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(54) **Floor hinge hidden in door panel**

(57) Provided is a floor hinge (10) including a base (20) fixed to the ground, a body (30) disposed in a door panel (12), an axle (40) pivotally disposed in the body (30), and a damping unit (50) disposed in the body (30) and abutting against the axle (40). To allow the door panel (12) to open or shut, the body (30) rotates about the axle (40) in response to the opening and shutting of the door panel (12). The damping unit (50) is pushed by the axle (40) to thereby compress a hydraulic oil stored in the body (30) while the body (30) is rotating. Therefore, not only can the floor hinge (10) be fixed to the door panel (12) from inside easily, but a hydraulic resistance between the damping unit (50) and the hydraulic oil is also generated to lessen door-opening and door-shutting forces.

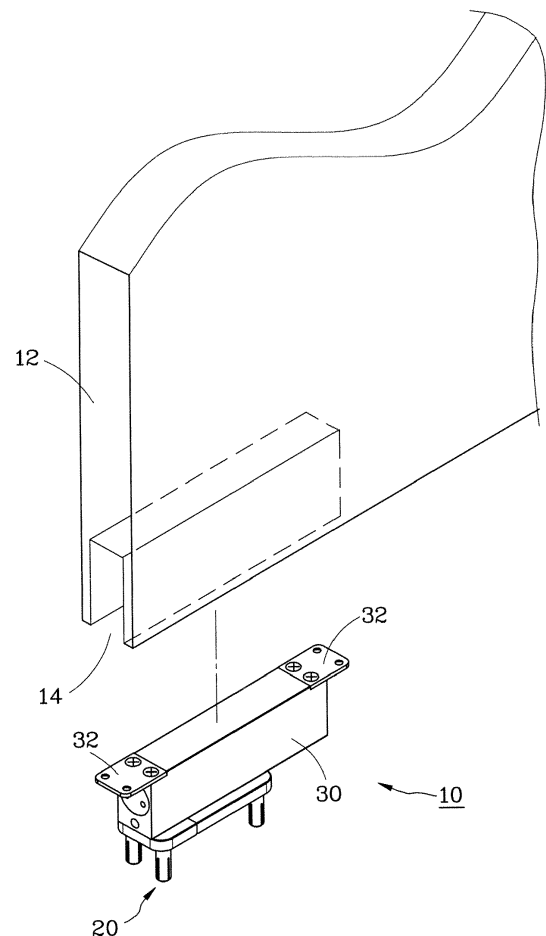


FIG. 1

Description

BACKGROUND OF THE INVENTION

[0001] 1. Technical Field

[0002] The present invention relates to floor hinges, and more particularly, to a floor hinge hidden in a door panel.

[0003] 2. Description of Related Art

[0004] In general, once a conventional hinge is installed on a door panel, an axle of the hinge will become unstable gradually after being in use for a while, because the door panel is not weightless. As a result, the door panel starts to sag and thus is likely to collide with the ground during a door-opening process and a door-shutting process or even crack when the collision is severe. Hence, conventional door panels are equipped mostly with a floor hinge for providing a door-opening function and a door-shutting function.

[0005] Although a conventional floor hinge has advantages, such as a low breakdown rate, high load-bearing capacity, and being capable of adjusting the door-opening angle and automatic return speed, an installation process of the conventional floor hinge entails making a recess in the ground beforehand according to the dimensions of the floor hinge and then fixing the floor hinge firmly in the recess. Normally, a door panel installation process is carried out one or two days later than the floor hinge installation process. Therefore, the floor hinge installation process is time-consuming and laborious, not to mention that rainwater is likely to accumulate in the recess and thereby rust the floor hinge.

SUMMARY OF THE INVENTION

[0006] It is an objective of the present invention to provide a floor hinge hidden in a door panel so as to render floor hinge installation easy and provide an appropriate resistance for lessening a door-opening force and a door-shutting force during a door-opening process and a door-shutting process, respectively.

