(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
25 November 2010 (25.11.2010)

PCT

(10) International Publication Number
WO 2010/133478 A2

(51) International Patent Classification: Not classified

(21) International Application Number:
PCT/EP2010/056446

(22) International Filing Date:
11 May 2010 (11.05.2010)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
A 2009/03978 22 May 2009 (22.05.2009) TR

(71) Applicant *(for all designated States except US)*: **ARCELIK ANONIM SIRKETI** [TR/TR]; E5 Ankara Asfalti Uzeri, Tuzla, 34950 Istanbul (TR).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **FESLIGIL, Ahmet, Onder** [TR/TR]; E5 Ankara Asfalti Uzeri, Tuzla, 34950 Istanbul (TR). **HACIOGLU, Mehmet, Cemal** [TR/TR]; E5 Ankara Asfalti Uzeri, Tuzla, 34950 Istanbul (TR). **KAHRAMAN, Soner** [TR/TR]; E5 Ankara Asfalti Uzeri, Tuzla, 34950 Istanbul (TR). **MOZA, Ahmet, Onur** [TR/TR]; E5 Ankara Asfalti Uzeri, Tuzla, 34950 Istanbul (TR).

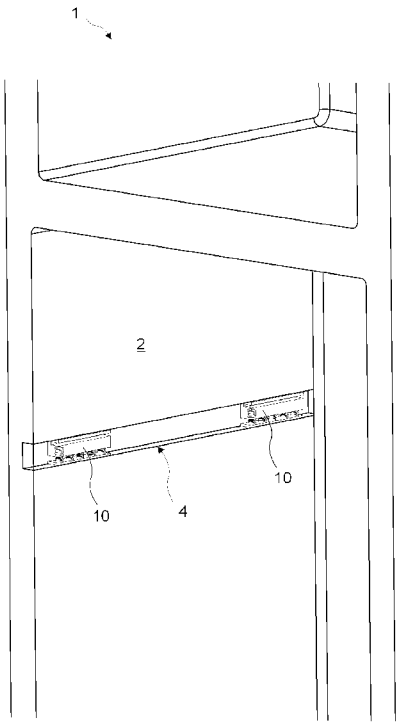
(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU,

[Continued on next page]

(54) Title: A REFRIGERATOR COMPRISING A SHELF

Figure 1



(57) Abstract: The present invention relates to a refrigerator (1) comprising a body, more than one side wall (2), one or more shelves (3) used for emplacing items thereon and more than one shelf support (4) that extend inside the body in the horizontal direction from the front backwards on the inner side of the side walls (2) for supporting the shelves (3) and a load control device (10) which provides that the user is warned when the shelves (3) disposed on the shelf supports (4) are loaded excessively.

WO 2010/133478 A2

LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *without international search report and to be republished upon receipt of that report (Rule 48.2(g))*

Description

A REFRIGERATOR COMPRISING A SHELF

[0001] The present invention relates to a refrigerator comprising shelves whereon items are placed and wherein excessive loading of the shelves is prevented.

[0002] In refrigerators, shelves are utilized inside the body or the door for the items to be easily emplaced and stored by the user. The weight of the load placed on the shelves should not exceed a certain value by taking into consideration the strength of the shelf. When the shelf is excessively loaded by the user, the shelf stretches and could result in accidents. Moreover, the shelf can be permanently deformed when the amount of stretching in the shelf exceeds a certain limit.

[0003] In the state of the art, weight sensors such as a strain gauge are utilized to determine the load on the shelves, however by means of data gathered by weight sensors, only detection of whether or not there is load on the shelf and the change in the amount and positions of loads on the shelf can be made but not whether or not the shelf is strained under excessive load.

[0004] In the refrigerator explained in the Japanese Patent Applications No. JP2002303479 and No. JP2007010208, the positions of the foodstuff placed on the shelf are determined by means of weight sensors disposed between the shelf and the shelf support.

[0005] In the United States of America Patent No. US4891755, a weight detection system utilized in mini bars is explained. Strain gauges are disposed under the stand at the lower side of the mini bar body for detecting the weight of the items placed thereon or removed from there.

