, so that the linkage (21) is able to rotate to drive the connecting plate (26) to perform a planar movement close to or away from the hinge base (11), and the planar movement of the connecting plate (26) then drives the oil cylinder (27) to compress or reset, a mechanical force during an opening and closing process of the door hinge is cleverly used to help the oil cylinder (27) reset, thereby reducing a loss of the oil cylinder (27). The present application has advantages of reducing the loss of the oil cylinder of the door hinge and prolonging the service life of the oil cylinder.

EP 4 524 353 A1

Description

FIELD OF TECHNOLOGY

[0001] The present application relates to the technical field of home furnishing, and in particular to a buffering device for a door hinge and the door hinge.

BACKGROUND

[0002] A door hinge is a device that allows a door to rotate open and close. Existing door hinges will be provided an oil cylinder with a buffering effect, which can reduce an impact force that the door hinge receives during a process of opening and closing the door. In this way, closing speed of the door can be controlled, reducing a risk of pinching and accidental injury, and also avoiding violent collisions and damage. However, the oil cylinder of the existing door hinge is easily damaged during use. When the oil cylinder is damaged, the door hinge will also lose its buffering effect, resulting in poor safety performance of the door hinge.

SUMMARY

[0003] Based on this, a purpose of the present application is to provide a buffering device for a door hinge and a door hinge that are able to reduce a loss of the oil cylinder in the door hinge and prolong a service life of the oil cylinder.

[0004] The present application provides a buffering device as defined in the independent claim 1, and some embodiments of the buffering device are defined in the independent claim 1.

[0005] Therefore, compared with prior art, the buffering device is able to be installed in the existing door hinge. Specifically, a structure of a torsion spring in the existing door hinge can be adjusted to fix the torsion spring to a linkage and an oil cylinder liner of the buffering device, a mechanical force during an opening and closing process of the door hinge is cleverly used to help the oil cylinder reset, thereby reducing a loss of the oil cylinder and prolonging a service life of the oil cylinder.

[0006] Further embodiments of the invention are defined in dependent claims 2-10.

[0007] For better understanding and implementation, the present application will be described in detail below with reference to the accompanying drawings.

BRIEF DESCRIPTION

[0008]

FIG. 1 is an exploded view of a door hinge of the present application;
FIG. 2 is a three-dimensional schematic diagram of the door hinge in FIG. 1;
FIG. 3 is a A-A cross-sectional view of the door hinge

in FIG. 1;

FIG. 4 is a schematic structural view of an oil cylinder liner of the door hinge in FIG. 1;

FIG. 5 is a schematic structural view of an oil cylinder of the door hinge in FIG. 1;

FIG. 6 is a schematic structural view of a connecting plate of the door hinge in FIG. 1;

FIG. 7 is a schematic structural view of a linkage of the door hinge in FIG. 1;

FIG. 8 is another schematic structural view of the oil cylinder liner of the door hinge in FIG. 1;

FIG. 9 is an assembly diagram of a torsion spring and the oil cylinder liner of the door hinge in FIG. 1;

FIG. 10 is a cross-sectional view of an assembly of the torsion spring and the oil cylinder liner of the door hinge in FIG. 1;

wherein: 1: hinge body, 11: hinge base, 12: U-shaped rotating shaft, 121: first connecting shaft, 122: second connecting shaft, 13: connecting piece, 131: side plate, 14: first rotating shaft, 15: housing, 2: buffering unit, 21: linkage, 211: protrusion, 22: torsion spring, 221: spring center portion, 222: twisting arm, 23: oil cylinder liner, 231: oil cylinder placement portion, 232: connecting plate movement track, 233: spring avoiding groove, 233A: first spring avoiding groove, 233B: second avoiding groove, 234: linkage movable limiting portion, 235: opening, 236: first side wall, 237: second side wall, 238: third side wall, 239: liner seat, 24: second rotating shaft, 25: third rotating shaft, 26: connecting plate, 261: connecting plate front end, 2611: groove, 262: connecting plate rear end, 2621: end face, 2622: stopping structure, 27: oil cylinder, 271: cylinder body, 272: piston rod, 3: buffering device.

DETAILED DESCRIPTION

[0009] The applicant conducted research on a buffering device of an existing door hinge and found that the buffering effect of an oil cylinder in the existing buffering device relies on compression and reset of the oil cylinder, and the compression and reset of the oil cylinder rely on its own internal spring. In order to achieve the buffering effect, the internal spring must be continuously compressed and reset, which will keep the spring in working condition for a long time, shortening a service life of the spring, and thus affecting a service life of the oil cylinder. To this end, the present application provides a door hinge that can help the oil cylinder reset through mechanical action, reduce a pressure on the internal spring of the oil cylinder, and thereby prolong the service life of the oil cylinder.