[0007] In order to achieve the above and other objectives, the present invention provides a floor hinge that comprises a base, a body, an axle, and a damping unit. The base is fixed to the ground. The body is fixed to a receiving chamber of the door panel and has an oil storage space for storing a hydraulic oil and an axle bore in perpendicular communication with the oil storage space. The axle is pivotally disposed in the axle bore of the body and has a spindle and an eccentric cam disposed at the spindle, wherein the spindle has an end protruding out of the axle bore and connected to the base, such that the body can rotate about the axle in response to the opening and shutting of the door panel. The damping unit is disposed in the oil storage space of the body and abuts against the eccentric cam of the axle so as for the damping unit to be pushed by the eccentric cam to thereby compress the hydraulic oil for generating a resistance to

door-opening and door-shutting. Accordingly, a floor hinge of the present invention is **characterized in that** the body is fixed to the receiving chamber of the door panel to thereby dispense with excavation, render the installation process easy, and provide an appropriate hydraulic resistance for lessening door-opening and door-shutting forces.

[0008] As regards a floor hinge of the present invention, the base has a fixing plate, an adjusting plate, and a plurality of adjusting screws. The fixing plate is fixed to the ground, has a recess, and forms a plurality of screw holes at a periphery of the fixing plate and in communication with the recess. The adjusting plate is disposed in the recess of the fixing plate and connected to the spindle of the axle. The plurality of adjusting screws is disposed in the plurality of screw holes, respectively, to abut against the adjusting plate and thereby adjust a position of the adjusting plate relative to the fixing plate. Accordingly, the adjusting plate can be pushed by the plurality of adjusting screws to thereby undergo deflection, to-and-fro motion or sideward motion relative to the fixing plate, so as to adjust the offset of the door panel and enable the door panel to shut completely, thereby solving offset-related problems.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] Objectives, features, and advantages of the present invention are hereunder illustrated with specific embodiments in conjunction with the accompanying drawings, in which:

[0010] FIG. 1 is an exploded perspective view of a floor hinge hidden in a door panel according to a preferred embodiment of the present invention;

[0011] FIG. 2 is a partial exploded perspective view of the floor hinge according to a preferred embodiment of the present invention;

[0012] FIG. 3 is an exploded perspective view of a body and a damping unit according to a preferred embodiment of the present invention;

[0013] FIG. 4 is a cross-sectional view of the body and the damping unit according to a preferred embodiment of the present invention; and

[0014] FIGs. 5A, 5B, 5C are bottom views of the base according to a preferred embodiment of the present invention, showing the states of offset adjustment performed on the door panel.

DETAILED DESCRIPTION OF THE EMBODIMENTS OF THE INVENTION

[0015] Referring to FIG. 1, in a preferred embodiment of the present invention, a floor hinge 10 is applicable to a door panel 12 of different types, such as an iron door or a solid wooden door. The present invention will work well with whatever types of the door panel 12, provided that the bottom of the door panel 12 has a receiving chamber 14 for installing the floor hinge 10 of the present in-

vention. Referring to FIG. 2 and FIG. 3, the floor hinge 10 comprises a base 20, a body 30, an axle 40, and a damping unit 50.

[0016] The base 20 comprises a fixing plate 21, an adjusting plate 22, a plurality of adjusting screws 23, 24, and two end plates 25. A rectangular recess 212 is centrally disposed in the fixing plate 21. Two through holes 214 are formed on the left and right sides of the rectangular recess 212, respectively. A plurality of fixing screws 26 and sheaths 27 which mesh passes through the through holes 214, respectively, and is fixed firmly in the ground, such that the fixing plate 21 can be fixed to the ground. Two screw holes 216 are disposed on two opposing long sides of the fixing plate 21, respectively. Two screw holes 216 are disposed on two opposing short sides of the fixing plate 21, respectively. The screw holes 216 are in communication with the rectangular recess 212. The adjusting plate 22 is disposed in the rectangular recess 212 of the fixing plate 21. An engaging hole 221 is centrally disposed in the adjusting plate 22. The dimensions of the adjusting plate 22 are less than the dimensions of the rectangular recess 212, such that the adjusting plate 22 still has leeway when positioned inside the rectangular recess 212. The adjusting screws 23, 24 are disposed in the screw holes 216 of the fixing plate 21, respectively, and abut against the edge of the adjusting plate 22, such that the adjusting plate 22 can undergo deflection, to-and-fro motion, or sideward motion relative to the fixing plate 21. Optionally, the two end plates 25 are coupled to the left and right ends of the fixing plate 21, respectively, as needed.

