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(71) Applicants:
- **Qingyuan Saca Precision Manufacturing Co., Ltd.**
Qingyuan, Guangdong 511500 (CN)
- **Wu, Qiuhua**
Guangdong 528311 (CN)

(72) Inventor: **WU, Qiuhua**
Foshan, Guangdong 528311 (CN)

(74) Representative: **Lin Chien, Mon-Yin**
Gloria Fuertes 1, 2° D
28340 Valdemoro Madrid (ES)

(54) **DOOR HINGE HAVING TWO-SECTION FORCE**

(57) A door hinge having a two-section force, comprising a first rotating shaft (3), a second rotating shaft (4), a crank (5), a rocker (6), a housing (10), a hinge cup (1), a U-shaped shaft (2), a double-leg torsion spring (7), a damper (8), and a guide base (9). Protrusions (52) and arc-shaped abutting positions (51) are provided on both front and back sides of a right end of the crank (5), an arc center of each of the arc-shaped abutting position (51) is coaxial with the axis of the first rotating shaft (3); two legs (71) of the double-leg torsion spring (7) respectively abut on the corresponding arc-shaped abutting positions (51) or abut on right ends of the arc-shaped abutting position (51); the damper (8) is mounted in the housing (10); recesses (91) are provided on both front and back sides of the guide base (9); the guide base (9) is located in the housing (10) and can relatively move; the protrusions (52) are located in the corresponding recesses (91); and an end portion of a piston rod (84) of the damper (8) is provided on the guide base (9).

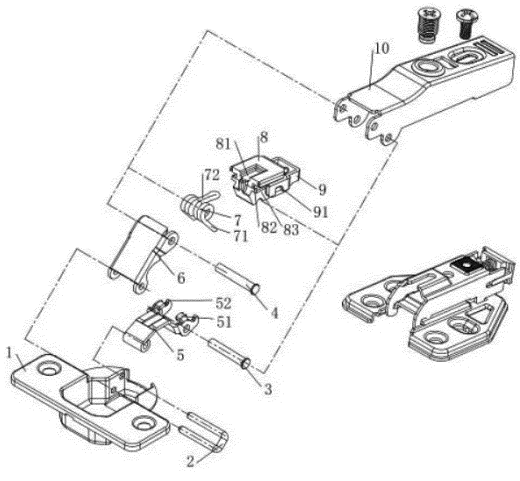

FIG.1

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Description

FIELD OF THE DISCLOSURE

[0001] The present disclosure relates to a two-way door hinge.

BACKGROUND OF THE DISCLOSURE

[0002] Currently, a two-way door hinge generally includes a housing, a damper, a guide base, a first rotating shaft, a second rotating shaft, a crank, a rocker, a hinge cup, a U-shaped shaft and a torsion spring.

SUMMARY OF THE DISCLOSURE

Technical problem

[0003] During production, since fittings of the two-way door hinge are different from that of the one-way door hinge, a manufacturer can produce the two-way door hinge only after replacing production equipment, thus the production cost is high. When working, the legs of the double-leg torsion spring are in contact with the crank, and the contact surface is a plane. The door hinge is not responsive between a first way and a second way, which leads to poor use effect. The friction of the contact surface between the legs of the double-leg torsion spring and the crank is large, which leads to large working loss of the legs of the double-leg torsion spring and the crank, resulting in short service life of a product.

Solutions to problems

Technical solution

[0004] The present disclosure aims to overcome shortcomings of the prior art and provide a two-way door hinge, which can adapt some fittings of the one-way door hinge, thereby achieving low production cost, sensitive response between the first way and the second way, good use effect and long service life.

[0005] For the purpose described above, the present disclosure is realized as a two-way door hinge, which is characterized by including:

a first rotating shaft, a second rotating shaft, a crank, a rocker and a housing; wherein, the first rotating shaft and the second rotating shaft are both mounted on a left part of the housing; the right end portion of the crank is rotationally connected with the left part of the housing through the first rotating shaft; protrusions and arc-shaped abutting positions are provided on both front and back sides of a right end of the crank; the arc-shaped abutting position is located on the left side of the protrusion, and an arc center of each of the arc-shaped abutting position is coaxial with the axis of the first rotating shaft; the right end portion of the rocker is rotationally connected with the left part of the housing through the second rotating shaft;

a hinge cup and a U-shaped shaft; the left end portion of the rocker is rotationally connected with the hinge cup through a shaft of the U-shaped shaft, and the left end portion of the crank is rotationally connected with the hinge cup through the other shaft of the U-shaped shaft;

a double-leg torsion spring; the double-leg torsion spring is sleeved on the second rotating shaft; a positioning structure for positioning the double-leg torsion spring is provided on the double-leg torsion spring; two legs of the double-leg torsion spring respectively abut on the corresponding arc-shaped abutting positions or abut on right ends of the arc-shaped abutting positions; when the two legs of the double-leg torsion spring abut on the arc-shaped abutting positions, the door hinge is in a first way, and when the two legs of the double-leg torsion spring abut on the right end of the arc-shaped abutting positions, the door hinge is in a second way; and

a damper and a guide base; the damper is mounted in the housing; recesses are provided on both front and back sides of the guide base; the guide base is located in the housing and can relatively move; the protrusions are located in the corresponding recesses to drive the guide base to move; and an end portion of a piston rod of the damper is provided on the guide base, so that the damper acts as a buffer role.

[0006] In the technical solution, the upper end face of the damper abuts on the top face of inner wall of the housing. Front and back sides of upper part of the damper abuts on the front and back sides of the inner wall of the housing. An arc-shaped groove is provided on lower part of the damper. The first rotating shaft is inserted into the arc-shaped groove, and the left end face of the damper abuts on double-leg torsion springs, so that the damper is positioned and mounted in the housing.

