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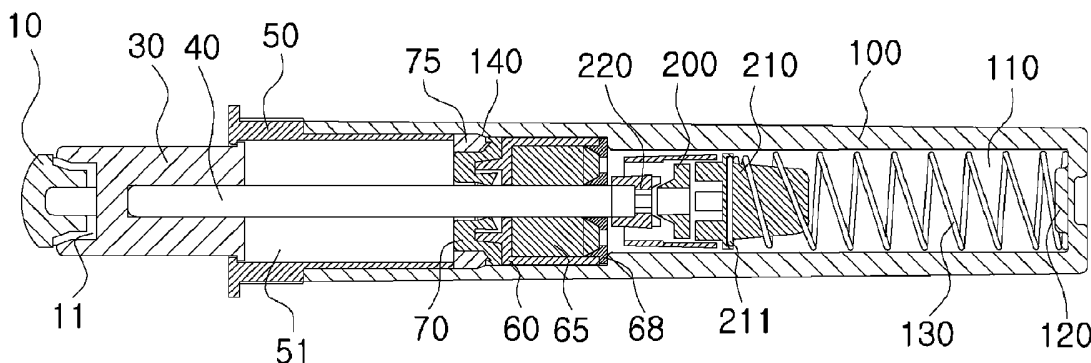
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(54) Title: DOOR DAMPER



(57) Abstract: Disclosed is a door damper for preventing impact and noise generated when a door for a furniture article or a sink is rapidly opened and closed and the door is impacted on a doorframe. An oil seal is disposed in a housing body so as to form an oil chamber, and a piston rod is inserted into a center portion of the oil seal. A cylinder guide and a first and second check valve are disposed at one end of the piston rod so that an oil path can be controlled, and a spring is further provided in the housing body so that an impact from a door can be absorbed. A space guide bush is disposed in an opening portion of the housing body, and a bumper fixing cap and a bumper are provided at the other end of the piston rod. According to the door damper, the impact from the door can be facilely absorbed. And also, since the oil path is widely formed, the door can be easily returned to its position even through the return spring has a small elastic force.

Description

DOOR DAMPER

Technical Field

- [1] The present invention relates to a door damper for preventing impact and noise generated when a door for a furniture article or a sink is rapidly opened and closed and the door is impacted on a doorframe.

Background Art

- [2] Generally, a door is mounted through a spring hinge on a sink or a furniture article such as a clothes chest and a bookcase. In an opening and closing operation of the door, when the door is opened and closed, particularly when the door is rapidly closed, the door is impacted on a doorframe and large impact is applied to the door, and noise is generated due to the impact. In the worst case, the door may be damaged.
- [3] Further, when the door is suddenly closed, a finger of a user may be squeezed in the door. In particular, in the case of a child, such an accident is often brought about by his/her carelessness.
- [4] To solve the problem, there was developed a conventional door damper as shown in FIG. 1. In the conventional door damper, however, when the door mounted through a spring hinge is suddenly closed, the door is bounced from a bumper 13 and noise is also generated. since an oil path through first and second check valves 21 and 22 is narrow, a pressure in an oil chamber 3 is excessively increased. A housing surrounding the oil chamber 3 is bent to an outside due to the increase in the pressure. Therefore, a fine gap is generated between a housing body 16 and an oil seal 17 for preventing oil leakage so that the oil is leaked. Since the door is closed by the spring hinge, a return spring 15 having small elastic force has to be used in the spring hinge. In this case, there is a problem that the door is slowly returned.

Disclosure of Invention

Technical Problem

- [5] Therefore, an object of the present invention is to provide a door damper which has a typical shape so as to facilely absorb an impact, and also has a wide oil path so that a door can be easily returned to its position even though a return spring has small elastic force.

Technical Solution

- [6] In order to achieve the above objects, a door damper which comprises a housing body of which one end is opened, and which has an enlarged diameter in an opened

direction and has two stepped portions and a spring mounting protrusion on an inner wall thereof, and in which an oil seal and an oil seal ring are disposed at one of the stepped portions so as to form an oil chamber; a piston rod inserted into the housing body; a cylinder guide disposed at one end of the piston rod in the oil chamber so as to be moved along the inner wall of the housing body; a first check valve fixed to a distal end of the cylinder guide; a second check valve movably disposed between the cylinder guide and the first check valve; a spring disposed between the first check valve and the spring mounting protrusion; a tube guide bush disposed at the other stepped portion of the housing body; a tube type member disposed in the tube guide bush; a space guide bush inserted into an opening portion of the housing body and having a flange portion; a bumper fixing cap disposed at the other end of the piston rod; and a bumper disposed so as to be apart from the bumper fixing cap in a desired gap, is characterized in that:

- [7] the cylinder guide is formed with a mounting groove, in which the piston rod is inserted, and a hole at a center portion thereof, and a receiving groove at an opposite side of the mounting groove, and an outer circumference of the cylinder guide has a smaller diameter than a diameter of the inner wall of the housing body,
- [8] the first check valve has a cross shape, and a spring groove in which a spring can be disposed is formed at an outer surface of the first check valve, and an upper end of the cross shape is dug in a desired depth,
- [9] the second check valve is movably disposed between the cylinder guide and the first check valve and formed with a hole at a center portion thereof, and a edge portion of the second check valve is formed to be inserted into the cylinder guide, a front end of the second check valve is a protrusion of which an outer circumference is inclined.