[0006] In the refrigerator explained in the Japanese Patent Application No JP2008151357, a load sensor which detects the existence or nonexistence of foodstuff on the shelves in the storage compartment is utilized. When foodstuff is detected to be on the shelf, the region of the shelf is illuminated.

[0007] In the refrigerator explained in the Japanese Patent Application No. JP2006329597, it is detected by means of the weight sensor whether there is a change in the weight of the food on the shelf and when the

packages of the food are determined to be opened, the expiry dates stored in the memory are updated.

[0008] The aim of the present invention is the realization of a refrigerator wherein the user is provided to be warned in the case the shelves are loaded excessively.

[0009] The refrigerator realized in order to attain the aim of the present invention is explicated in the claims.

[0010] The refrigerator of the present invention comprises a load control device mounted to the shelf channels or the shelf supports that extend one over the other and parallel to each other on the body side walls for holding the shelves that detects excessively loaded shelf and warns the user by illuminating the shelf or by a sound.

[0011] The load control device comprises a lower tray disposed on the shelf support at the side wall, helical compression springs disposed on the lower tray and a shelf holder emplaced on the springs and whereto the shelf is mounted. A channel is situated on the shelf holder whereto the side edge of the shelf is mounted and a light source that illuminates the shelf when the weight of the items placed on the shelf exceeds a predetermined limit amount of load.

[0012] In an embodiment of the present invention, the load control device comprises a push button situated on the lower tray and which changes the light source to the active mode when actuated by the shelf holder that moves downward with the effect of the load. The push button controls the light source with a cable that passes through the lower tray and the opening in the middle of the helical springs reaching the light source.

[0013] In another embodiment of the present invention, the load control device comprises a plug disposed on the lower tray for delivering electric energy to the light source and a socket under the shelf holder which is fitted into the plug when the shelf holder moves downward.

[0014] In yet another embodiment of the present invention, the light source in the load control device is energized by a battery and the battery is placed inside a battery casing situated in the load control device.

[0015] In an embodiment of the present invention, the shelf is produced from a

transparent material, for example glass and the glass shelf is illuminated from the edges by the light source disposed inside the shelf holder channel in the load control device.

[0016] In another embodiment of the present invention, light piping particles which have light reflecting properties when light acts thereon are added to the transparent material from which the shelf is produced. Thus, when the shelf is illuminated by the light source, the light entirely spreads into the shelf body.

[0017] In another embodiment of the present invention, the load control device comprises a light source such as LED which is situated on the front face of the shelf facing the user and which is turned on when the shelf is excessively loaded.

[0018] The load control device single handedly performs the functions of both detecting the load and also warning the user when the shelf is loaded excessively thereby avoiding the accidents that could occur while loading the shelf. Since all the elements that the load control device comprises are integrated to one another, it can be mounted easily to the refrigerator and dismounted from there.

[0019] The refrigerator realized in order to attain the aim of the present invention is illustrated in the attached claims, where:

[0020] Figure 1 - is the schematic view of a refrigerator comprising load control devices disposed in the shelf support on the side wall.

[0021] Figure 2 - is the schematic view of a load control device on the shelf support.

[0022] Figure 3 - is the perspective view of a load control device comprising a push button.

[0023] Figure 4 - is the perspective view of a load control device comprising a plug and a socket.

[0024] Figure 5 - is the perspective view of a load control device comprising a battery casing..

[0025] Figure 6 - is the perspective view of a load control device comprising a LED.

[0026] The elements illustrated in the figures are numbered as follows:

1. Refrigerator
2. Side wall
3. Shelf
4. Shelf support
5. Lower tray
6. Spring
7. Channel
8. Light source
9. Shelf holder
10. Load control device
11. Push button
12. Plug
13. Socket
14. Battery casing

[0027] The refrigerator (1) comprises a body, more than one side wall (2), one or more shelves (3) utilized for emplacing items thereon and more than one shelf support (4) that extend inside the body in the horizontal direction from the front backwards opposite to each other on the inner side of the side walls (2) for supporting the shelves (3).

[0028] The refrigerator (1) of the present invention comprises a load control device (10) that is disposed between the shelf (3) and the shelf support (4) by being mounted on the edge of the shelf (3) on the side of the side wall (2), and which provides that the user is warned when the weight of the items emplaced on the shelf (3) or the load applied on the shelf (3) by the user exceeds a predetermined limit load value that the shelf (3) can carry without straining.