[0007] In the technical solution, guide grooves are provided on the front and back sides of the damper. Guide inserting blocks are provided on the front and back sides of the guide base. The guide inserting blocks are inserted on the corresponding guide grooves to make the guide base move on the damper.

[0008] In the technical solution, sunken avoidance positions are provided on the front and back sides of the damper, and the two legs of the double-leg torsion spring are located in the sunken avoidance positions.

[0009] In the technical solution, the damper is an auto-eject type damper.

[0010] In the technical solution, the positioning structure on the double-leg torsion spring is a top pillar on the double-leg torsion spring. The damper is provided with a second groove which is matched with the top surface of the inner wall of the housing to form an installation slot, into which the top pillar is inserted to position the double-

leg torsion spring.

[0011] In the technical solution, a first groove is provided on the right end portion of the arc-shaped abutting position to facilitate the downward swing of the double-leg torsion spring. The legs of the double-leg torsion spring can abut on the corresponding first groove.

The beneficial effects of the disclosure

Beneficial effects

[0012] Compared to the prior art, the present disclosure has advantages as follows: it can adapt some fittings of the one-way door hinge; the production cost is low; the arc-shaped abutting position results in sensitive response between the first way and the second way, with balanced stress, stable rotation, good use effect and long service life.

BRIEF DESCRIPTION OF THE DRAWINGS

DESCRIPTION OF THE DRAWINGS

[0013]

Fig. 1 is an exploded view of the present disclosure;
Fig. 2 is an perspective view of the present disclosure;
Fig. 3 is an top view of the present disclosure;
Fig. 4 is a cross-sectional view taken along line A-A in fig. 3;
Fig. 5 is a cross-sectional view taken along line B-B in fig. 3;
Fig. 6 is a cross-sectional view taken along line C-C in fig. 3;
Fig. 7 is a front perspective view of the present disclosure with the housing and the rocker removed;
Fig. 8 is a rear perspective view of the present disclosure with the housing and the rocker removed;
Fig. 9 is an exploded view of the damper and the guide base of the present disclosure;
Fig. 10 is a perspective view of the crank of the present disclosure.

DETAILED DESCRIPTION OF THE EMBODIMENTS

The preferred embodiments of the disclosure

[0014] The specific embodiments of the present disclosure will be further illustrated with reference to the attached drawings. It should be illustrated that the description of these embodiments is provided to help understand the present disclosure, but does not limit the present disclosure. Furthermore, the technical features involved in the various embodiments of the present disclosure described below can be combined with each other as long as they do not conflict with each other.

[0015] In the description of the present disclosure, the terms "upper", "lower", "front", "back", "left" and "right", etc. indicate the orientation or position relationship based on the orientation or position relationship shown in the drawings, only to facilitate the description of the present disclosure rather than requiring the present disclosure to be constructed and operated in a specific orientation, so it should not be construed to limit the present disclosure.

[0016] In the description of the present disclosure, the terms "first" and "second" are used for descriptive purposes only and should not to be construed to indicate or imply a relative importance.

[0017] As shown in figs. 1 to 10, it is a two-way door hinge, comprising:

a first rotating shaft 3, a second rotating shaft 4, a crank 5, a rocker 6 and a housing 10; wherein, the first rotating shaft 3 and the second rotating shaft 4 are both mounted on a left part of the housing 10; the right end portion of the crank 5 is rotationally connected with the left part of the housing 10 through the first rotating shaft 3; protrusions 52 and arc-shaped abutting positions 51 are provided on both front and back sides of a right end of the crank 5; the arc-shaped abutting position 51 is located on the left side of the protrusion 52, and an arc center of each of the arc-shaped abutting position 51 is coaxial with the axis of the first rotating shaft 3; the right end portion of the rocker 6 is rotationally connected with the left part of the housing 10 through the second rotating shaft 4;

a hinge cup 1 and a U-shaped shaft 2; the left end portion of the rocker 6 is rotationally connected with the hinge cup 1 through a shaft of the U-shaped shaft 2, and the left end portion of the crank 5 is rotationally connected with the hinge cup 1 through the other shaft of the U-shaped shaft 2;

a double-leg torsion spring 7; the double-leg torsion spring 7 is sleeved on the second rotating shaft 4; a positioning structure for positioning the double-leg torsion spring 7 is provided on the double-leg torsion spring 7; two legs 71 of the double-leg torsion spring 7 respectively abut on the corresponding arc-shaped abutting positions 51 or abut on right ends of the arc-shaped abutting positions 51; when the two legs 71 of the double-leg torsion spring 7 abut on the arc-shaped abutting positions 51, the door hinge is in a first way, and when the two legs 71 of the double-leg torsion spring 7 abut on the right end of the arc-shaped abutting positions 51, the door hinge is in a second way; and

a damper 8 and a guide base 9; the damper 8 is mounted in the housing 10; recesses 91 are provided on both front and back sides of the guide base 9; the guide base 9 is located in the housing 10 and can relatively move; the protrusions 52 are located in the corresponding recesses 91 to drive the guide base 9 to move; and an end portion of a piston rod 84 of the damper 8 is provided on the guide base 9, so

that the damper 8 acts as a buffer role.

