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(54) Soft closing system

(57) The present invention relates to a slow closing system (1) which enables the overloads that can occur in case the household appliance door is closed fast to be absorbed and thus enables slow closing.

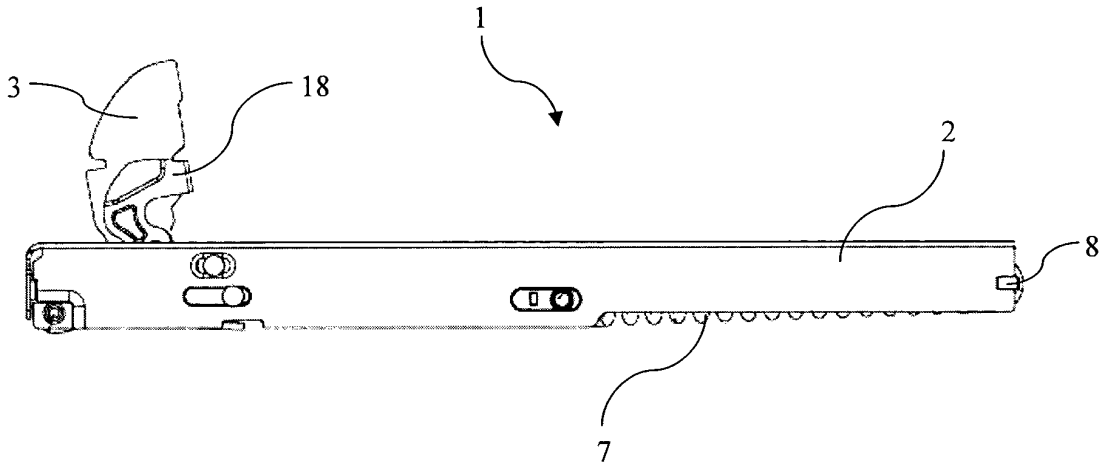

Figure 1

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Description

Field of the Invention

[0001] The present invention relates to system which enables the cover to be closed slowly in household appliances.

Background of the Invention

[0002] Today household appliances used for various purposes such as oven, dish washer, microwave oven are manufactured. Each of the said household appliances has doors in order to access their inner compartments. Movement mechanisms and hinges of the doors show great difference in various embodiments and each embodiment has its own advantages and disadvantages.

[0003] That the system has too many connectors and the said connectors cannot fulfill its function in time stand out as one of the biggest problems of the hinge systems used in the doors of the household appliances. As a result of these problems, the door cannot be closed completely, more force is required to open and close the door compared to the first state of it and noise is seen.

[0004] European Patent document no EP1847670, an application known in the state of the art, discloses a hinge produced to be used especially in electrical appliances. The force created during the door closing is absorbed right before the door is closed, so that the noise and the door hitting the electrical appliance strongly are prevented. But in the system of the European patent document no EP 1847670, the movement received from the door is transferred to the damper using a lot of connectors. For this reason there are risks that can occur from the incompatibilities between the parts in the system of the European patent document no EP 1847670.

[0005] International Patent document no WO2010091770, another application known in the state of the art, discloses an opening and closing device used in oven doors. The device comprises at least one hinge, at least one element which generates closing force, at least one kinematic means which transforms the movement of the door to a reciprocal movement, and at least one damper which applies counter force to the closing force.

[0006] In the documents above, a reversible force is not disclosed, which is generated upon the rollers located on the arm pushing the slider.

Summary of the Invention

[0007] The objective of the present invention is to provide a slow closing system which has members that protect the damper so that the overloads that may be generated when the household appliance door is closed fast do not cause any damage on the damper.

[0008] Another objective of the present invention is to provide a slow closing system which prevents the door of a household appliance from making noise when being opened and closed and slows down the fast movement during closing.

Detailed Description of the Invention

[0009] The "Slow closing system" developed to fulfill the objective of the present invention is illustrated in the accompanying figures wherein,

Figure 1 is the side view of the slow closing system.
Figure 2 is the transparent side view of the slow closing system.
Figure 3 is the semi-open state of the arm of the slow closing system.
Figure 4 is the transparent side view of the semi-open state of the arm of the slow closing system.
Figure 5 is the side view open state of the arm of the slow closing system.
Figure 6 is the transparent side view open state of the arm of the slow closing system.
Figure 7 is the perspective view of the slow closing system in which its members can be seen.
Figure 8 is the perspective view of the slider.
Figure 9 is the perspective view of the arm and the slider when the arm first touches the slider.
Figure 10 is the exploded perspective view of the slow closing system.
Figure 11 is the exploded perspective view of the arm and the slider.
Figure 12 is the perspective view of the arm touching the slider.