[0017] The body 30 is fastened to the receiving chamber 14 of the door panel 12 by means of two top plates 32, as shown in FIG. 1. The body 30 has therein an oil storage space 34 for storing a hydraulic oil, as shown in FIG. 3 and FIG. 4. The oil storage space 34 comprises a cavity 342, an oil conduit 344, and a valve aperture 346. The oil conduit 344 is in communication with the cavity 342. The valve aperture 346 is in communication with the cavity 342 and the oil conduit 344. The body 30 has an axle bore 348. The axle bore 348 is in perpendicular communication with the cavity 342 of the oil storage space 34. The body 30 has two ends each hermetically sealed with an end lid 36 for sealing hermetically the cavity 342 of the oil storage space 34. An oil level adjustment valve 38 is disposed in the valve aperture 346 of the body 30 and adapted to adjust the flow rate of the hydraulic oil.

[0018] Referring to FIG. 3 and FIG. 4, the axle 40 is pivotally disposed in the axle bore 348 of the body 30 by means of two bearings 46 and hermetically sealed with a seal 48. The axle 40 has a spindle 42 and an eccentric cam 44 disposed at the spindle 42. An engaging end 422 of the spindle 42 protrudes out of the axle bore 348. The engaging end 422 is inserted into and thus fixed to the engaging hole 221 of the adjusting plate 22 of the base 20, such that the axle 40 and the adjusting plate 22 can operate synchronously.

[0019] Referring to FIG. 3 and FIG. 4, a damping unit

50 is received in the cavity 342 of the oil storage space 34 of the body 30, and comprises a piston 51, a fixing block 52, and a resilient element 54. The piston 51 has an oblong hole 512 penetrable by the spindle 42 of the axle 40. An oil drainage hole 514 is disposed at an end of the piston 51. A relief valve 55 is disposed in the oil drainage hole 514. The fixing block 52 is fixed to the piston 51 by means of a pin 53 and abuts against the eccentric cam 44 of the axle 40; hence, in response to the rotation of the door panel 12, the fixing block 52 inside the body 30 pushes the piston 51 when abutted by the eccentric cam 44 of the axle 40. Two ends of the resilient element 54 abut against the piston 51 and one of the end lids 36 of the body 30, respectively, to exert a restoring force on the piston 51.

[0020] The floor hinge 10 of the present invention is described above in detail. The use and features of the floor hinge 10 of the present invention are described below.

[0021] As regards the opening of the door panel 12, the body 30 rotates about the axle 40 in response to the opening of the door panel 12; meanwhile, the piston 51 is pushed by the eccentric cam 44 of the axle 40 and therefore moves within the cavity 342 of the oil storage space 34, whereas the hydraulic oil is compressed by the piston 51 and thus flows from the left end of the piston 51 to the right end of the piston 51 via the oil conduit 344 and the oil level adjustment valve 38. Once the door panel 12 starts to shut, the piston 51 will be pushed by the resilient element 54 to thereby compress the hydraulic oil; hence, the relief valve 55 is pushed open by the hydraulic oil, and then the hydraulic oil is introduced into the cavity 342 through the oil drainage hole 514 and flows toward the left end of the piston 51 until the door panel 12 is completely shut. Oil level can be adjusted with the oil level adjustment valve 38, so as to adjust the door-shutting speed of the door panel 12.