[0018] In operation, when the legs 71 of the double-leg torsion spring 7 abut on the arc-shaped abutting positions 51, a force of the legs 71 of the double-leg torsion spring 7 is transmitted to the axis of the rotating shaft at the right end portion of the crank 5. When the crank 5 rotates, the hinge cup 1 can freely swing without the spring force of the double-leg torsion spring 7, this is the first way of the two-way door hinge. When the legs 71 of the double-leg torsion spring 7 abut on the right end of the arc-shaped abutting positions 51, the force of the legs 71 of the double-leg torsion spring 7 is transmitted to the right side of the rotation axis of the right end portion of the crank 5, so that the legs 71 of the double-leg torsion spring 7 start to apply leftward rotation force to the crank 5, and the crank 5 starts to rotate to drive the hinge cup to rotate, this is the second way of the two-way door hinge.

[0019] In production, the hinge cup 1, the U-shaped shaft 2, the first rotating shaft 3, the second rotating shaft 4, the guide base 9 and the housing 10 can use parts of the one-way door hinge, which reduces the production cost.

[0020] In this embodiment, the upper end face of the damper 8 abuts on the top face of inner wall of the housing 10. The front and back sides of the upper part of the damper 8 abuts on the front and back sides of the inner wall of the housing 10. The arc-shaped groove 85 is provided on lower part of the damper 8. The first rotating shaft 3 is inserted into the arc-shaped groove 85, and the left end face of the damper 8 abuts on double-leg torsion springs 7, so that the damper 8 is positioned and mounted in the housing.

[0021] In this embodiment, the guide grooves 82 are provided on the front and back sides of the damper 8. The guide inserting blocks 92 are provided on the front and back sides of the guide base 9. The guide inserting blocks 92 are inserted on the corresponding guide grooves 82 to make the guide base 9 move on the damper 8.

[0022] In this embodiment, the sunken avoidance positions 83 are provided on the front and back sides of the damper 8, and the two legs 71 of the double-leg torsion spring 7 are located in the sunken avoidance positions 83.

[0023] In this embodiment, the damper 8 is an auto-eject type damper.

[0024] In this embodiment, the positioning structure on the double-leg torsion spring 7 is the top pillar 72 on the double-leg torsion spring. The damper 8 is provided with the second groove 81 which is matched with the top surface of the inner wall of the housing 10 to form the installation slot, into which the top pillar 72 is inserted to position the double-leg torsion spring 7.

[0025] In this embodiment, the first groove is provided on the right end portion of the arc-shaped abutting position 51 to facilitate the downward swing of the double-leg torsion spring 7. The legs of the double-leg torsion spring 7 can abut on the corresponding first groove 53.

[0026] When working, the legs 71 of the double-leg torsion spring 7 are in better contact with the crank 5, so that the hinge cup 1 rotates quickly.

[0027] The embodiments of the present disclosure are described in detail above with reference to the attached drawings, but the present disclosure is not limited to the described embodiments. For those skilled in the art, various changes, modifications, substitutions, and variations of these embodiments can be made without departing from the principles and spirit of the present disclosure, which still fall within the protection scope of the present disclosure.

Claims

1. A two-way door hinge, **characterized in that** the door hinge comprises:

   a first rotating shaft (3), a second rotating shaft (4), a crank (5), a rocker (6) and a housing (10); wherein, the first rotating shaft (3) and the second rotating shaft (4) are both mounted on a left part of the housing (10); the right end portion of the crank (5) is rotationally connected with the left part of the housing (10) through the first rotating shaft (3); protrusions (52) and arc-shaped abutting positions (51) are provided on both front and back sides of the right end portion of the crank (5); the arc-shaped abutting position (51) is located on a left side of the protrusion (52), and an arc center of each arc-shaped abutting position (51) is coaxial with an axis of the first rotating shaft (3); a right end portion of the rocker (6) is rotationally connected with the left part of the housing (10) through the second rotating shaft (4);

   a hinge cup (1) and a U-shaped shaft (2); wherein a left end portion of the rocker (6) is rotationally connected with the hinge cup (1) through a shaft of the U-shaped shaft (2), and a left end portion of the crank (5) is rotationally connected with the hinge cup (1) through another shaft of the U-shaped shaft (2);

   a double-leg torsion spring (7); wherein the double-leg torsion spring (7) is sleeved on the second rotating shaft (4); a positioning structure for positioning the double-leg torsion spring (7) is provided on the double-leg torsion spring (7); two legs (71) of the double-leg torsion spring (7) respectively abut on corresponding arc-shaped abutting positions (51) or abut on right ends of the arc-shaped abutting positions (51); when the two legs (71) of the double-leg torsion spring (7) abut on the arc-shaped abutting positions (51), the door hinge is in a first way, and when the

two legs (71) of the double-leg torsion spring (7) abut on the right ends of the arc-shaped abutting positions (51), the door hinge is in a second way; and

a damper (8) and a guide base (9); wherein the damper (8) is mounted in the housing (10); recesses (91) are provided on both front and back sides of the guide base (9); the guide base (9) is located in the housing (10) and is able to relatively move; the protrusions (52) are located in corresponding recesses (91) to drive the guide base (9) to move; and an end portion of a piston rod (84) of the damper (8) is provided on the guide base (9), so that the damper (8) acts as a buffer.

2. The two-way door hinge according to claim 1, **characterized in that** an upper end face of the damper (8) abuts on a top surface of an inner wall of the housing (10); front and back sides of an upper part of the damper (8) abuts on front and back sides of the inner wall of the housing (10); an arc-shaped groove (85) is provided on lower part of the damper (8); the first rotating shaft (3) is inserted into the arc-shaped groove (85), and a left end face of the damper (8) abuts on the double-leg torsion spring (7), so that the damper (8) is positioned and mounted in the housing (10).