[0010] The components shown in the figures are each given reference numbers as follows:

1. Slow closing system
2. Main body
3. Arm
4. Protrusion
5. Connecting shaft
6. Lower piece
7. Main elastic piece
8. Suspension piece
9. Damper
10. Rivet
11. Damper pin
12. Slider
13. Connection piece
14. Roller
15. Connector
16. Connection member
17. Elastic member
18. Saddle bracket
19. Movement member

[0011] The slow closing system (1), which is mounted on to household appliances, comprises

- at least one main body (2) which is mounted to the household appliance body,
- at least one arm (3) which is mounted to the household appliance's door from one end thereof and to the main body (2) from the other end thereof,
- at least one protrusion (4) which is located on the part of the arm (3) at which it is connected to the household appliance body,
- at least one connecting shaft (5) which enables the arm (3) to be connected to the household appliance body by being passed through the hole on the arm (3) and its rotational movement at the same time,
- at least one lower piece (6) which is located on the lower part of the main body (2),
- at least one main elastic piece (7) which is connected from one end thereof to the lower piece (6) and which stabilizes the moments arising from the weight of the appliance door,
- at least one suspension piece (8) to which is connected the other end of the main elastic piece (7) that is not connected to the lower piece (6) and which is mounted to the main body (2),
- at least one damper (9) which is positioned within the lower piece (6) and enables the appliance door to be closed slowly,
- at least one rivet (10) which is located between the damper (9) and the main elastic piece (7) and enables its movement inside the groove located within the main body (2) by being attached to the main elastic piece (7),
- at least one damper pin (11) which is located as a protrusion on part of the damper (9) that is towards the arm (3),
- at least one slider (12) which applies pressure to the damper (9) by contacting the damper pin (11),
- at least one connection piece (13) which enables the connection of the lower piece (6) with the arm (3),
- at least one roller (14) which is positioned on the slider (12) within the main body (2),
- at least one connector (15) which is present next to the roller (14),
- at least one connection member (16) which enables the connection of the connector (15) to the main body (2),
- an elastic member (17) which is passed through the arms of the connector (15),
- at least one saddle bracket (18) which enables the arm (3) to be mounted to the household appliance body by being attached on the arm (3),
- at least one movement member (19) which is mounted on the arm (3) and contacts the slider (12) during closing.

[0012] The household appliance of the present invention comprises an appliance body which fulfills the main function of the household appliance and has an opening, and at least one door which is useful for closing the opening on the appliance body.

[0013] The body of the appliance is the part of the household appliance which fulfills the function thereof. There is an opening on the body of the appliance enabling access inside the household appliance. The door enables the opening on the body of the appliance to be closed and opened.

[0014] In addition to absorption systems with damper known in the state of the art, in the slow closing system (1) which is developed for damper (9) to receive the force more homogenously and in a long time, the force which is applied right before the door is closed in order to prevent the door from hitting the device body strongly and thus from the impact during closing the door enables slow closing by means of the movement members (19) attached to the arm (3) forcing the slider (12) to move forward after the arm (3) contacts and pushes the roller (14) due to its shape.

[0015] The main body (2) supports the components constituting the said slow closing system (1) and is fixed to the household appliances such as oven and dish washer.

[0016] First the end of the arm (3) contacts the roller (14) located on the main body (2) while the arm (3) is rotating in the connection shaft (5) axis. As the rotational movement of the arm (3) continues, the roller (14) moves backwards inside the main body (2) on which the connection member (16) is present enables the elastic members (17) to be wound.

[0017] However, the roller (14) starts to apply force in opposite direction in the same axis of the winding power of the elastic members (17) to be able to be released due to the surface angle of the arm (3) after rotation exceeds a certain angle. This situation supports the rotation of the arm (3) and provides acceleration.

[0018] At that exact moment the movement members (19) which are attached on both sides of the arm (3) contact the slider (12) present within the lower piece (6). The slider (12) transfers the load occurring from the downwards movement of the arm (3) to the damper (9) along the opening on the surface of the main body (2).

[0019] The damper (9) which is fixed inside the lower piece (6) directly meets and absorbs the load coming from the slider (12).