[0029] The load control device (10) warns the user by light or sound when the shelf (3) is loaded by the user in a way to strain the strength of the shelf (3) or if the user applies force on the shelf (3) while loading items thereon thereby preventing the deformation of the shelf (3) and avoiding accidents.

[0030] In the preferred embodiment of the present invention, the load control device (10) has

[0031] - a lower tray (5) disposed on the shelf support (4),

[0032] - one or more helical compression springs (6) disposed on the lower tray (5),

[0033] - a channel (7) disposed above the springs (6) whereto the side edge of the shelf (3) is mounted,

[0034] - a light source (8) that illuminates the shelf (3) if the weight of the items placed on the shelf (3) exceeds a predetermined limit load amount and

[0035] - a shelf holder (9) that moves toward the lower tray (5) together with the shelf (3) with the effect of the weight applied on the shelf (3) by compressing the springs (6) and changes the light source (8) to the active mode if the downward motion exceeds a predetermined limit distance (Wmax).

[0036] The springs (6) utilized in the load control device (10) are in free length in the unloaded state of the shelf (3). When the shelf (3) is loaded, the shelf holder (9) disposed on the springs (6) and fastened to the shelf (3) by the channel (7) compresses the springs (6) by moving downward. As long as the amount of the load loaded on the shelf (3) remains within determined limits, the downward motion distance of the shelf holder (9) is less than the maximum movement distance (Wmax) and in this case the light source (8) is kept in the passive mode thereby not illuminating the shelf (3).

[0037] If the amount of load placed on the shelf (3) exceeds the predetermined limit, the downward movement distance of the shelf holder (9) exceeds the maximum distance (Wmax), the shelf holder (9) compresses the springs (6) beneath approximately to their solid length and in this case the light source (8) is changed to the active mode thereby illuminating the shelf (3).

[0038] In an embodiment of the present invention, the load control device (10) comprises a push-button (11) situated on the lower tray (5) that is pressed on by the shelf holder (9) to activate the light source (8), which moves downward by exceeding the predetermined distance (Wmax) (Figures 2, 3). The push button (11) controls the light source (8) with a cable (K) that passes through the lower tray (5) and the opening in the middle of the helical springs (6) reaching the light source (8). When the shelf holder (9) moves downward with the effect of excessive load on the shelf (3) and presses on the push button (11), the light source (8) illuminates the shelf

(3) and when the shelf holder (9) moves upward by the excessive load on the shelf (3) being removed, the contact of the shelf holder (9) with the push button (11) is interrupted and the light source (8) does not illuminate the shelf (3).

[0039] In another embodiment of the present invention, the load control device (10) comprises a plug (12) disposed on the lower tray (5) for delivering electric energy to the light source (8) and a socket (13) situated under the shelf holder (9) which is fitted into the plug (12) when the shelf holder (9) moves downward by exceeding the predetermined distance (Wmax) (Figure 4).

[0040] In another embodiment of the present invention, the load control device (10) comprises a battery for energizing the light source (8) and a battery casing (14) disposed inside the body of the lower tray (5) or the shelf holder (9) (Figure 5).

[0041] In an embodiment of the present invention, the shelf (3) is produced from a transparent material and the load control device (10) comprises a light source (8) disposed inside the channel (7) in the shelf holder (9) which illuminates the shelf (3) by delivering light to the side edge thereof (Figure 2).

[0042] In another embodiment of the present invention, light piping particles (P), having light reflecting properties when light acts thereon, are added to the transparent material from which the shelf (3) is produced (Figure 2). In this embodiment, when the shelf (3) is illuminated by the light source (8) inside the channel (7) whereto it is mounted, the light spreads to the entire shelf (3) body.

[0043] In yet another embodiment of the present invention, the load control device (10) comprises a light source (8) such as LED, which is disposed on the front face of the shelf holder (9) facing the user, which is turned on when the shelf (3) is loaded excessively and turned off when the load is removed (Figure 6).