[0010] Please refer to FIGS 1-3, a door hinge of the present application includes a hinge body 1 and a buffering unit 2. The hinge body 1 includes a hinge base 11, a U-shaped rotating shaft 12, a connecting piece 13, a first rotating shaft 14 and a housing 15; the hinge base 11 is fixed on one of a door frame or a door, and the housing 15

is fixed on the other. During a relative movement of the door relative to the door frame, the hinge base 11 rotates relative to the housing 15. The connecting piece 13 is hinged between the hinge base 11 and the housing 15 through the U-shaped rotating shaft 12 and the first rotating shaft 14. In which, the U-shaped rotating shaft 12 includes a first connecting shaft 121 and a second connecting shaft 122 whose axes are substantially parallel to each other. The connecting piece 13 is provided with a plate surface, and two opposite side plates 131 are protruding from two opposite edges of one side of the plate surface and extend on the plate surface of the connecting piece 13. In the extending direction of the side plate 131, the first connecting shaft 121 is close to one side of the hinge base 11 and passes through the two side plates 131. One end of the connecting piece 13 is rotatably connected to the hinge base 11 through the first connecting shaft 121 of the U-shaped rotating shaft 12. The first rotating shaft 14 passes through a side of the two side plates 131 away from the hinge base 11 and is axially parallel to the first connecting shaft 121, so that the other end of the connecting piece 13 is rotatably arranged in the housing 15 through the first rotating shaft 14. As the door rotates, the connecting piece 13 located between the hinge base 11 and the housing 15 can rotate relative to the hinge base 11 and the housing 15.

[0011] The buffering unit 2 includes a linkage 21, a torsion spring 22, an oil cylinder liner 23, a second rotating shaft 24, a third rotating shaft 25, a connecting plate 26 and an oil cylinder 27; the oil cylinder liner 23 is fixedly connected to the housing 15, and the linkage 21 is connected between the hinge base 11 and the oil cylinder liner 23. The linkage 21 can rotate as the door rotates, and during the rotation of the linkage 21, the connecting plate 26 can be pushed and pulled to slide along a plane in the oil cylinder liner 23 to press the oil cylinder 27 located in the oil cylinder liner 23. The torsion spring 22 resets the linkage 21. In which, the linkage 21 extends between the hinge base 11 and the oil cylinder liner 23, and is engaged with the connecting plate 26 on a side close to the oil cylinder liner 23. One end of the linkage 21 close to the hinge base 11 is rotatably connected to the hinge base 11 through the second connecting shaft 122 of the U-shaped rotating shaft 12. Projected along an axial direction of the first rotating shaft 14, the second connecting shaft 122 is located between the first rotating shaft 14 and the first connecting shaft 121. The other end of the linkage 21 close to the oil cylinder liner 23 is rotatably disposed in the oil cylinder liner 23 through the second rotating shaft 24. The second rotating shaft 24 is parallel to an axis of the second connecting shaft 122. The torsion spring 22 is sleeved on the first rotating shaft 14 and fit on the linkage 21. One end of the torsion spring 22 abuts on the oil cylinder liner 23, and the other end abuts on an inner wall of the connecting piece 13. The oil cylinder liner 23 is fixed in the housing 15 through the second rotating shaft 24 and the third rotating shaft 25. Preferably, along an axial projection of the first rotating shaft 14, in a direction in

which the hinge base 11 points to the housing 15, the second rotating shaft 24 and the third rotating shaft 25 are arranged front and back. The second rotating shaft 24 is located on a side close to the hinge base 11, and axes of the second rotating shaft 24 and the third rotating shaft 25 are both parallel to the first rotating shaft 14.