3. The two-way door hinge according to claim 1, **characterized in that** guide grooves (82) are provided on front and back sides of the damper (8); guide inserting blocks (92) are provided on the front and back sides of the guide base (9); the guide inserting blocks (92) are inserted on corresponding guide grooves (82) to make the guide base (9) move on the damper (8).

4. The two-way door hinge according to claim 1, **characterized in that** sunken avoidance positions (83) are provided on the front and back sides of the damper (8), and the two legs (71) of the double-leg torsion spring (7) are located in the sunken avoidance positions (83).

5. The two-way door hinge according to claim 1, **characterized in that** the damper (8) is an auto-eject type damper.

6. The two-way door hinge according to claim 1, **characterized in that** the positioning structure on the double-leg torsion spring (7) is a top pillar (72) on the double-leg torsion spring; the damper (8) is provided with a second groove (81) which fits the top surface of the inner wall of the housing (10) to form an installation slot, the top pillar (72) is inserted into the installation slot to position the double-leg torsion spring (7).

7. The two-way door hinge according to claim 1, **characterized in that** a first groove (53) is provided on a right end portion of the arc-shaped abutting position (51) to facilitate a downward swing of the double-leg torsion spring (7); the legs of the double-leg torsion spring (7) abut on corresponding first groove (53).