[0044] The load control device (10) performs the functions of both detecting the load and also warning the user when the shelf (3) is loaded excessively thereby avoiding accidents that could occur while loading the shelf (3). The

elements such as the spring (6), the shelf holder (9) providing the excessive load on the shelf (3) to be detected and the light source (8) enabling the user to be warned are integrated to one another, thus the load control device (10) can be easily mounted to the refrigerator (1), dismounted from there in a single piece.

[0045] In another embodiment of the present invention, the refrigerator (1) comprises an audio alarm device (not shown in the figures) which provides that the user is warned when the weight of the items placed on the shelf (3) or the load applied on the shelf (3) by the user exceeds a predetermined limit load amount that the shelf (3) can carry without straining.

[0046] It is to be understood that the present invention is not limited by the embodiments disclosed above and a person skilled in the art can easily introduce different embodiments. These should be considered within the scope of the protection postulated by the claims of the present invention.

Claims

1. A refrigerator (1) comprising a body, more than one side wall (2), one or more shelves (3) used for emplacing items thereon and more than one shelf support (4) that extend inside the body in the horizontal direction opposite to each other from the front backwards on the inner side of the side walls (2) for supporting the shelves (3), **characterized by** a load control device (10) that is disposed between the shelf (3) and the shelf support (4) by being mounted on the side edge of the shelf (3), which provides that the user is warned when the weight of the items emplaced on the shelf (3) or the load applied on the shelf (3) by the user exceeds a predetermined limit load amount that the shelf (3) can carry without straining.
2. A refrigerator (1) as in Claim 1, **characterized by** the load control device (10) which has - a lower tray (5) disposed on the shelf support (4), - one or more helical compression springs (6) disposed on the lower tray (5), - a channel (7) disposed above the springs (6) whereto the side edge of the shelf (3) is mounted, - a light source (8) that illuminates the shelf (3) if the weight of the items placed on the shelf (3) exceeds a predetermined limit amount of load and - a shelf holder (9) that moves toward the lower tray (5) together with the shelf (3) with the effect of the weight applied on the shelf (3) by compressing the springs (6) and if the downward motion exceeds a predetermined limit distance (Wmax) provides to change the light source (8) to the active mode.
3. A refrigerator (1) as in Claim 2, **characterized by** the load control device (10) comprising a push button (11) situated on the lower tray (5) which is pressed on to change the light source (8) to the active mode by the shelf holder (9) that moves downward by exceeding the predetermined distance (Wmax).
4. A refrigerator (1) as in Claim 3, **characterized by** the load control device (10) comprising the push button (11) that controls the light source (8) with a cable (K) that reaches the light source (8) by passing through the lower tray (5) and the opening in the middle of the helical springs (6).
5. A refrigerator (1) as in Claim 2, **characterized by** the load control device (10) comprising a plug (12) disposed on the lower tray (5) for delivering electric energy to the light source (8) and a socket (13) situated under the shelf holder (9) which is fitted into the plug (12) when the shelf holder (9) moves downward

by exceeding the predetermined distance (Wmax).

6. A refrigerator (1) as in any one of the above Claims, **characterized by** the load control device (10) comprising a battery for energizing the light source (8) and a battery casing (14) disposed inside the body of the lower tray (5) or the shelf holder (9).
7. A refrigerator (1) as in any one of the above Claims, **characterized by** the shelf (3) produced from a transparent material and the load control device (10) comprising the light source (8) disposed inside the channel (7) in the shelf holder (9) which illuminates the shelf (3) by delivering light to the side edge thereof.
8. A refrigerator (1) as in any one of the above Claims, **characterized by** the shelf (3) produced from a material including light piping particles (P) that have light reflecting properties when light acts thereon.
9. A refrigerator (1) as in any one of the above Claims 1 to 6, **characterized by** the load control device (10) comprising a light source (8) such as LED, which is disposed on the front face of the shelf holder (9) facing the user, which is turned on when the shelf (3) is loaded excessively and turned off when the load is removed.
10. A refrigerator (1) as in Claim 1, **characterized by** an audio alarm device which provides that the user is warned when the weight of the items placed on the shelf (3) or the load applied on the shelf (3) by the user exceeds a predetermined limit load amount that the shelf (3) can carry without straining.