Advantageous Effects

- [10] According to the door damper, the impact from the door can be facilely absorbed. And also, since the oil path is widely formed, the door can be easily returned to its position even through the return spring has a small elastic force.

Brief Description of the Drawings

- [11] The above aspects and features of the present invention will be more apparent by describing certain embodiments of the present invention with reference to the accompanying drawings, in which:
- [12] FIG. 1 is a cross-sectional view of a conventional door damper;
- [13] FIG. 2 is a cross-sectional view of a door damper according to an embodiment of

the present invention;

[14] FIG. 3 is a cross-sectional view of the door damper according to the embodiment of the present invention, in which a piston is pushed in a cylinder;

[15] FIG. 4 is a cross-sectional view of a housing body and the piston of the door damper according to the present invention;

[16] FIG. 5 is a cross-sectional view of a bumper, a bumper fixing cap and a space guide bush of the door damper according to the present invention;

[17] FIG. 6 is a cross-sectional view of an oil seal ring, an oil seal, a tube guide, a tube type member and a mounting ring of the door damper according to the present invention;

[18] FIG. 7 is a cross-sectional view of a second check valve of the door damper according to the present invention;

[19] FIG. 8 is a plan view, a cross-sectional view and a perspective view of a cylinder guide of the door damper according to the present invention;

[20] FIG. 9 is a plan view, a cross-sectional view and a lower view of a first check valve of the door damper according to the present invention;

[21] FIG. 10 is an enlarged cross-sectional view of a moving route of oil in the door damper according to the present invention; and

[22] FIG. 11 is a view showing a status that the door damper of the present invention is mounted on a doorframe.

Best Mode for Carrying Out the Invention

[23] The present invention will now be described in further detail by examples.

[24] In FIGs. 2 to 11, an inclined stepped portion 140 and a stepped portion 141 are formed on an inner wall of a housing body having an enlarged diameter in an opened direction. Further, an oil seal 70, a tube guide bush 60, a tube type member 65 and a mounting ring 68 are disposed in turn between the inclined stepped portion 140 and the stepped portion 141, and then fixed by an oil seal ring 75. In the housing body 100, there is formed an oil chamber 110 divided by the mounting ring 68. The oil chamber 110 is filled with oil.

[25] A piston rod 40 is inserted into a center portion of the housing body 100. At an end of the piston rod 40 in the oil chamber 110, there is provided a cylinder guide 220 which has a smaller diameter than the diameter of the inner wall of the housing body 100 and also has a hole in which the end of the piston rod 40 is inserted.

[26] At an end of the cylinder guide 220, there is disposed a first check valve 210 which has a cross shape and is formed with a spring groove 211 in which a spring 130 can be

disposed. And in an inner portion of the cylinder guide 220, there is disposed a second check valve 200 so that movement of the second check valve 200 is limited by the first check valve 210. Furthermore, each end of the spring 130 is fixedly disposed by the spring groove 211 of the first check valve 210 and a spring mounting protrusion 120 of the housing body 100.

[27] A space guide bush 50 is inserted into an opening portion 150 of the housing body 100. At a left end of the space guide bush 50, there are formed an outer flange portion 52 and an inner flange portion 53. A part of an outer wall of the space guide bush 50 is formed to have a smaller diameter than the inner wall of the housing body 100, whereby the part of the out wall is fitted to the opening portion 150 of the housing body 100. A right end of the space guide bush 50 is contacted with the oil seal ring 75 so as to support the oil seal ring 75. Preferably, the space guide bush 50 and the housing body 100 are welded to each other by a radio frequency welding, etc.

[28] The piston rod 40 is inserted into a retreat space 51 formed in the space guide bush 50. A bumper fixing cap 30 having a flange portion 31 is provided at a left end of the piston rod 40. When the bumper fixing cap 30 is pushed out by the spring 130, the flange portion 31 of the bumper fixing cap 30 is contacted with the inner flange portion 53 of the space guide bush 50, thereby stopping the movement of the bumper fixing cap 30. In addition, at a left end of the bumper fixing cap 30, there is disposed a bumper 10 so as to be apart from the bumper fixing cap 30 in a desired gap. The bumper 10 is formed of rubber, plastic foam, etc., so as to absorb an impact.

Mode for the Invention

[29] Hereinafter, an operation process of the door damper 300 according to the present invention will be described in detail.

[30] As shown in FIG. 11, the door damper 300 is disposed at a doorframe 15. In this state, if a door 16 is closed, the bumper 30 is pushed in the retreat space 51 of the space guide bush 50. Then, as shown in FIG. 3, the spring 130 is compressed. The cylinder guide 220, the first and second check valves 210 and 200 disposed at a rear side of the piston rod 40 are also pushed to the vicinity of the spring mounting protrusion 120.