[0012] With reference to FIG. 4, the oil cylinder liner 23 is provided with an oil cylinder placement portion 231, a connecting plate movement track 232, an opening 235, a first side wall 236, a second side wall 237, a third side wall 238 and a liner seat 239. The first side wall 236, the second side wall 237 and the third side wall 238 protrude on a plane of one side of the liner seat 239. The second side wall 237 and the third side wall 238 are arranged oppositely, and the first side wall 236 is connected between the second side wall 237 and the third side wall 238, so that a hollow structure is formed on the liner seat 239 to form the oil cylinder placement portion 231 for accommodating the oil cylinder 27. The opening 235 is directly opposite to the first side wall 236 and faces the housing 15, and is in communication with the oil cylinder placement portion 231. The connecting plate movement track 232 is arranged on the first side wall 236 and in communication with the oil cylinder placement portion 231. In an embodiment, the connecting plate movement track 232 is located between the first side wall 236 and the liner seat 239 and extends toward the oil cylinder placement portion 231. The connecting plate 26 is inserted into the connecting plate movement track 232 for position limiting, **one end of the connecting plate 26 inserts into the oil cylinder placement portion 231** and extends toward the housing 15 on and along a plane of the liner seat 239. The linkage 21 drives the connecting plate 26 to slide in the connecting plate movement track 232 to perform a planar movement close to or away from the hinge base 11. With reference to FIG. 5, the oil cylinder 27 includes a cylinder body 271 and a piston rod 272, the piston rod 272 is located on one side of the cylinder body 271 and extends toward the housing 15. Preferably, an extension direction of the piston rod 272 is parallel to a sliding direction of the connecting plate 26 and points toward the housing 15, and is perpendicular to the axes of the second rotating shaft 24 and the third rotating shaft 25 respectively. The cylinder body 271 is fixedly installed in the oil cylinder placement portion 231 of the oil cylinder liner 23, and abuts the first side wall 236. An end of the piston rod 272 away from the cylinder body 271 is always in contact with the connecting plate 26.

[0013] With reference to FIG. 6, in an embodiment, the cylinder body 271 is located on a side plate of the connecting plate 26 facing away from the liner seat 239. The connecting plate 26 includes a connecting plate front end 261 and a connecting plate rear end 262, in which the connecting plate front end 261 and the connecting plate rear end 262 are respectively located on opposite sides of the piston rod 272 in the axial direction thereof, and the connecting plate rear end 262 is located on a side close to the housing 15. The connecting plate front end 261 is

provided with a groove 2611. With reference to FIG. 7, the linkage 21 is located below the connecting plate 26, and an end of the linkage 21 that is connected to the second rotating shaft 24 is provided with a protrusion 211 which is clamped into the groove 2611 from bottom to top. The linkage 21 pushes and pulls the connecting plate 26 through the protrusion 211, so that the connecting plate 26 slides on the liner seat 239. The connecting plate rear end 262 has an end face 2621 protruding toward the cylinder body 271, and the end face 2621 is always in contact with the piston rod 272 of the oil cylinder 27. During a rotation of a door, since the hinge base 11 rotates relative to the housing 15, the connecting piece 13 and the linkage 21 are driven to rotate relative to the first rotating shaft 14. A side of the linkage 21 close to the oil cylinder liner 23 rotates around the second connecting shaft 122 at the same time, so that the linkage 21 moves relative to the oil cylinder liner 23 fixed to the housing 15, and a side of the linkage 21 that is close to the oil cylinder liner 23 is also away from or close to the hinge base 11 relative to the oil cylinder liner 23. Since the linkage 21 is engaged with the connecting plate 26, the connecting plate 26 also moves accordingly. Under the limiting effect of the connecting plate movement track 232, the connecting plate 26 slides on the plane of the liner seat 239.

[0014] In an embodiment, the connecting plate rear end 262 is also protruded with two stopping structures 2622 that limit a movement of the oil cylinder 27 and are arranged oppositely. The end face 2621 is connected between the two stopping structures 2622. The stopping structure 2622 can ensure that the oil cylinder 27 is fixed in the connecting plate rear end 262 and prevent the oil cylinder 27 from shaking on the connecting plate 26.

[0015] With reference to FIGS. 8 to 10, in an embodiment, the torsion spring 22 includes a spring center portion 221 and two torsion arms 222. The spring center portion 221 surrounds the first rotating shaft 14 to form a central axis. The two torsion arms 222 are respectively disposed at both axial sides of the spring center portion 221 and extend in a direction perpendicular to the central axis of the spring center portion 221. The oil cylinder liner 23 is also provided with two spring avoiding grooves 233 and a linkage movable limiting portion 234. The spring avoiding grooves 233 include a first spring avoiding groove 233A and a second spring avoiding groove 233B, in which the first spring avoiding groove 233A is provided outside the second side wall 237 or the third side wall 238, and extends from the opening 235 toward the first side wall 236, and the linkage movable limiting portion 234 is located in the first spring avoiding groove 233A. The second spring avoiding groove 233B is provided on a side close to the opening 235 and connected between the second side wall 237 and the third side wall 238. The spring center portion 221 is disposed in the second spring avoiding groove 233B, and its central axis points from the second side wall 237 to the third side wall 238. One of the two torsion arms 222 is inserted into the first spring avoiding groove 233A, and its outer surface is in contact

with the linkage movable limiting portion 234, the other of the two torsion arms 222 abuts against an inner surface of one of the side plates 131 of the connecting piece 13. The torsion spring 22 does not contact the oil cylinder 27 during the opening and closing of the door hinge. The linkage movable limiting portion 234 restricts the linkage 21 to only rotate around the rotating shaft and not to swing left and right along the central axis of the spring center portion 221, so that a door panel will not sag even when opening and closing under load, it will not affect the rotation of the door hinge, making a product quieter and more durable.