Figure 1

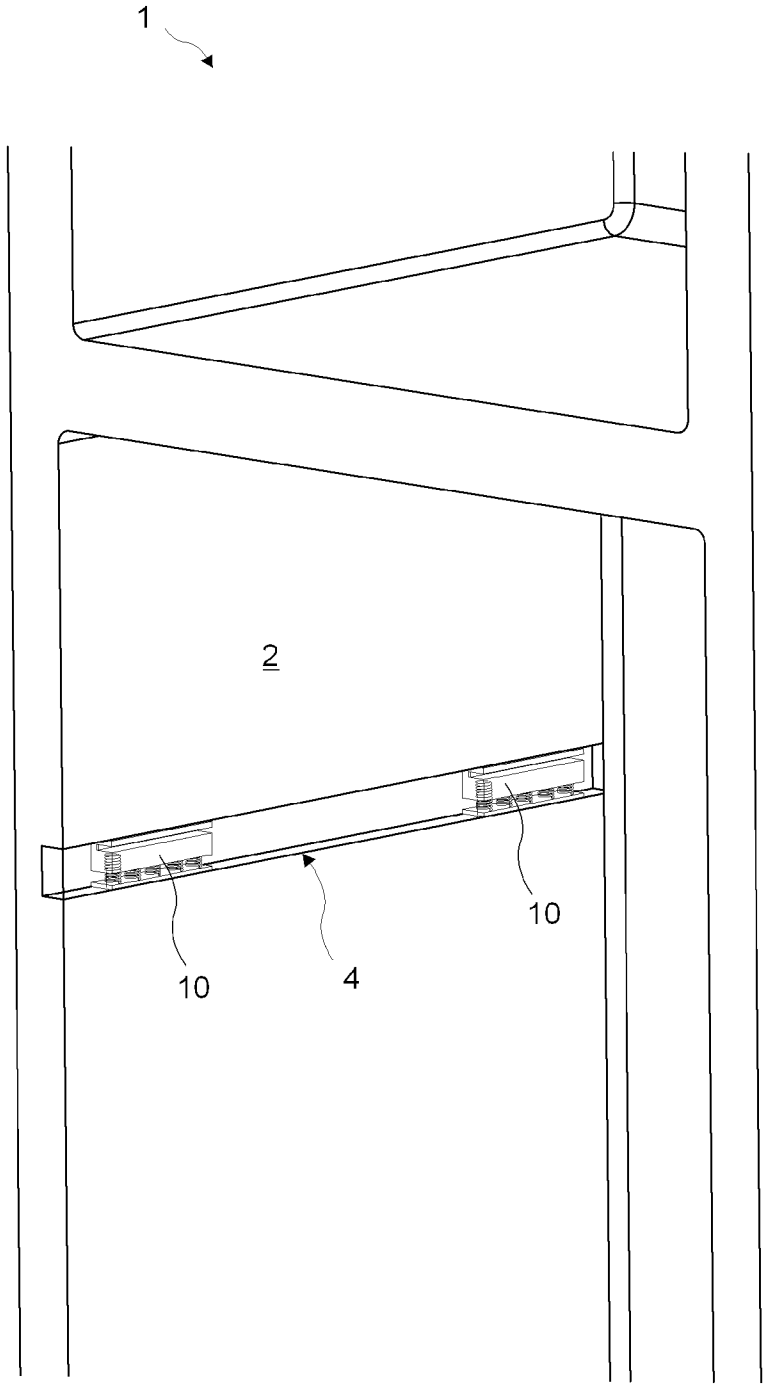


Figure 2