[0022] In the situation where the door panel 12 fails to shut completely, it is feasible to use four said adjusting screws 23 to abut against the two long sides of the adjusting plate 22 and thereby enable the adjusting plate 22 within the recess 212 to undergo deflection or to-and-fro motion, so as to correct the rotational offset or to-and-fro offset of the door panel 12 by means of the axle 40 and the body 30, as shown in FIGs. 5A, 5B. The sideward offset of the door panel 12 can be corrected, by using the two other adjusting screws 24 to abut against the two short sides of the adjusting plate 22, as shown in FIG. 5C.

[0023] In conclusion, an installation process of the floor hinge 10 of the present invention entails fixing the base 20 to the ground, hiding the body 30 in the door panel 12, and connecting the base 20 and the body 30 by means of the axle 40 so as to finalize the floor hinge installation process. The floor hinge installation process dispenses with excavation, prevents accumulation of water and thus rusting, and is easy to perform. When in use, the floor hinge 10 of the present invention employs a hydraulic resistance provided between the damping unit

50 and the hydraulic oil to lessen door-opening and door-shutting forces. Upon completion of the installation process of the floor hinge 10 of the present invention, it is feasible to fine-tune the position of the door panel 12, so as for the door panel 12 to shut precisely, thereby solving offset-related problems.

Claims

1. A floor hinge (10) hidden in a door panel (12), the door panel (12) having a bottom provided therein with a receiving chamber (14), being **characterized in that** the floor hinge (10) comprises:

a base (20) fixed to a ground;
a body (30) fixed to the receiving chamber (14) from inside and having an oil storage space (34) for storing a hydraulic oil and an axle bore (348) in perpendicular communication with the oil storage space (34);

an axle (40) pivotally disposed in the axle bore (348) of the body (30) and having a spindle (42) and an eccentric cam (44) disposed at the spindle (42), the spindle (42) having an end protruding out of the axle bore (348) and connected to the base (20); and

a damping unit (50) disposed in the oil storage space (34) of the body (30) and abutting against the eccentric cam (44) of the axle (40) so as for the damping unit (50) to be pushed by the eccentric cam (44) to thereby compress the hydraulic oil for generating a resistance to door-opening and door-shutting.

2. The floor hinge (10) hidden in a door panel (12) of claim 1, being **characterized in that** the base (20) has a fixing plate (21), an adjusting plate (22), and a plurality of adjusting screws (23,24), the fixing plate (21) being fixed to the ground, having a recess (212), and forming a plurality of screw holes (216) at a periphery of the fixing plate (21) and in communication with the recess (212), the adjusting plate (22) being disposed in the recess (212) of the fixing plate (21) and connected to the spindle (42) of the axle (40), and the plurality of adjusting screws (23,24) being disposed in the plurality of screw holes (216), respectively, to abut against the adjusting plate and thereby adjust a position of the adjusting plate (22) relative to the fixing plate (21).

3. The floor hinge (10) hidden in a door panel (12) of claim 2, being **characterized in that** both the recess (212) of the fixing plate (21) and the adjusting plate (22) are rectangular, and dimensions of the adjusting plate (22) are less than dimensions of the recess (212) of the fixing plate (21).

4. The floor hinge (10) hidden in a door panel (12) of claim 2, being **characterized in that** the base (20) further has two end plates (25) connected to two ends of the fixing plate (21), respectively.

5. The floor hinge (10) hidden in a door panel (12) of claim 2, being **characterized in that** the fixing plate (21) is fixed to the ground by a plurality of fixing screws (26) and sheaths (27) which mesh.

6. The floor hinge (10) hidden in a door panel (12) of claim 2, being **characterized in that** the fixing plate (21) has an engaging hole (221), and the spindle (42) of the axle (40) has an engaging end (422) engageably disposed in the engaging hole (221).

7. The floor hinge (10) hidden in a door panel (12) of claim 1, being **characterized in that** the damping unit (50) comprises a piston (51), a fixing block (52), and a resilient element (54), the piston (51) having an oblong hole (512) penetrable by the spindle (42) of the axle (40), the fixing block (52) being disposed at the piston (51) and abutting against the eccentric cam (44) of the axle (40), and the resilient element (54) having an end abutting against the piston (51).