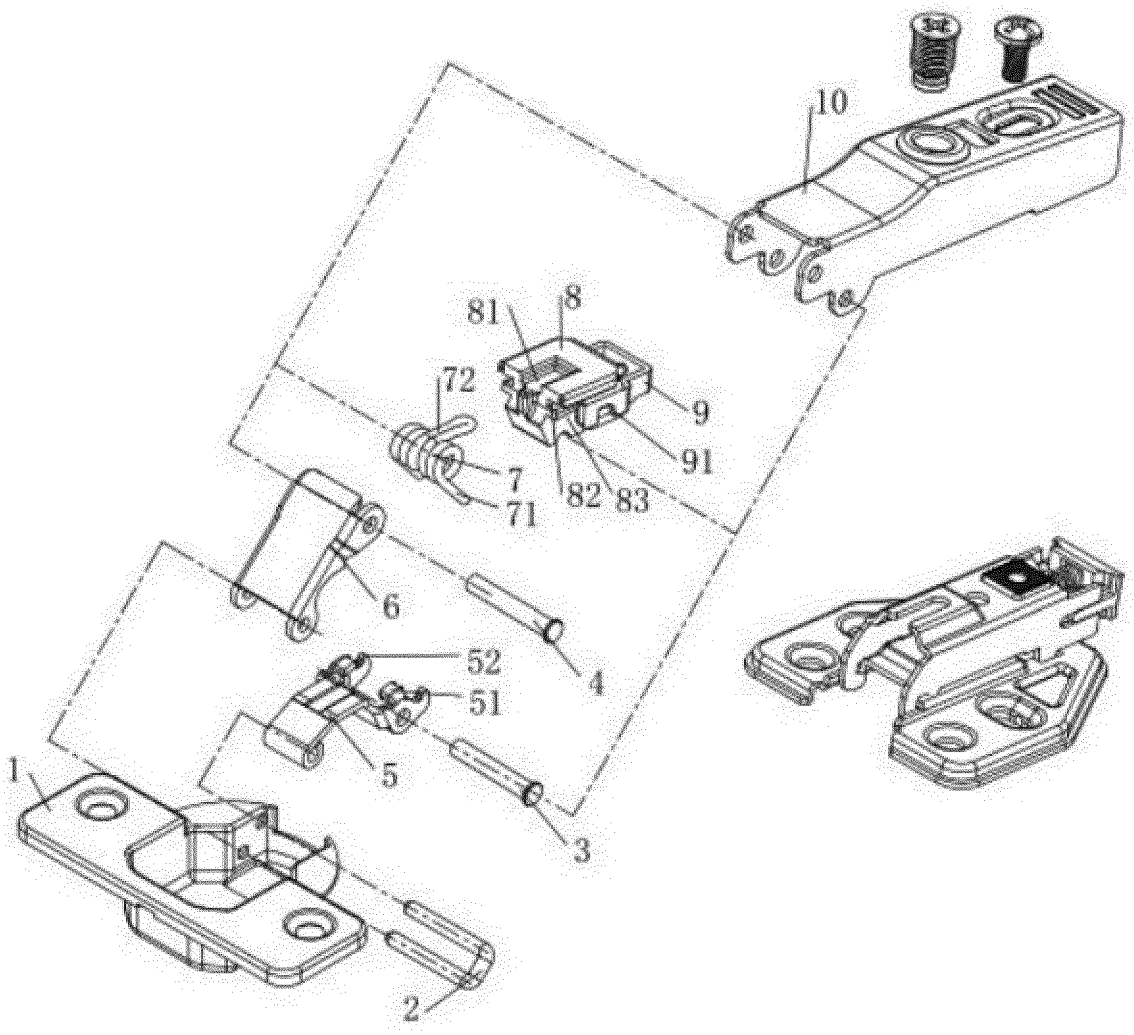

FIG.1

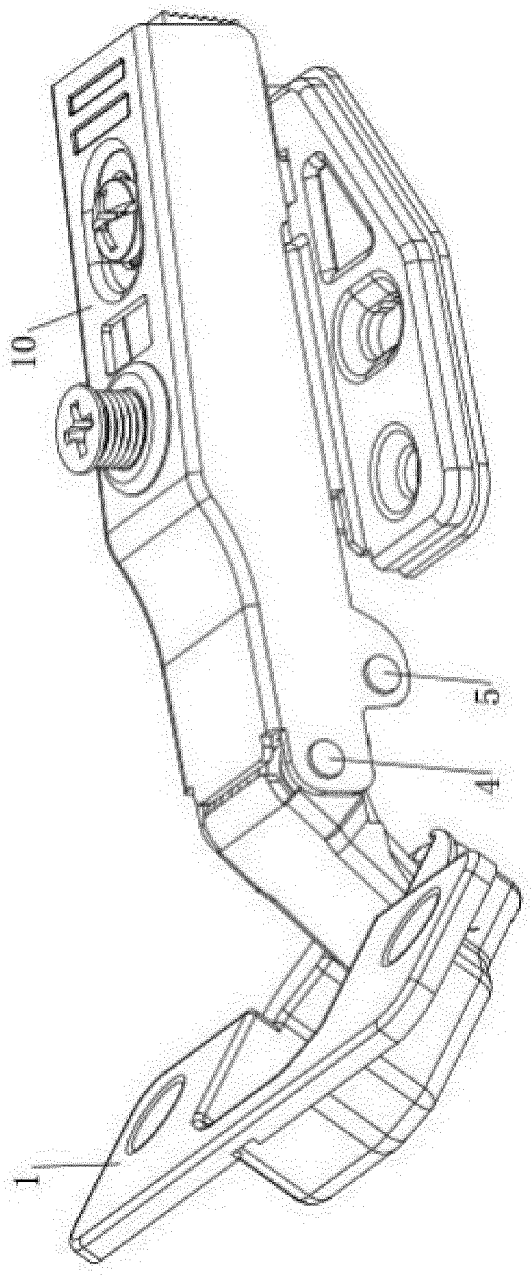

FIG.2

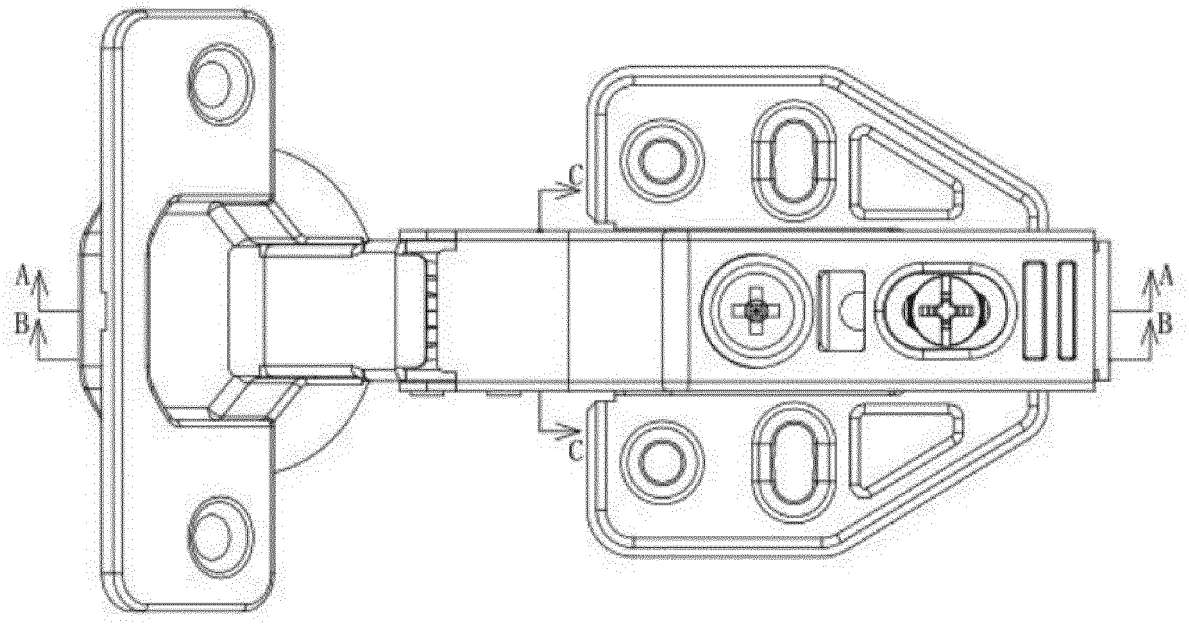

FIG.3

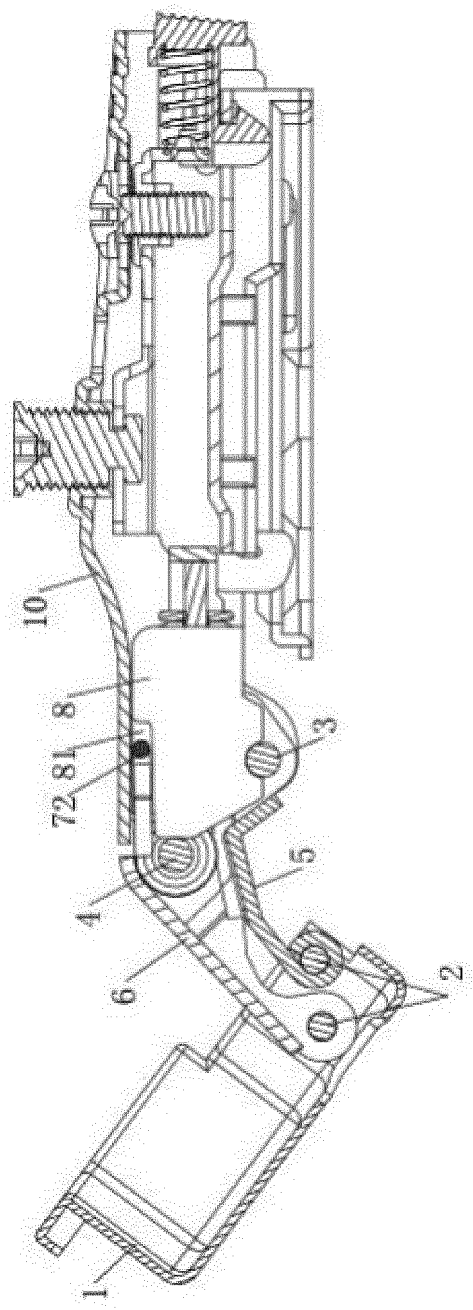

FIG.4

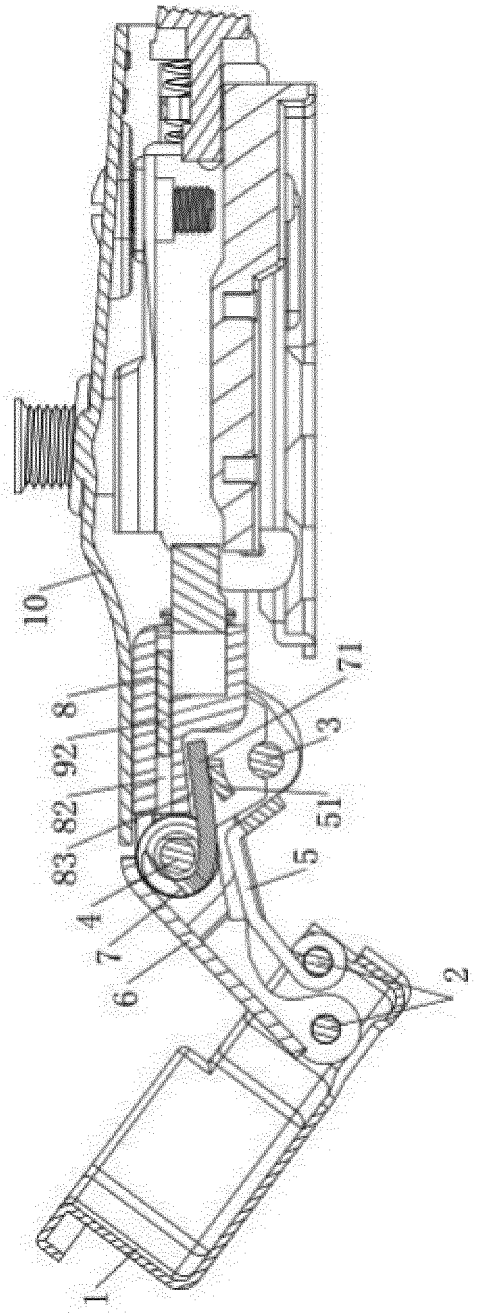

FIG.5

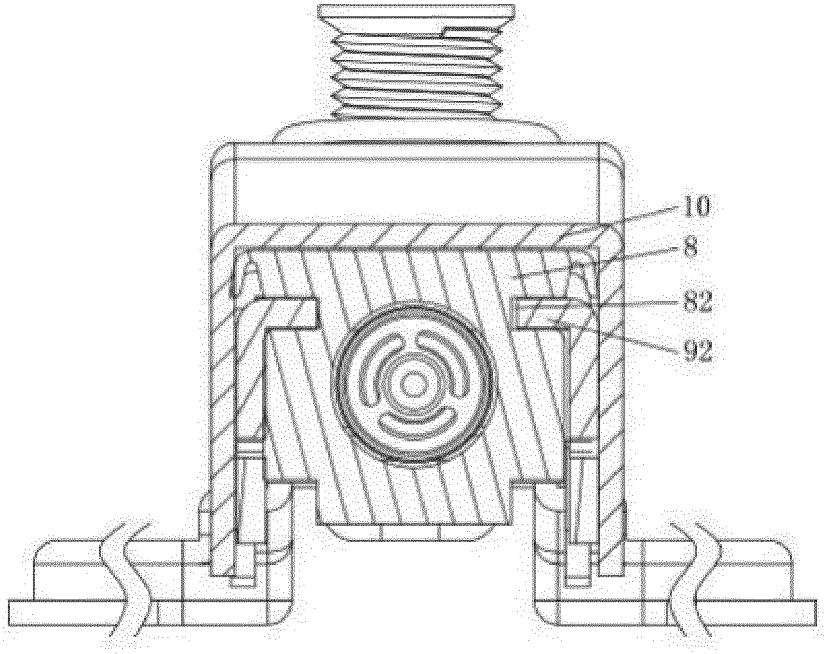

FIG.6

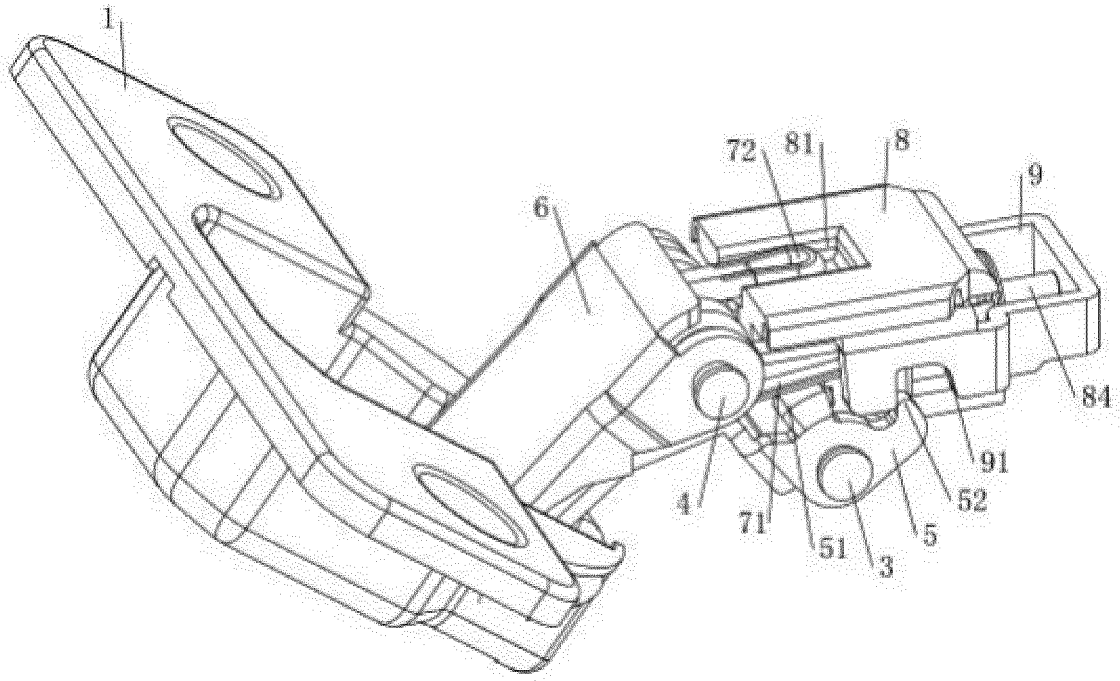

FIG.7

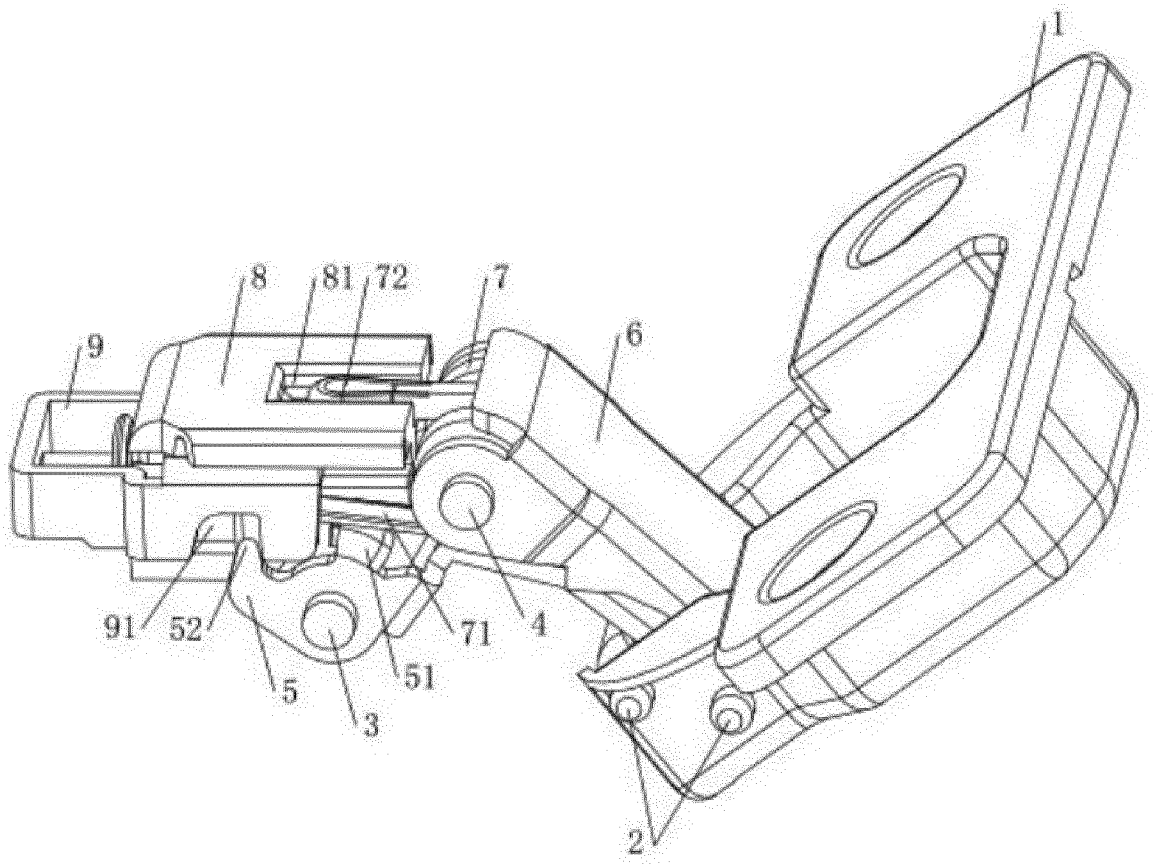

FIG.8

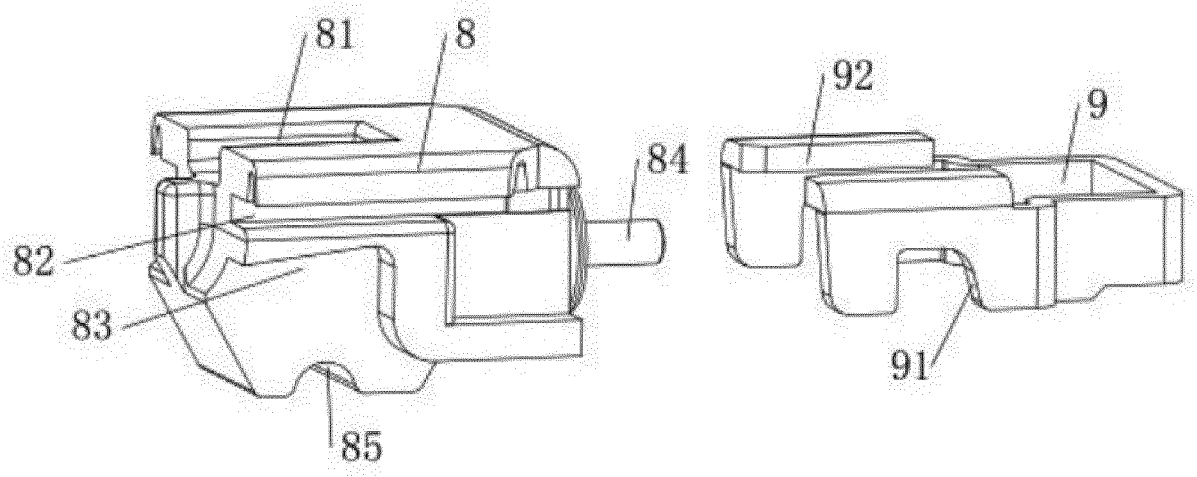

FIG.9

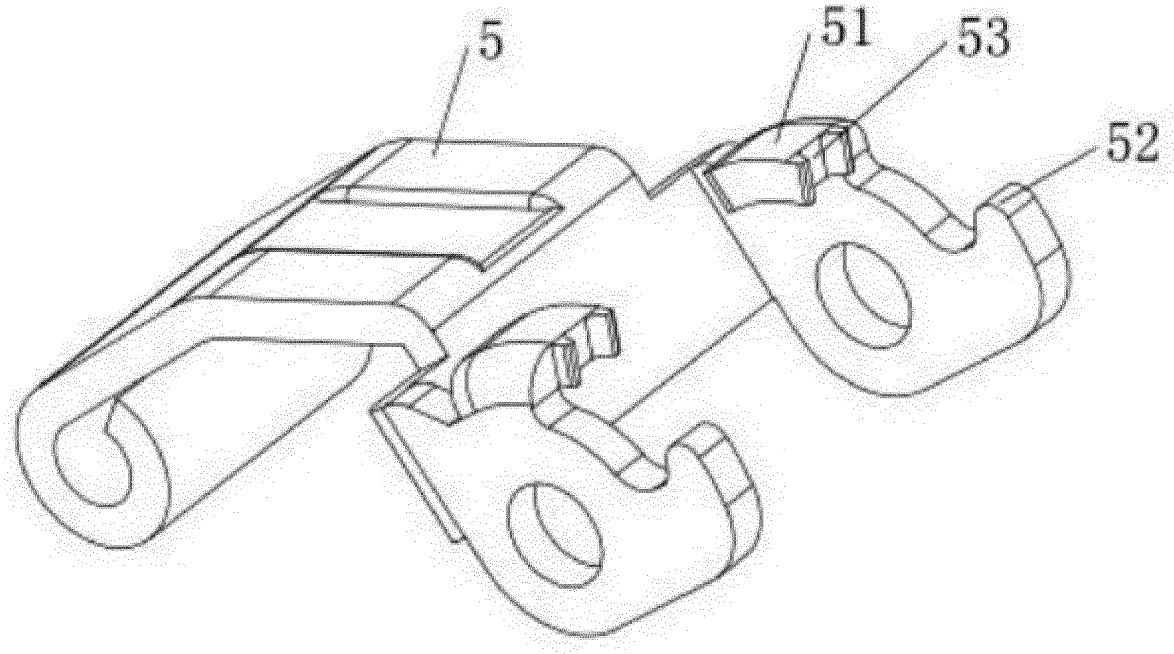

FIG.10

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2020/128558

A. CLASSIFICATION OF SUBJECT MATTER

E05D 3/06(2006.01)i; E05D 11/00(2006.01)i; E05F 5/10(2006.01)i; E05F 1/12(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)