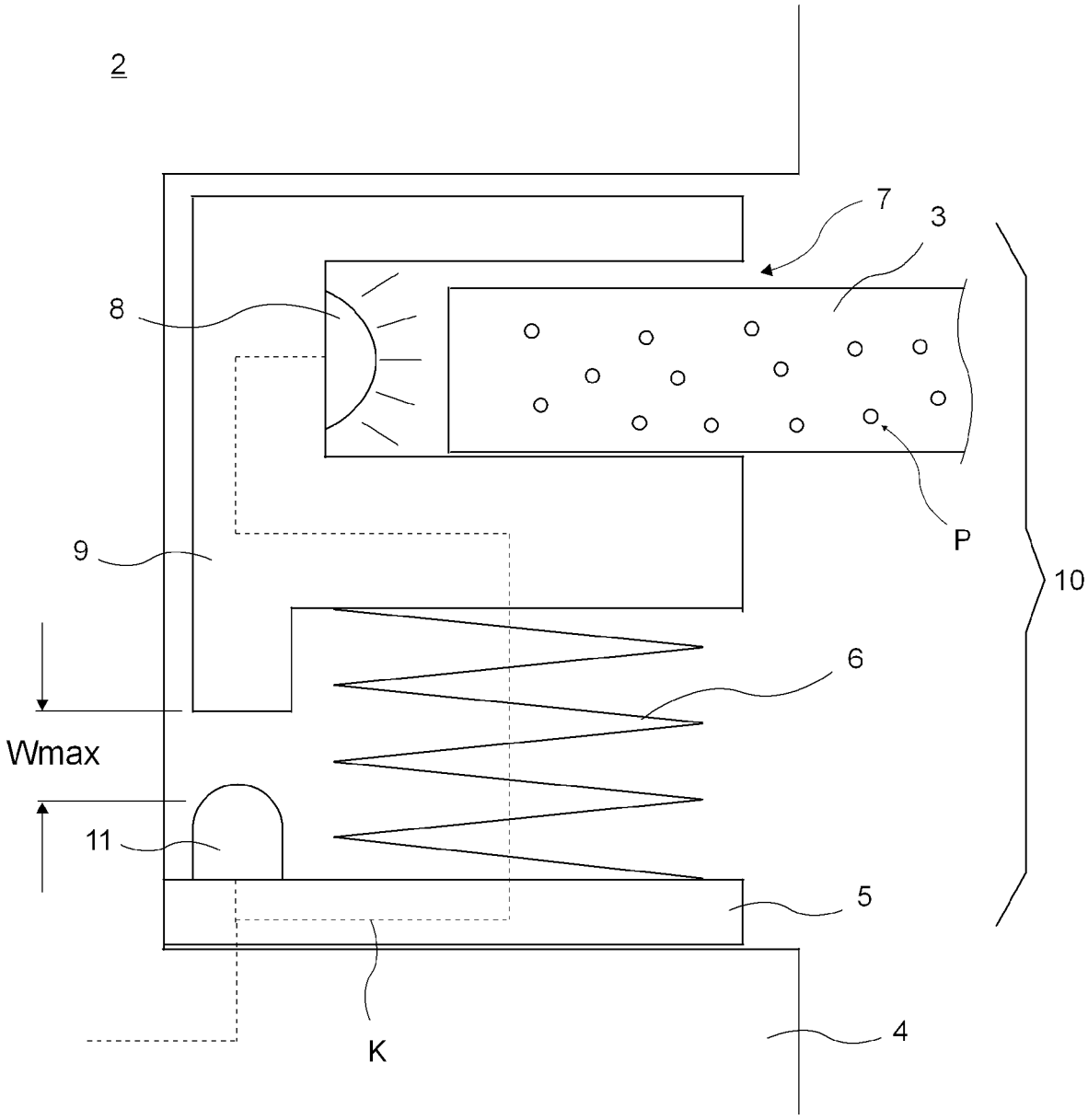


Figure 3

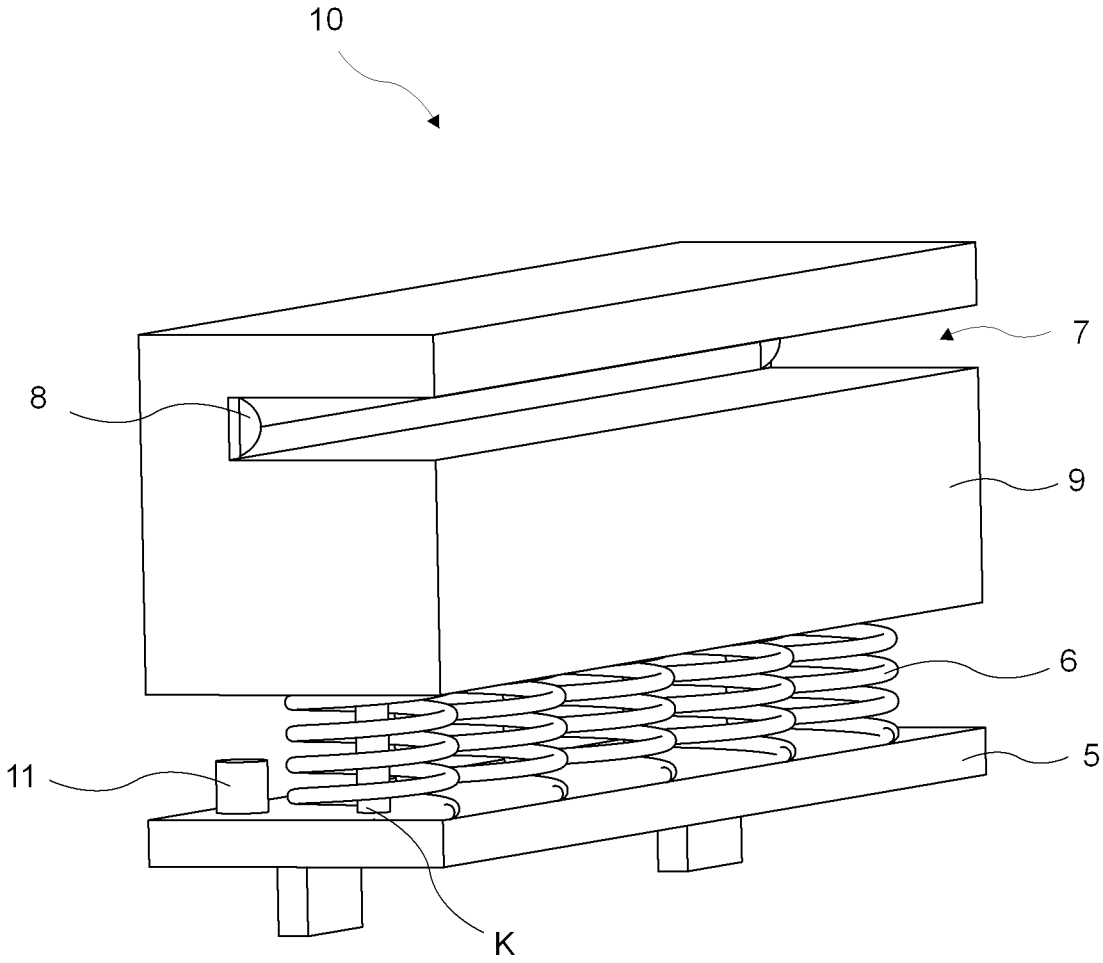