[0016] A working principle of the door hinge is as follows:

When the door hinge needs to be opened, the linkage 21 rotates clockwise around the second rotating shaft 24, and the protrusion 211 of the linkage 21 drives the connecting plate 26 through the groove 2611 to move toward the hinge base 11 along the connecting plate movement track 232. The end face 2621 of the connecting plate rear end 262 abuts the piston rod 272 of the oil cylinder 27 and moves so that the piston rod 272 is compressed and the door hinge gradually opens. This process is quiet, stable and smooth.

When the door hinge needs to be closed, the linkage 21 rotates counterclockwise around the second rotating shaft 24, and the protrusion 211 of the linkage 21 drives the connecting plate 26 through the groove 2611 to move away from the hinge base 11 along the connecting plate movement track 232, the connecting plate 26 is reset under the action of the linkage 21, without relying on a rebound force of the internal spring of the oil cylinder 27 to reset, thereby the loss of the internal spring of the oil cylinder is reduced and the service life of the oil cylinder is prolonged.

The present application also provides a buffering device 3 for a door hinge, which includes the linkage 21, the oil cylinder liner 23, the connecting plate 26 and the oil cylinder 27 in the above embodiments; the buffering device 3 can be installed in an existing door hinge. Specifically, the torsion spring can be fixed on the linkage 21 and the oil cylinder liner 23 of the buffering device by adjusting a structure of the torsion spring in the existing door hinge. The torsion spring and the buffering device 3 form a buffering unit of the existing door hinge. The buffering unit enables the existing door hinge to realize a function of prolonging the service life of the oil cylinder of the door hinge in the above embodiment.

Compared with prior art, the present application connects the linkage 21 to the oil cylinder 27 by adding a connecting plate 26, and the linkage 21 can rotate clockwise or counterclockwise during opening and closing of the door hinge. When the linkage 21 rotates, it can drive the connecting plate 26 to perform a planar movement close to or away from the hinge base 11, then the planar movement of the connecting plate 26 will in turn drive a piston rod 272 of the oil cylinder 27 to compress or reset, cleverly using a mechanical force during the opening and

closing process of the door hinge to help the oil cylinder 27 reset, without the need for an internal spring in the oil cylinder to continue to function when the oil cylinder is reset. In addition, the torsion spring 22 is fixed on the linkage 21 and the oil cylinder liner 23 to prevent the torsion spring 22 from contacting the oil cylinder 27 and prevent an elastic force of the torsion spring 22 from affecting the oil cylinder 27. The loss of the internal spring of the oil cylinder 27 is reduced from two aspects, and the service life of the oil cylinder 27 is prolonged.

Claims

1. A buffering device for a door hinge which includes a hinge base (11), **characterized in that**,

the buffering device comprises a linkage (21), an oil cylinder liner (23), a connecting plate (26) and an oil cylinder (27);

wherein, one end of the linkage (21) is rotatably connected to the hinge base (11), and the other end is rotatably provided in the oil cylinder liner (23);

the connecting plate (26) is arranged on the oil cylinder liner (23), and is driven by the linkage (21) to perform a planar movement close to or away from the hinge base (11); and

the oil cylinder (27) includes a cylinder body (271) and a piston rod (272), the cylinder body (271) is fixedly installed in the oil cylinder liner (23), and the connecting plate (26) is able to contact with the piston rod (272) with the planar movement of the connecting plate (26).

2. The buffering device of **claim 1, characterized in that**,

the connecting plate (26) includes a connecting plate front end (261) and a connecting plate rear end (262), the connecting plate front end (261) is provided with a groove (2611), one end of the linkage (21) that is connected to the oil cylinder liner (23) is provided with a protrusion (211), the protrusion (211) is clamped into the groove (2611), the connecting plate rear end (262) is provided with an end face (2621) which abuts against the piston rod (272) of the oil cylinder (27).

3. The buffering device of claim 2, wherein, the connecting plate rear end (262) is also provided with a stopping structure (2622) that is able to fix the cylinder body (271).