[0020] In the alternative embodiments of the invention, the angles (bracing angles) of the surfaces of the slider (12) contacting the movement members (19) on the arm (3) are changed and thus different closing speeds can be acquired. When the surface of the movement member (19) contacting the slider (12) is changed, the speed-time curve of the movement also changes. The load curve for transferring the load occurring from the arm (3) rotating to the damper (9) can be adjusted by changing the bracing angles of the slider (12).

[0021] In the preferred embodiment of the invention the household appliance in which the slow closing system (1) is used is an oven.

[0022] In another embodiment of the invention, the slow closing system (1) is used in a dish washer.

[0023] In another embodiment of the invention, the slow closing system (1) is used in a microwave oven.

Claims

1. A slow closing system (1), which enables the household appliance door to be closed slowly, essentially comprising

- at least one main body (2) which is mounted to the household appliance body,
- at least one arm (3) which is mounted to the household appliance's door from one end thereof and to the main body (2) from the other end thereof,
- at least one protrusion (4) which is located on the part of the arm (3) at which it is connected to the household appliance body,
- at least one connecting shaft (5) which enables the arm (3) to be connected to the household appliance body by being passed through the hole on the arm (3) and its rotational movement at the same time,
- at least one lower piece (6) which is located on the lower part of the main body (2),
- at least one main elastic piece (7) which is connected from one end thereof to the lower piece (6) and which stabilizes the moments arising from the weight of the appliance door,
- at least one suspension piece (8) to which is connected the other end of the main elastic piece (7) that is not connected to the lower piece (6) and which is mounted to the main body (2),
- at least one damper (9) which is positioned within the lower piece (6) and enables the appliance door to be closed slowly,
- at least one rivet (10) which is located between the damper (9) and the main elastic piece (7) and enables its movement inside the groove located within the main body (2) by being attached to the main elastic piece (7),
- at least one damper pin (11) which is located as a protrusion on part of the damper (9) that is towards the arm (3), and **characterized by**
- at least one slider (12) which applies pressure to the damper (9) by contacting the damper pin (11),
- at least one connection piece (13) which enables the connection of the lower piece (6) with the arm (3),
- at least one roller (14) which is positioned on the slider (12) within the main body (2),
- at least one connector (15) which is present next to the roller (14),
- at least one connection member (16) which enables the connection of the connector (15) to the main body (2),
- an elastic member (17) which is passed through the arms of the connector (15),
- at least one saddle bracket (18) which enables the arm (3) to be mounted to the household appliance body by being attached on the arm (3),
- at least one movement member (19) which is mounted on the arm (3) and contacts the slider (12) during closing.

2. A slow closing system (1) according to claim 1, **characterized by** damper (9) which absorbs the force applied for preventing the door from hitting the device body strongly and thus from the impact during closing the door.

3. A slow closing system (1) according to claim 1 and 2, **characterized by** arm (3) which provides slow closing by means of the movement members (19) attached thereon forcing the slider (12) to move forward after the arm (3) contacts and pushes the roller (14) due to its shape.

4. A slow closing system (1) according to claim 3, **characterized by** arm (3) first the end of which contacts the roller (14) present on the main body (2) while rotating in the connection shaft (5) axis.

5. A slow closing system (1) according to claim 1, **characterized by** roller (14) which enables the elastic members (17) to be wound by moving backwards inside the main body (2) on which the connection member (16) is present, as the rotational movement of the arm (3) continues.

6. A slow closing system (1) according to claim 5, **characterized by** roller (14) which starts to apply force on opposite direction in the same axis with the winding force of the elastic members (17) to be able to be released due to surface angle of the arm (3) after the rotational angle of the arm (3) exceeds a certain angle, and which provides acceleration by supporting te rotation of the arm (3).

7. A slow closing system (1) according to claim 4, **characterized by** movement members (19) which contact the slider (12) present within the lower piece when the rotational movement of the arm (3) speeds up, and which are attached on both sides of the arm (3).

8. A slow closing system (1) according to claim 1, **characterized by** slider (12) which transfers the load occurring from the downwards movement of the arm (3) to the damper (9) along the opening on the surface of the main body (2).

9. A slow closing system (1) according to claim 8, **characterized by** slider (12) which enables to acquire

different closing speeds in the alternative embodiment of the invention, by changing the transfer speed of the load to damper (9) by changing the bracing angles of the surfaces contacting the movement member (19) on the arm (3).