Figure 4

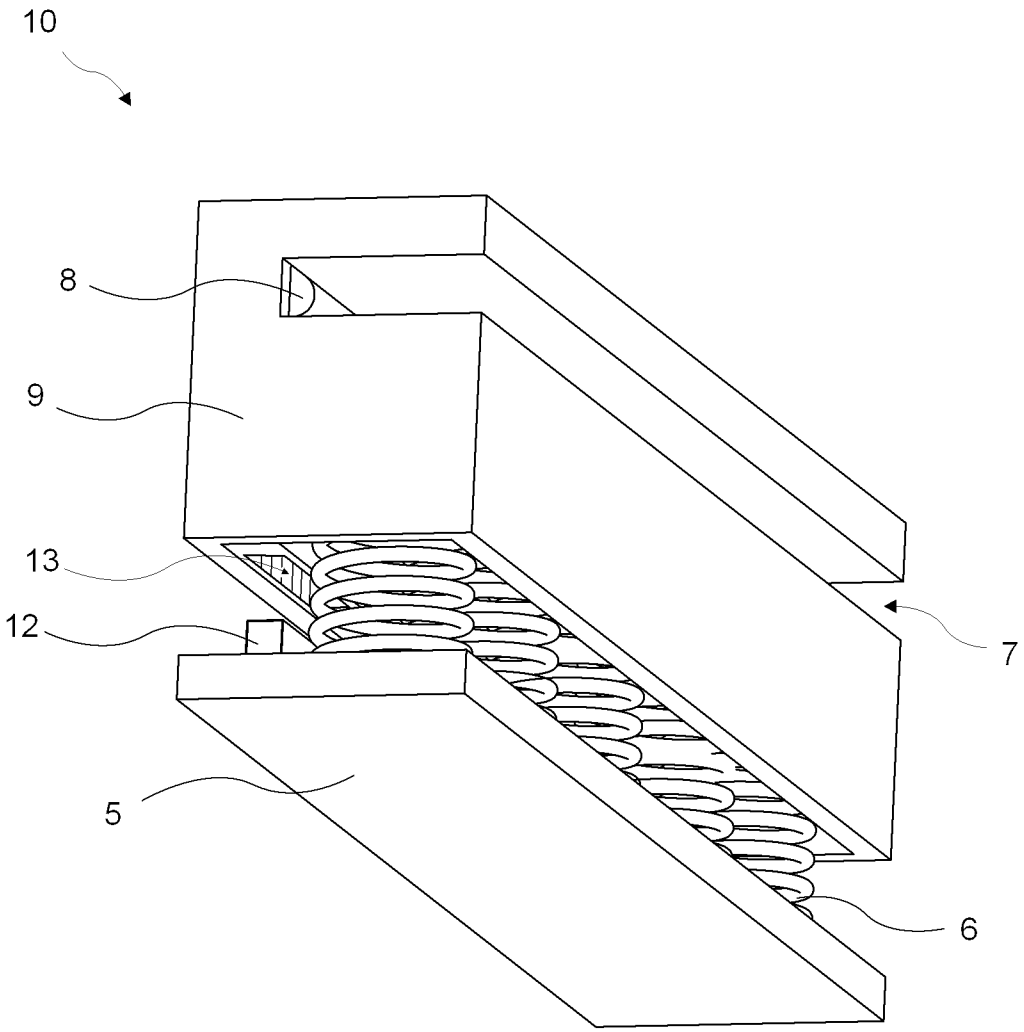


Figure 5