E05D3/-;E05D11/-;E05F5/-;E05F1/-

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, DWPI, SIPOABS, CNTXT, TWTXT, 中国期刊网全文数据库; 清远市星徽精密制造有限公司, 吴秋华, 门铰链, 铰链, 二段力, 弹簧, 扭簧, 扭力弹簧, 扭转弹簧, 弧形, 曲, 轴, 阻尼; spring, torsion, hinge?, pin, shaft?, rod?, arc+, curv+, damp+

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 211173603 U (WU, Qiuhua) 04 August 2020 (2020-08-04) claims 1-7, description, paragraphs 0029-0042 and figures 1-10	1-7
A	CN 207660429 U (WU, Qiuhua) 27 July 2018 (2018-07-27) description, paragraphs 0025-0034, and figures 1-8	1-7
A	CN 207813329 U (GUANGDONG TUTTI HARDWARE CO., LTD.) 04 September 2018 (2018-09-04) entire document	1-7
A	CN 108086836 A (WU, Qiuhua) 29 May 2018 (2018-05-29) entire document	1-7
A	CN 205297110 U (LIANG, Jinquan) 08 June 2016 (2016-06-08) entire document	1-7
A	CN 204804543 U (GUANGDONG TAIMING METAL PRODUCTS CO., LTD.) 25 November 2015 (2015-11-25) entire document	1-7
A	JP 2000008694 A (OTA SEISAKUSHO K.K.) 11 January 2000 (2000-01-11) entire document	1-7

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

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"E" earlier application or patent but published on or after the international filing date
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"P" document published prior to the international filing date but later than the priority date claimed
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"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
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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
21 January 2021	**20 February 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.

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2020/128558

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 2210662 A (GRASS AG.) 14 June 1989 (1989-06-14) entire document	1-7

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2020/128558

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CN	211173603	U	04 August 2020	None			
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