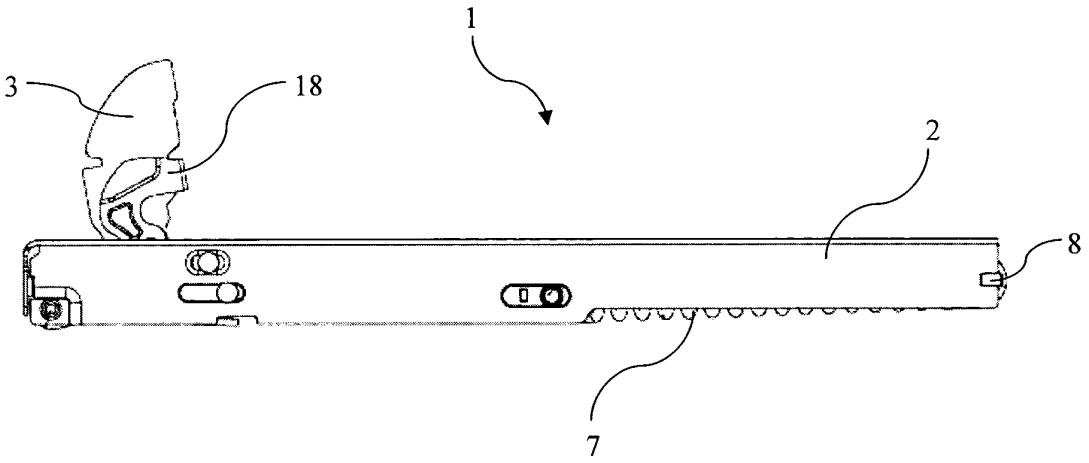

Figure 1

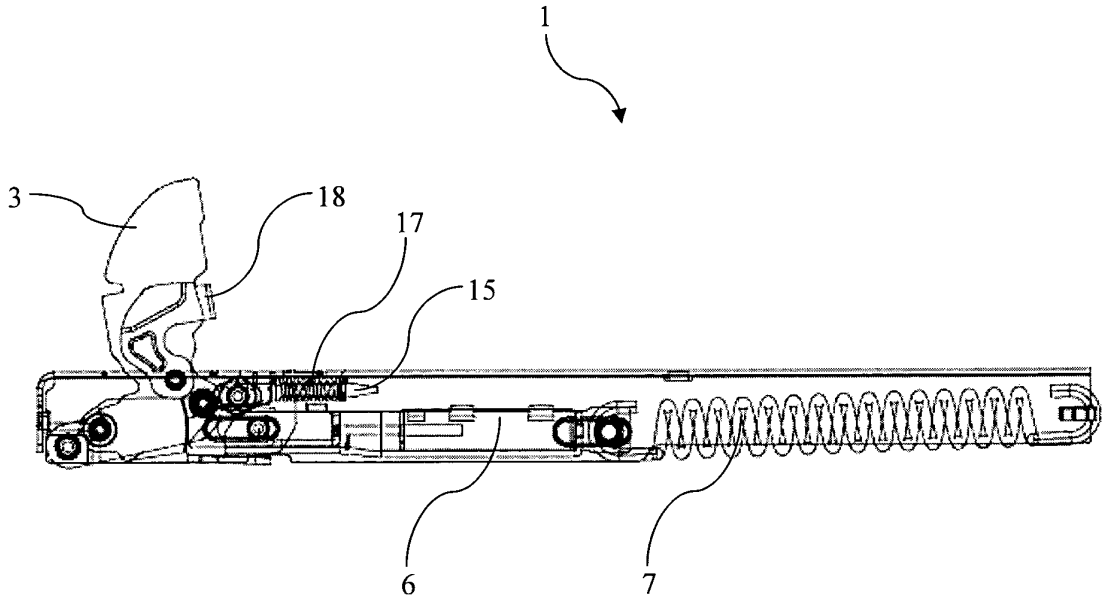

Figure 2

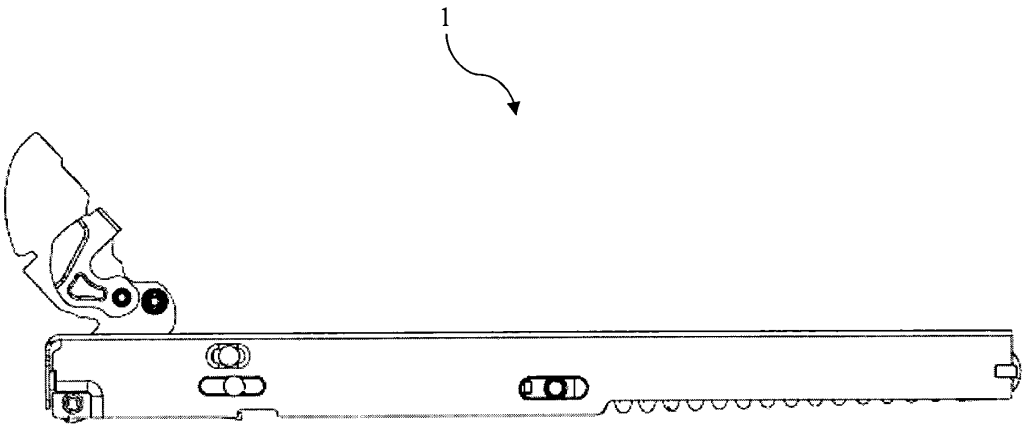

Figure 3

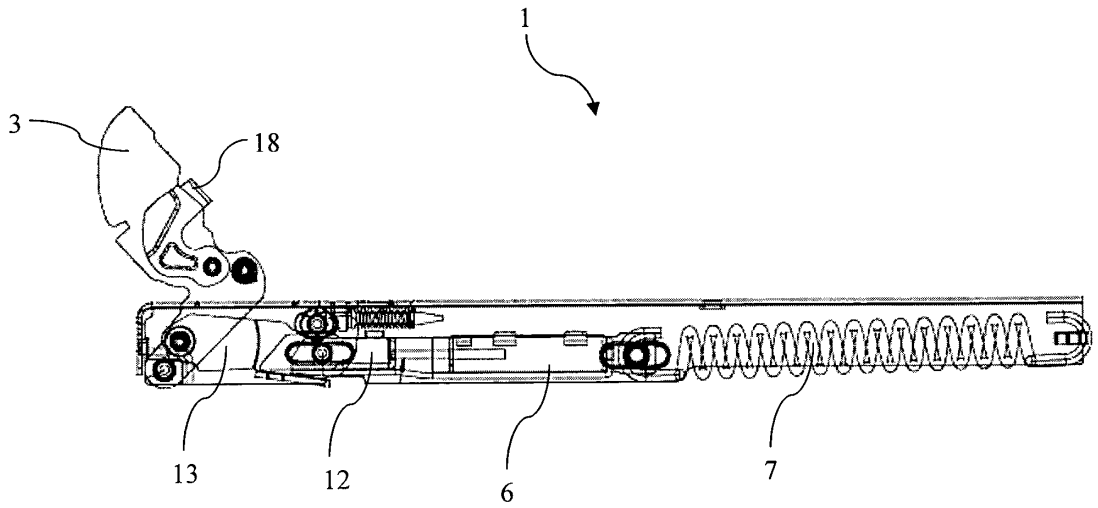

Figure 4

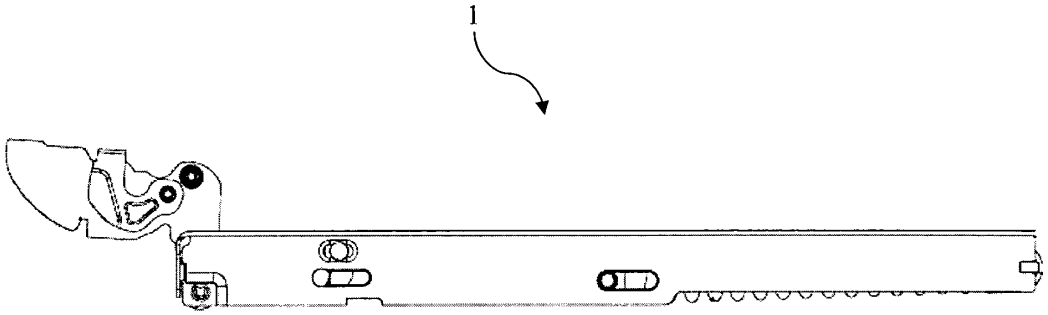

Figure 5

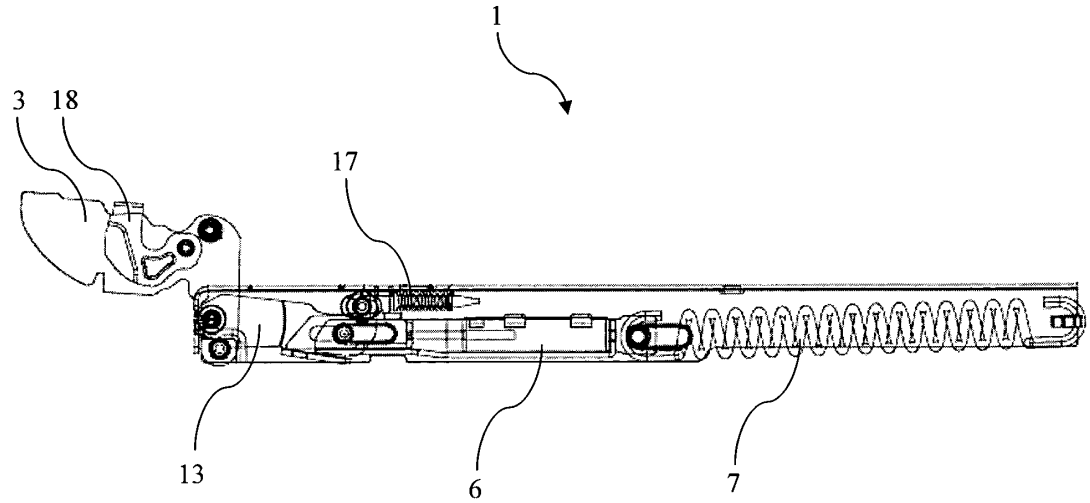