8. The floor hinge (10) hidden in a door panel (12) of claim 7, being **characterized in that** the damping unit (50) further has a relief valve (55) disposed in an oil drainage hole (514) of the piston (51).

9. The floor hinge (10) hidden in a door panel (12) of claim 1, being **characterized in that** the floor hinge (10) further comprises an oil level adjustment valve (38), wherein the oil storage space (34) of the body (30) has a cavity (342), an oil conduit (344), and a valve aperture (346), the cavity (342) receiving the damping unit (50) and being in communication with the axle bore (348), the oil conduit (344) being in communication with the cavity (342), and the valve aperture (346) being in communication with the cavity (342) and the oil conduit (344) and receiving the oil level adjustment valve (38).

10. The floor hinge (10) hidden in a door panel (12) of claim 1, being **characterized in that** the body (30) is fastened to the receiving chamber (14) of the door panel (12) by two top plates (32).

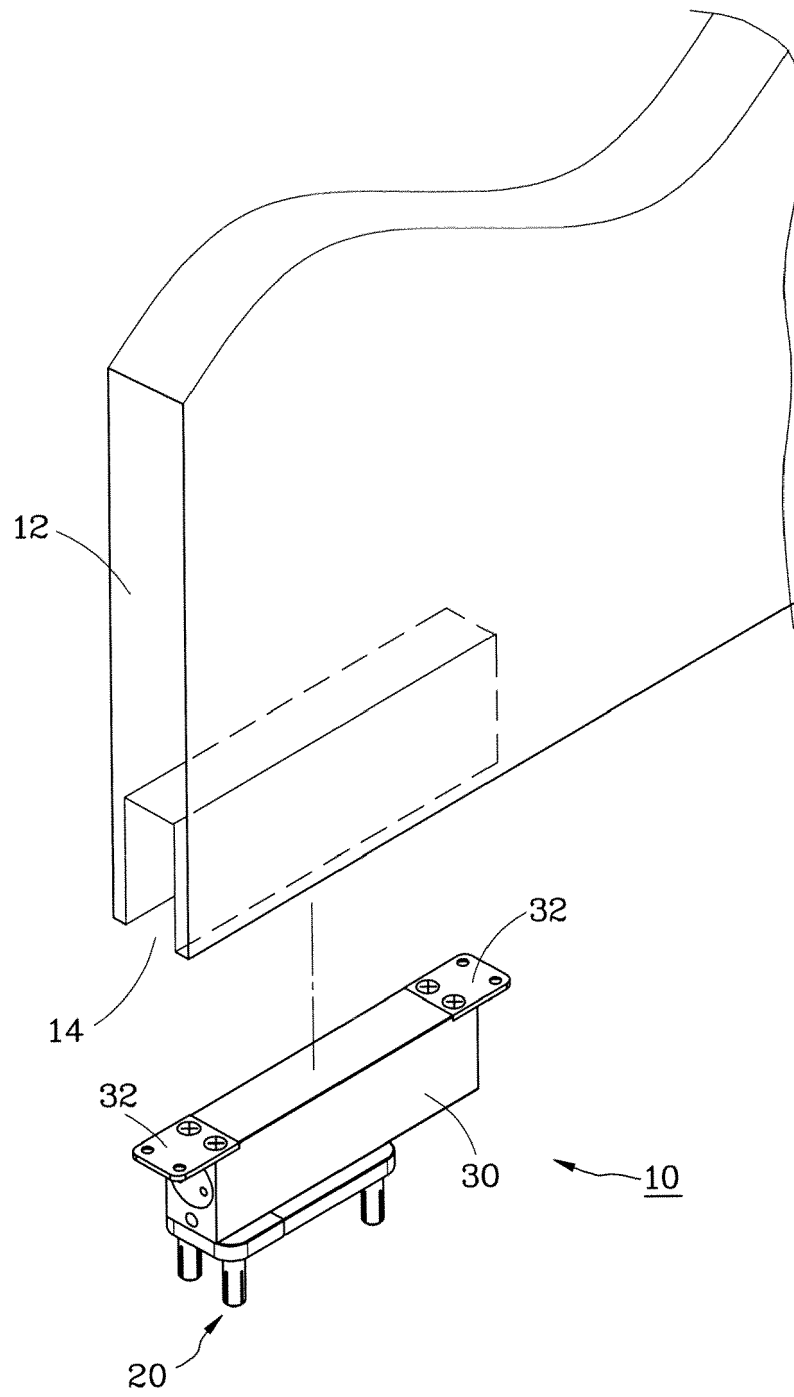


FIG. 1

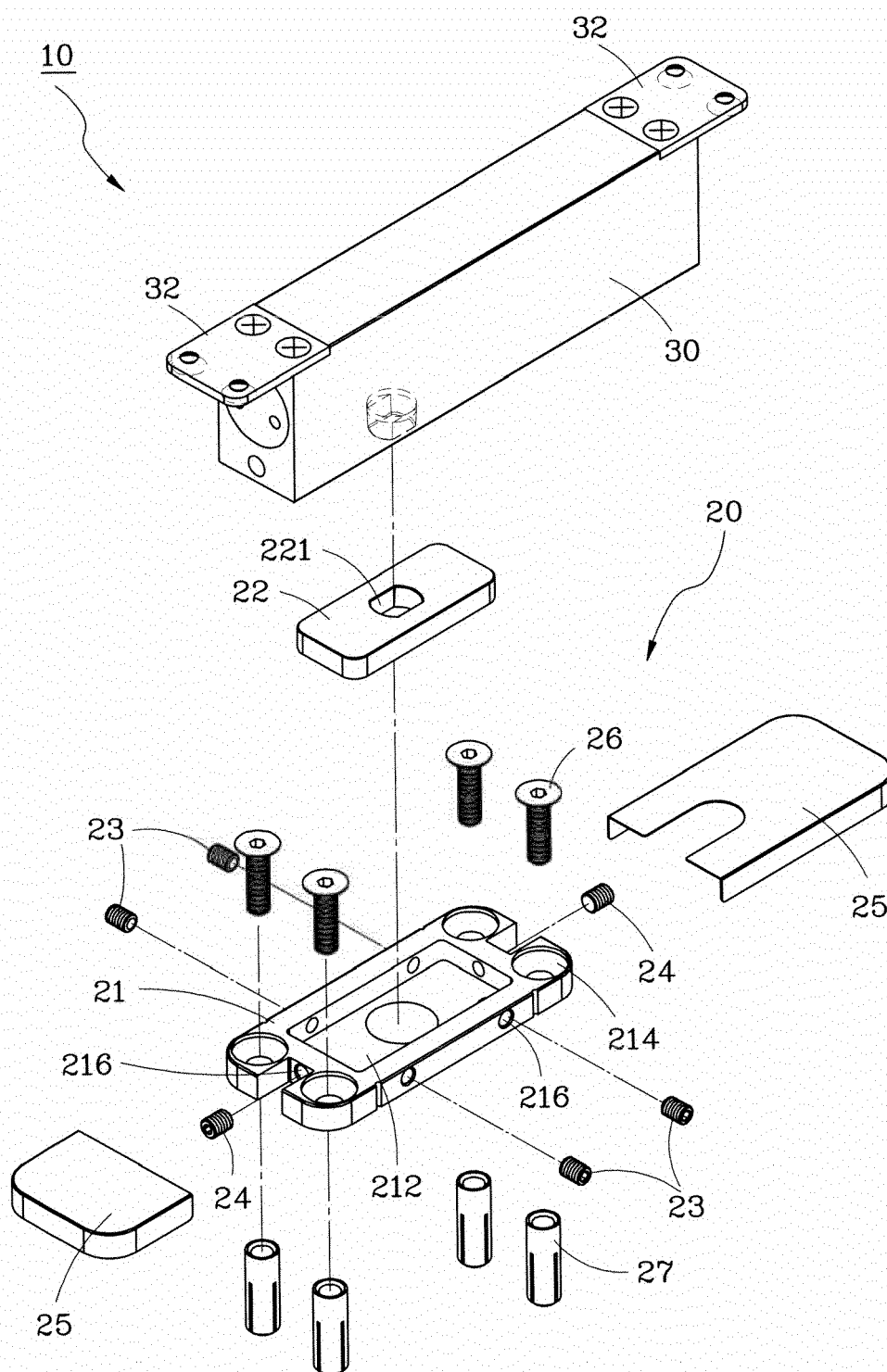


FIG. 2

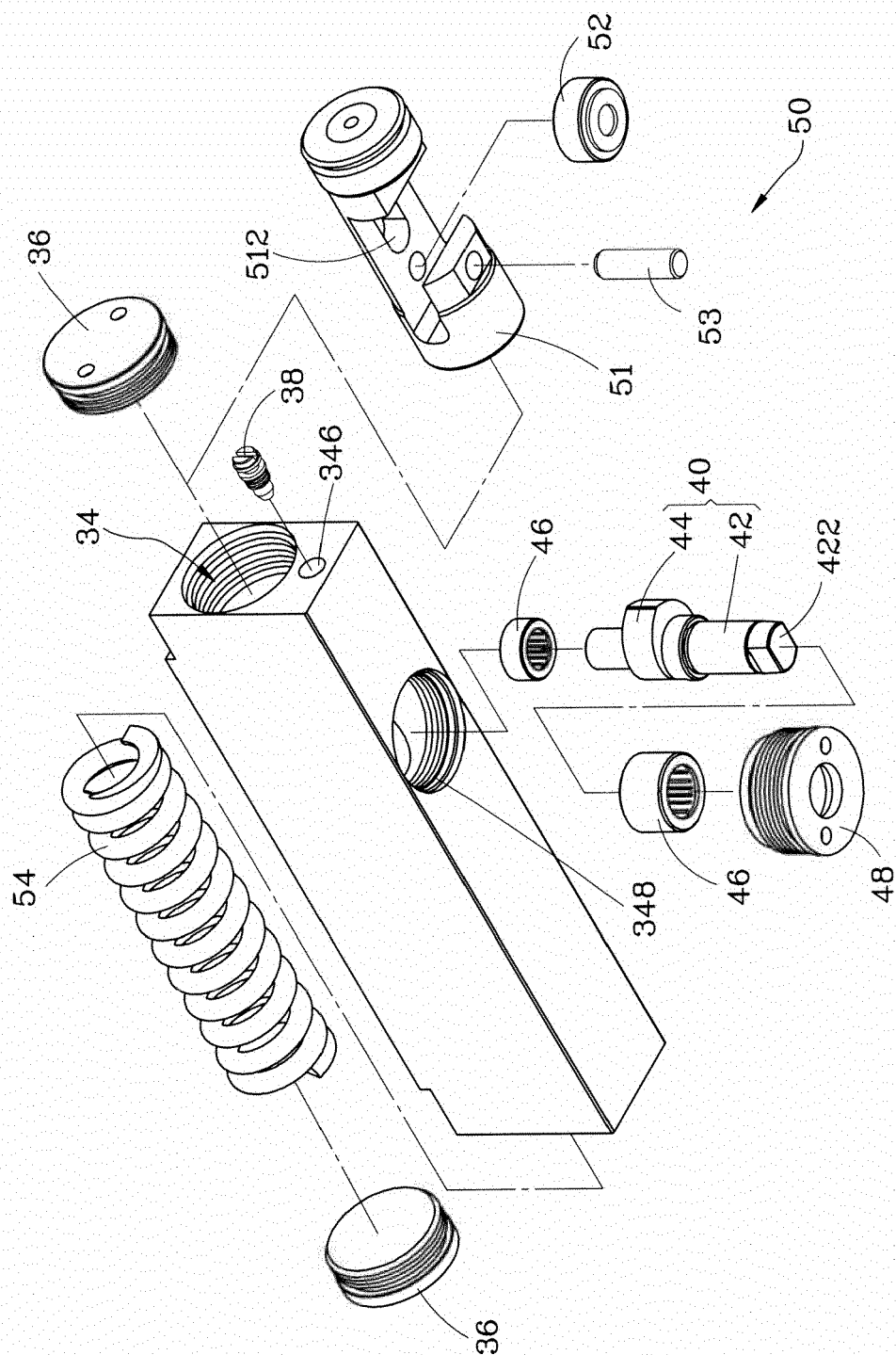


FIG. 3

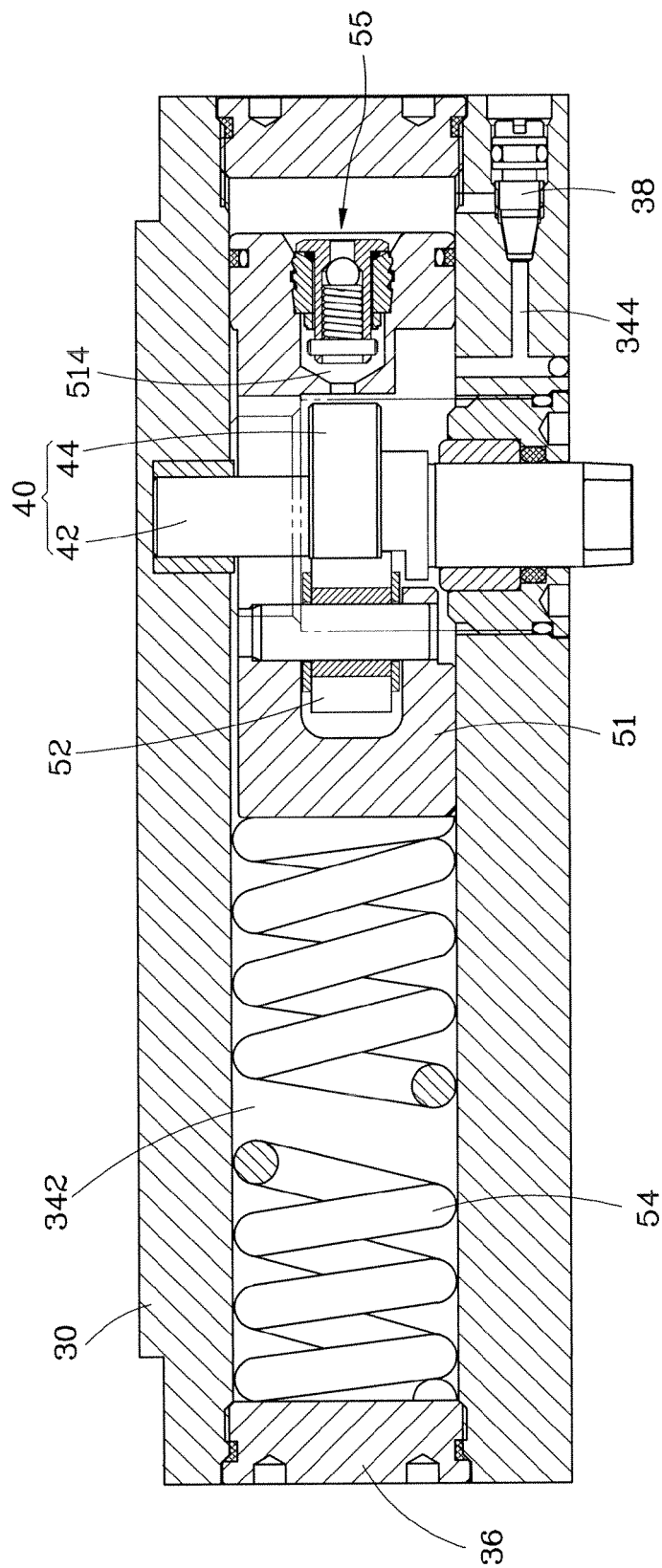


FIG. 4