4. The buffering device of claim 3, wherein, the oil cylinder liner (23) is provided with an oil cylinder placement portion (231) and a connecting plate movement track (232), the oil cylinder (27) is arranged in the oil cylinder placement portion (231),

and the connecting plate (26) is installed in the connecting plate movement track (232).

5. The buffering device of claim 4, wherein, the oil cylinder liner (23) is also provided with a linkage movable limiting portion (234).

6. A door hinge, **characterized in that**,

the door hinge comprises a hinge body (1) and a buffering unit (2), the hinge body (1) includes a hinge base (11), a U-shaped rotating shaft (12), a connecting piece (13), a first rotating shaft (14) and a housing (15);

wherein, the U-shaped rotating shaft (12) includes a first connecting shaft (121) and a second connecting shaft (122), one end of the connecting piece (13) is rotatably connected to the hinge base (11) through the first connecting shaft (121) of the U-shaped rotating shaft (12), and the other end of the connecting piece (13) is rotatably provided in the housing (15) through the first rotating shaft (14);

the buffering unit (2) includes the buffering device according to claim 1, a torsion spring (22) and a second rotating shaft (24);

wherein, one end of the linkage (21) is rotatably connected to the hinge base (11) through the second connecting shaft (122) of the U-shaped rotating shaft (12), and the other end of the linkage (21) is rotatably provided in the oil cylinder liner (23) through the second rotating shaft (24);

the torsion spring (22) is sleeved on the first rotating shaft (14) and fit on the linkage (21), the oil cylinder liner (23) is fixed in the housing (15), one end of the torsion spring (22) abuts on the oil cylinder liner (23), and the other end abuts on an inner wall of the connecting piece (13).

7. The door hinge of claim 6, wherein, the connecting plate (26) includes a connecting plate front end (261) and a connecting plate rear end (262), the connecting plate front end (261) is provided with a groove (2611), one end of the linkage (21) that is connected to the second rotating shaft (24) is provided with a protrusion (211), the protrusion (211) is clamped into the groove (2611), the connecting plate rear end (262) is provided with an end face (2621) which abuts against the piston rod (272) of the oil cylinder (27).

8. The door hinge of claim 7, wherein, the connecting plate rear end (262) is also provided with a stopping structure (2622) that is able to fix the cylinder body (271).

9. The door hinge of claim 8, wherein,

the oil cylinder liner (23) is provided with an oil cylinder placement portion (231) and a connecting plate movement track (233), the oil cylinder (27) is arranged in the oil cylinder placement portion (231), and the connecting plate (26) is installed in the connecting plate movement track (233).

10. The door hinge of claim 9, wherein, the oil cylinder liner (23) is also provided with two spring avoiding grooves (233) and a linkage movable limiting portion (234), the torsion spring (22) includes a spring center portion (221) and torsion arms (222) provided at both sides of the spring center portion (221), the spring center portion (221) and one of the torsion arms (222) are respectively arranged in the two spring avoiding grooves (233), and the other of the torsion arms (222) abuts against an inner wall of the connecting piece.

Amended claims in accordance with Rule 137(2) EPC.

1. A buffering device for a door hinge which includes a hinge base (11), **characterized in that,**

the buffering device comprises a linkage (21), an oil cylinder liner (23), a connecting plate (26) and an oil cylinder (27);

wherein, one end of the linkage (21) is rotatably connected to the hinge base (11), and the other end is rotatably provided in the oil cylinder liner (23);

the connecting plate (26) is arranged on the oil cylinder liner (23), and is driven by the linkage (21) to perform a planar movement close to or away from the hinge base (11); and

the oil cylinder (27) includes a cylinder body (271) and a piston rod (272), the cylinder body (271) is fixedly installed in the oil cylinder liner (23), and the connecting plate (26) is able to contact with the piston rod (272) with the planar movement of the connecting plate (26);

the connecting plate (26) includes a connecting plate front end (261) and a connecting plate rear end (262), the connecting plate rear end (262) is provided with an end face (2621) which abuts against the piston rod (272) of the oil cylinder (27);

the oil cylinder liner (23) is provided with an oil cylinder placement portion (231), a connecting plate movement track (232), a first side wall (236), a second side wall (237), a third side wall (238) and a liner seat (239); the second side wall (236) and the third side wall (238) protrude on a plane of one side of the liner seat (239), and the first side wall (236) is connected between the second side wall (237) and the third side wall (238) to form the oil cylinder placement portion (231);

the connecting plate movement track (232) is arranged between the first side wall (236) and the liner seat (239); the connecting plate front end (261) is clamped the top of linkage (21) after passing through the connecting plate movement track (232).