Figure 6

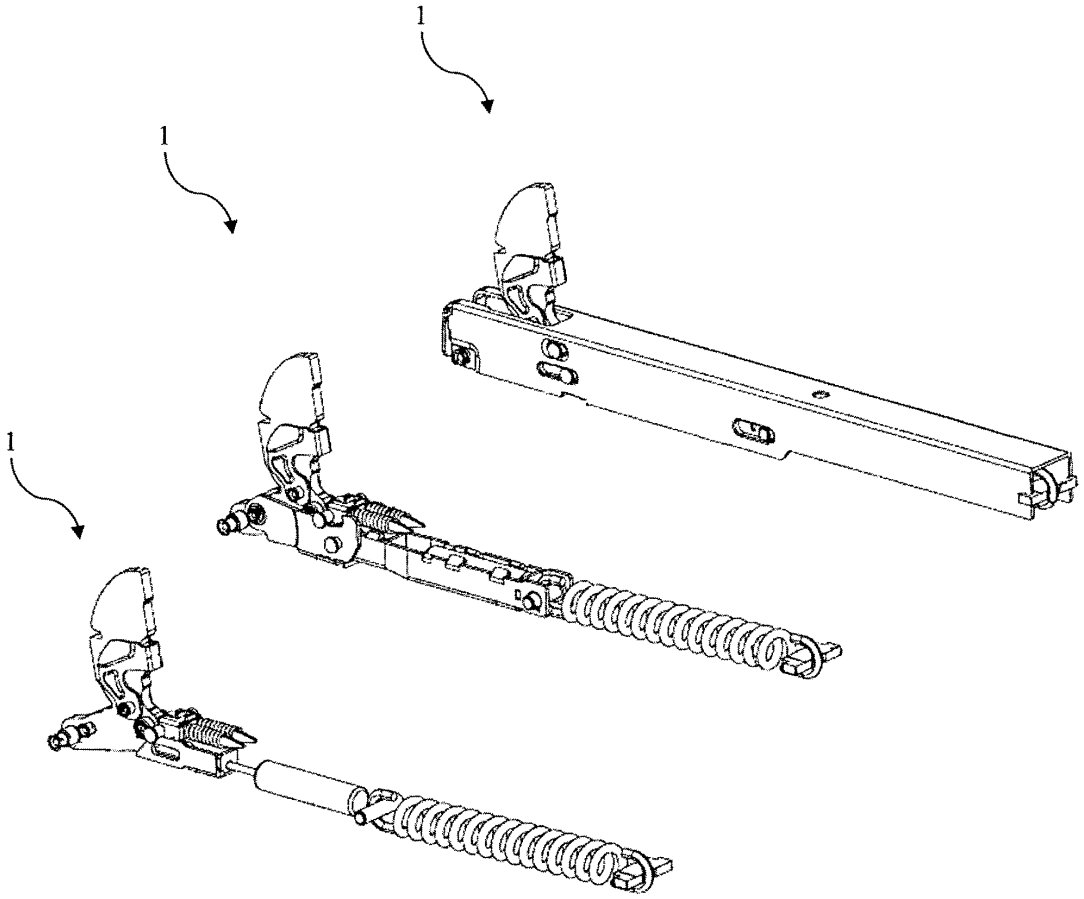

Figure 7

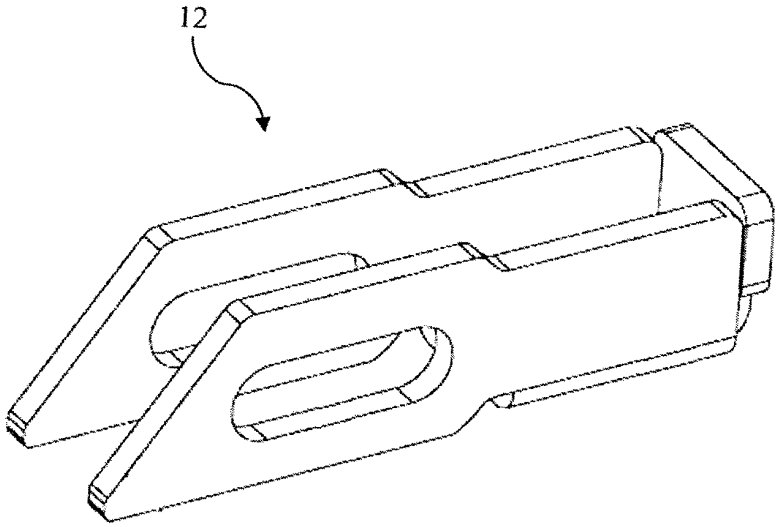

Figure 8

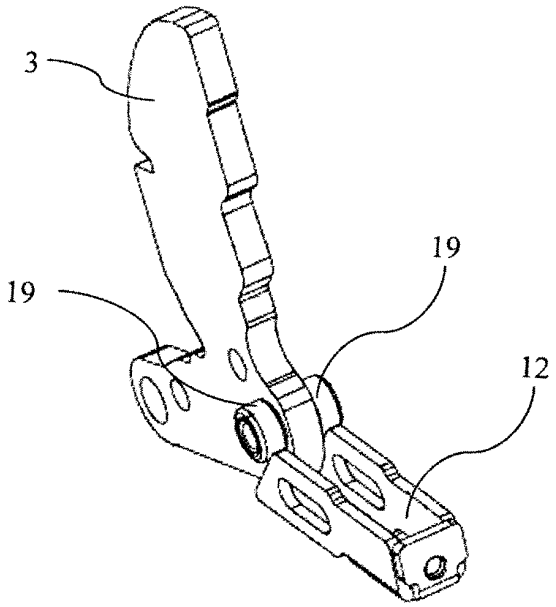

Figure 9

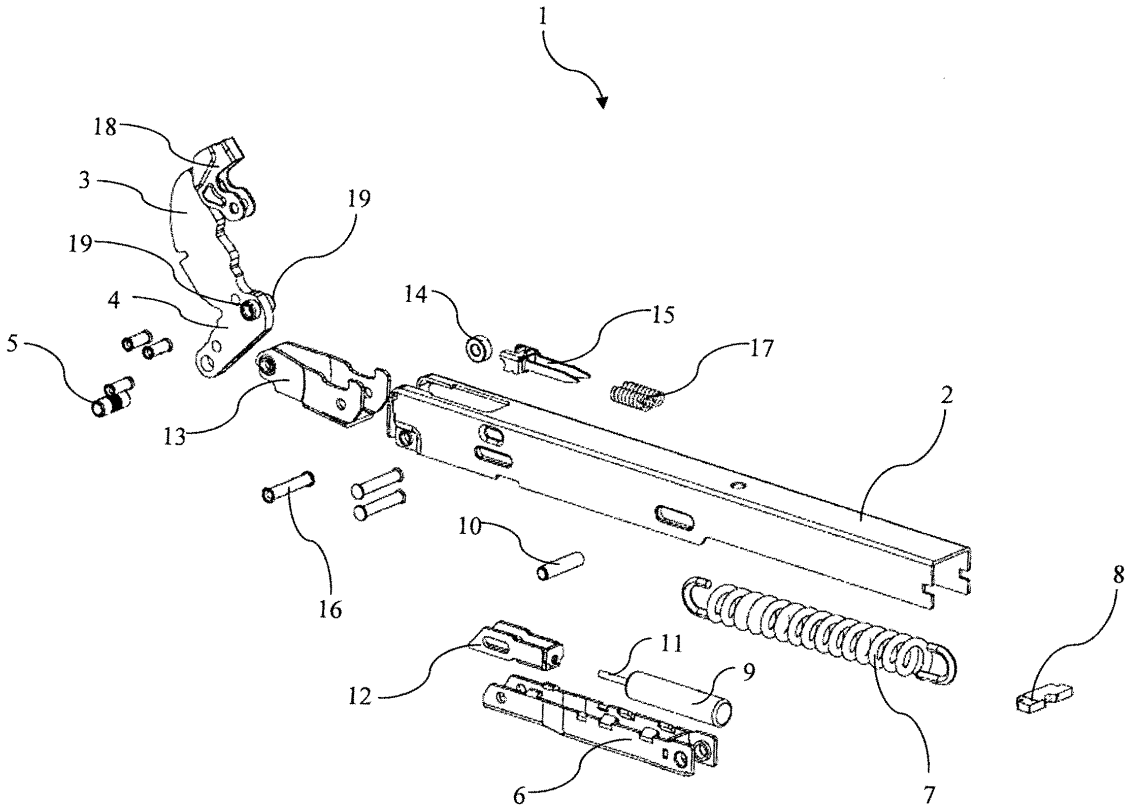

Figure 10

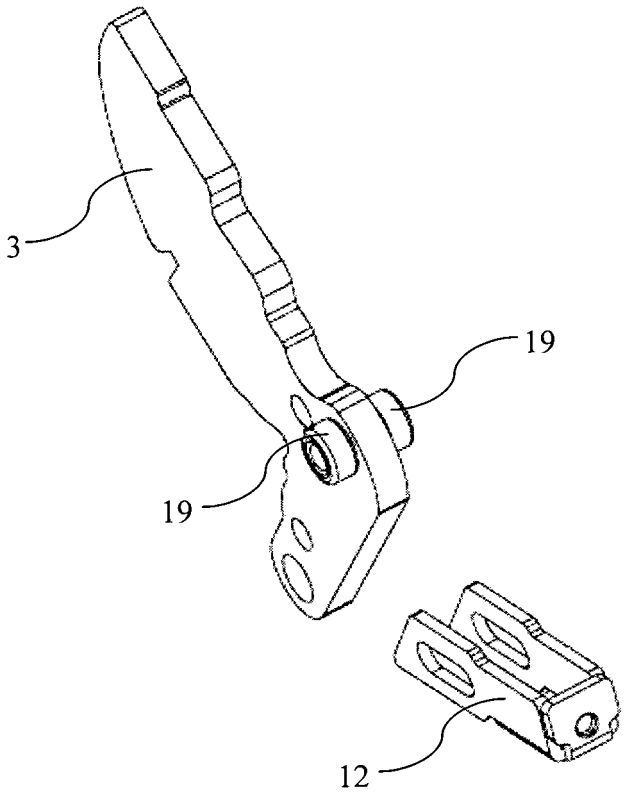

Figure 11

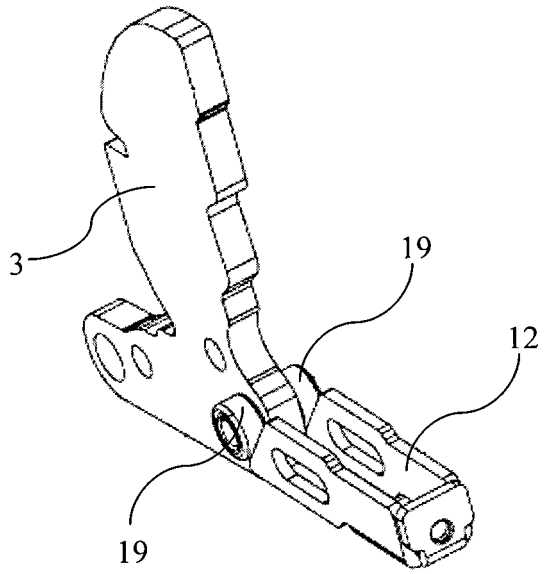

Figure 12

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EUROPEAN SEARCH REPORT

Application Number
EP 14 15 2590

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	EP 2 527 577 A2 (ATASAN METAL SANAYI TICARET LTD SIRKETI [TR]) 28 November 2012 (2012-11-28)	1-8	INV. E05F1/12 E05F5/02
A	* paragraph [0024]; figures *	9	
A,D	EP 1 847 670 A2 (NUOVA STAR SPA [IT]) 24 October 2007 (2007-10-24) * abstract; figures *	3,7	

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 February 2015	Witasse-Moreau, C

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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27-02-2015

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2527577 A2	28-11-2012	EP 2527577 A2	28-11-2012
		TR 201104989 A2	21-12-2012
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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- WO 2010091770 A **[0005]**