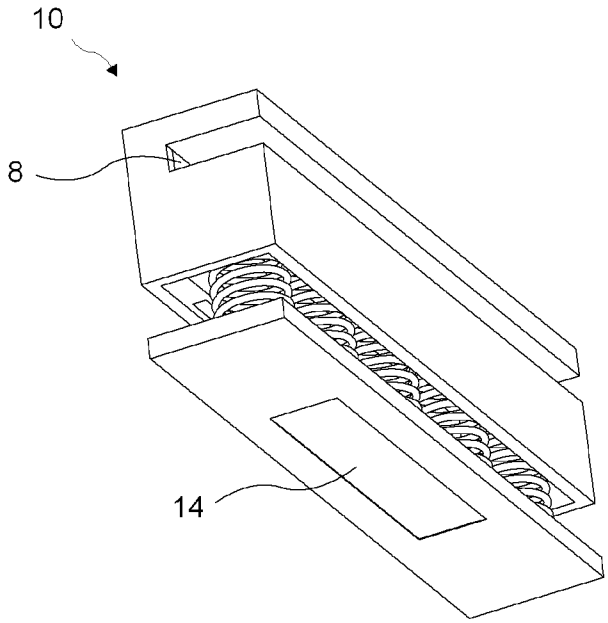
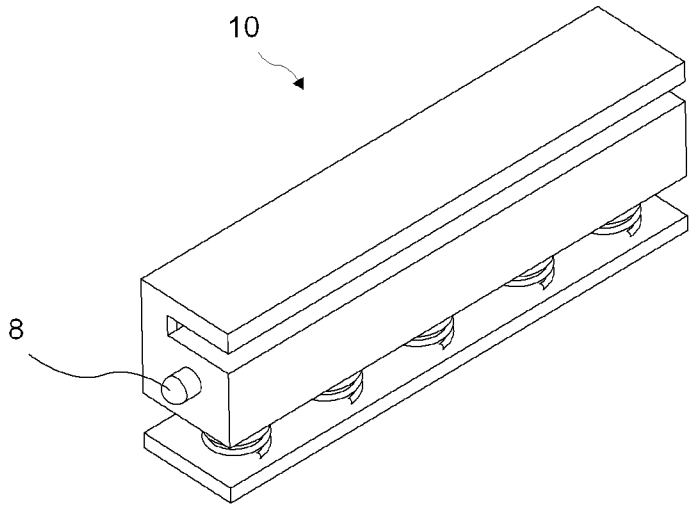



Figure 6