2. The buffering device of claim 1, **characterized in that,**

, the connecting plate front end (261) is provided with a groove (2611), one end of the linkage (21) that is connected to the oil cylinder liner (23) is provided with a protrusion (211), the protrusion (211) is clamped into the groove (2611).

3. The buffering device of claim 2, wherein, the connecting plate rear end (262) is also provided with a stopping structure (2622) that is able to fix the cylinder body (271).

4. The buffering device of claim 3, wherein, the oil cylinder liner (23) is provided with an oil cylinder placement portion (231), the oil cylinder (27) is arranged in the oil cylinder placement portion (231).

5. The buffering device of claim 4, wherein, the oil cylinder liner (23) is also provided with a linkage movable limiting portion (234).

6. A door hinge, **characterized in that,**

the door hinge comprises a hinge body (1) and a buffering unit (2), the hinge body (1) includes a hinge base (11), a U-shaped rotating shaft (12), a connecting piece (13), a first rotating shaft (14) and a housing (15);

wherein, the U-shaped rotating shaft (12) includes a first connecting shaft (121) and a second connecting shaft (122), one end of the connecting piece (13) is rotatably connected to the hinge base (11) through the first connecting shaft (121) of the U-shaped rotating shaft (12), and the other end of the connecting piece (13) is rotatably provided in the housing (15) through the first rotating shaft (14);

the buffering unit (2) includes the buffering device according to claim 1, a torsion spring (22) and a second rotating shaft (24);

wherein, one end of the linkage (21) is rotatably connected to the hinge base (11) through the second connecting shaft (122) of the U-shaped rotating shaft (12), and the other end of the linkage (21) is rotatably provided in the oil cylinder liner (23) through the second rotating shaft (24);

the torsion spring (22) is sleeved on the first rotating shaft (14) and fit on the linkage (21),

the oil cylinder liner (23) is fixed in the housing (15), one end of the torsion spring (22) abuts on the oil cylinder liner (23), and the other end abuts on an inner wall of the connecting piece (13).

5

7. The door hinge of claim 6, wherein, the connecting plate front end (261) is provided with a groove (2611), one end of the linkage (21) that is connected to the second rotating shaft (24) is provided with a protrusion (211), the protrusion (211) is clamped into the groove (2611). 10
8. The door hinge of claim 7, wherein, the connecting plate rear end (262) is also provided with a stopping structure (2622) that is able to fix the cylinder body (271). 15
9. The door hinge of claim 8, wherein, the oil cylinder liner (23) is provided with an oil cylinder placement portion (231), the oil cylinder (27) is arranged in the oil cylinder placement portion (231). 20
10. The door hinge of claim 9, wherein, the oil cylinder liner (23) is also provided with two spring avoiding grooves (233) and a linkage movable limiting portion (234), the torsion spring (22) includes a spring center portion (221) and torsion arms (222) provided at both sides of the spring center portion (221), the spring center portion (221) and one of the torsion arms (222) are respectively arranged in the two spring avoiding grooves (233), and the other of the torsion arms (222) abuts against an inner wall of the connecting piece. 25 30

35

40

45

50

55

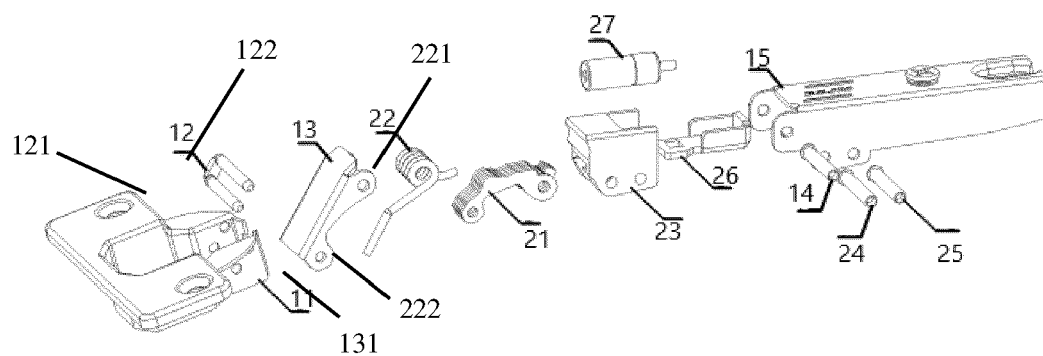


FIG. 1

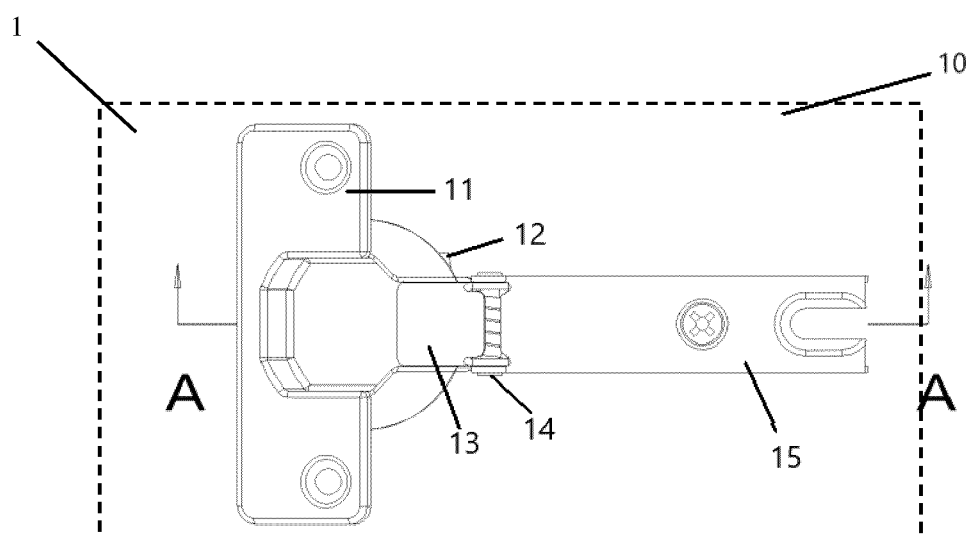


FIG. 2

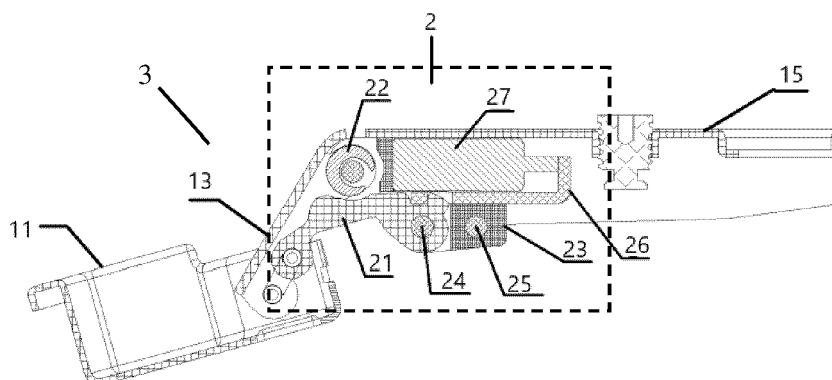


FIG. 3

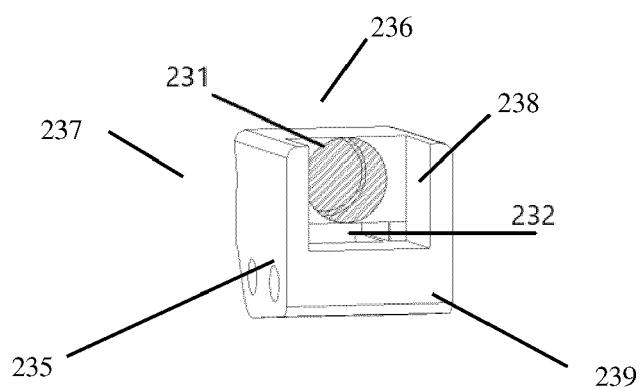


FIG. 4



FIG. 5

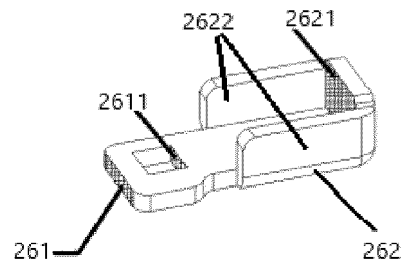


FIG. 6

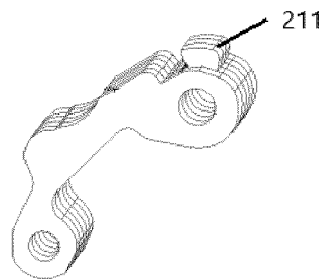


FIG. 7

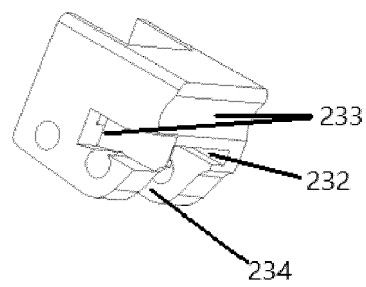


FIG. 8

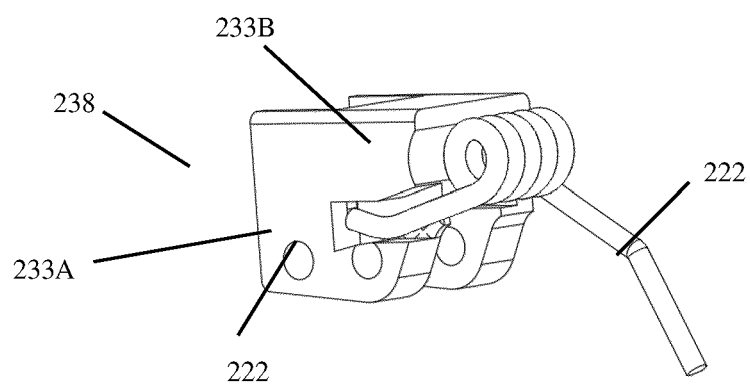


FIG. 9

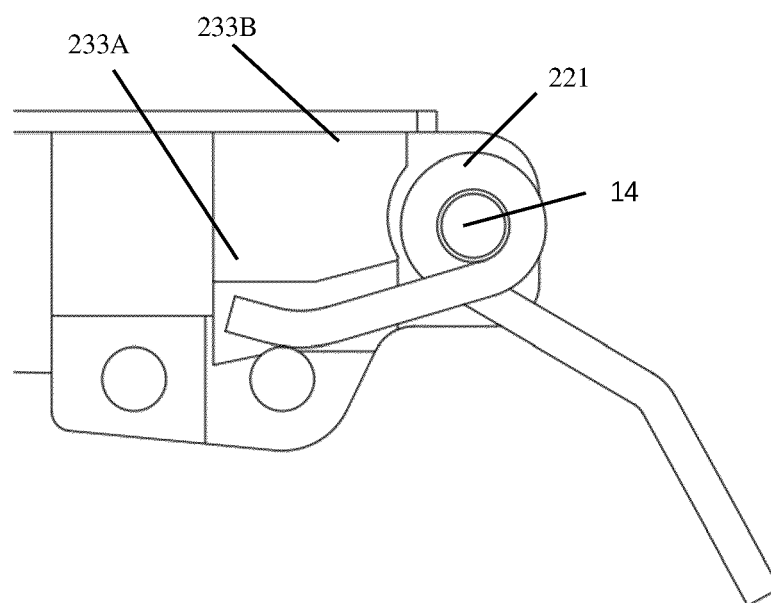


FIG. 10



EUROPEAN SEARCH REPORT

Application Number

EP 24 15 6041

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	TW I 673 423 B (EXCELLENT METAL CO LTD [TW]) 1 October 2019 (2019-10-01) * the whole document *	1-10	INV. E05F5/00
X	EP 4 050 185 A1 (QINGYUAN SACA PREC MANUFACTURING CO LTD [CN]; WU QIUHUA [CN]) 31 August 2022 (2022-08-31) * figures 1,4-10 *	1-10	
X	WO 2023/169078 A1 (GUANGDONG JUSEN HARDWARE PREC MFG CO LTD [CN]) 14 September 2023 (2023-09-14) * figures 3,4 *	1-10	
A	CN 108 798 335 A (GUANGDONG JINLI XIANGXING PREC METAL MANUFACTURING CO LTD) 13 November 2018 (2018-11-13)	1-10	
A	WO 2023/111719 A1 (DOGAMA S R L [IT]) 22 June 2023 (2023-06-22) * the whole document *	1-10	
			TECHNICAL FIELDS SEARCHED (IPC)
			E05F
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		27 May 2024	Loverdou, Lefki
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

EP 24 15 6041

5

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

27-05-2024

10

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
TW I673423	B	01-10-2019	NONE

EP 4050185	A1	31-08-2022	CN 211173603 U 04-08-2020
			EP 4050185 A1 31-08-2022
			KR 20220082052 A 16-06-2022
			WO 2021098592 A1 27-05-2021

WO 2023169078	A1	14-09-2023	CN 217380149 U 06-09-2022
			WO 2023169078 A1 14-09-2023

CN 108798335	A	13-11-2018	NONE

WO 2023111719	A1	22-06-2023	NONE

15

20

25

30

35

40

45

50

55

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82