[31] In this situation, if the door is opened, as shown in FIG.2, the piston rod 40 is pushed out by the spring 130 until the flange portion 31 of the bumper fixing cap 30 is contacted with the inner flange portion 53 of the space guide bush 50.

[32] An oil path in each case that the door 16 is opened and closed will be described.

[33] 1. In the case that the door is slowly closed

- [34] When the piston rod 40 is slowly pushed in toward a rear side, as shown in A of FIG. 10, oil in the oil chamber 110 is passed through an outer circumference and a center portion of the first and second check valves 210 and 200 and then moved through a AA portion and a BB portion.
- [35] 2. In the case that the door is rapidly closed
- [36] When the piston rod 40 is rapidly pushed in toward the rear side, as shown in B of FIG. 10, oil in the oil chamber 110 is adapted to press the second check valve 200 with a large pressure, so that a front protrusion of the second check valve 200 is inserted into a receiving groove of the cylinder guide 220 and then closely contacted with a center portion thereof. An edge side of the second check valve 200 is bent to the outer circumference in a moment. That is, as shown in B of FIG. 10, the second check valve 200 plugs up the AA portion. Thus, the oil is moved through the BB portion, thereby absorbing the impact.
- [37] In this case, since a flow of the oil is controlled, i.e., a flowing amount of the oil is controlled, the impact from the door is absorbed. Further, when the oil flow is controlled, the oil path is smoothly formed by the second check valve 200. Therefore, it is prevented that a large pressure is accumulated in the oil chamber 110.
- [38] 3. In the case that the door is opened
- [39] When the piston rod 40 is returned to a front side, as shown in C of FIG. 10, oil in the oil chamber 110 is passed through the AA and BB portions and then moved through the outer circumference BB and the center portion of the first and second check valves 210 and 200.

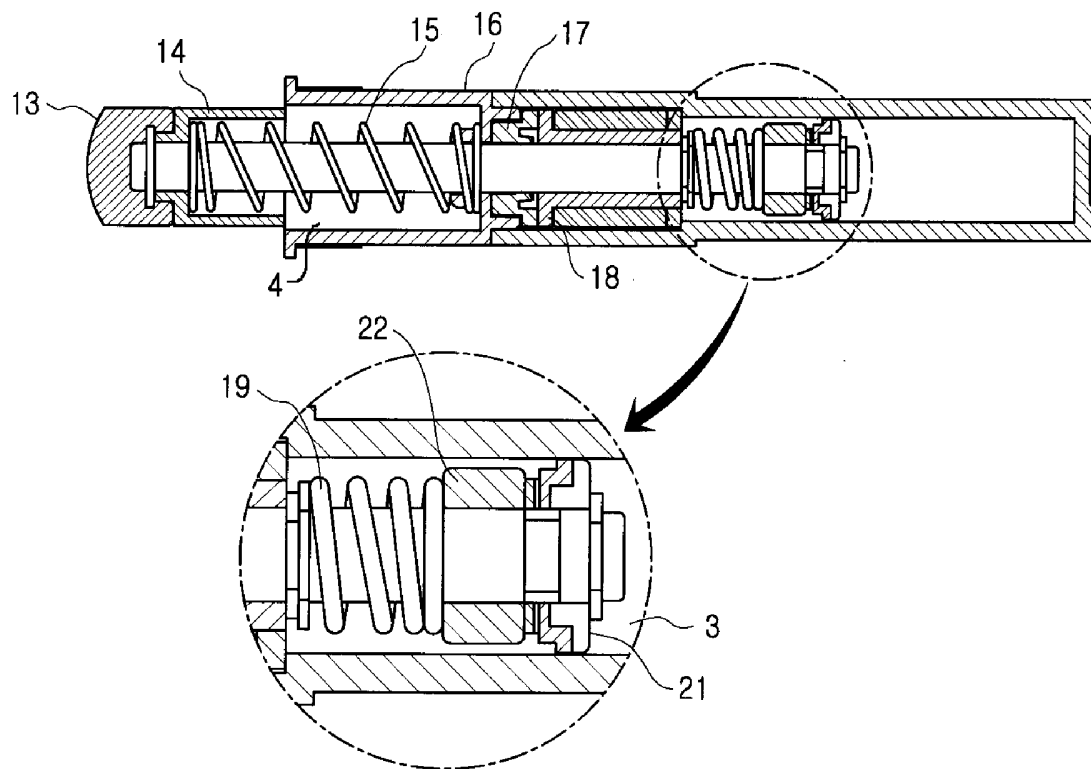
Industrial Applicability

- [40] According to the door damper of present invention, as described above, the impact from the door can be facilely absorbed. And also, since the oil path is widely formed, the door can be easily returned to its position even through the return spring has a small elastic force.
- [41] The foregoing embodiment and advantages are merely exemplary and are not to be construed as limiting the present invention. The present teaching can be readily applied to other types of apparatuses. Also, the description of the embodiments of the present invention is intended to be illustrative, and not to limit the scope of the claims, and many alternatives, modifications, and variations will be apparent to those skilled in the art.

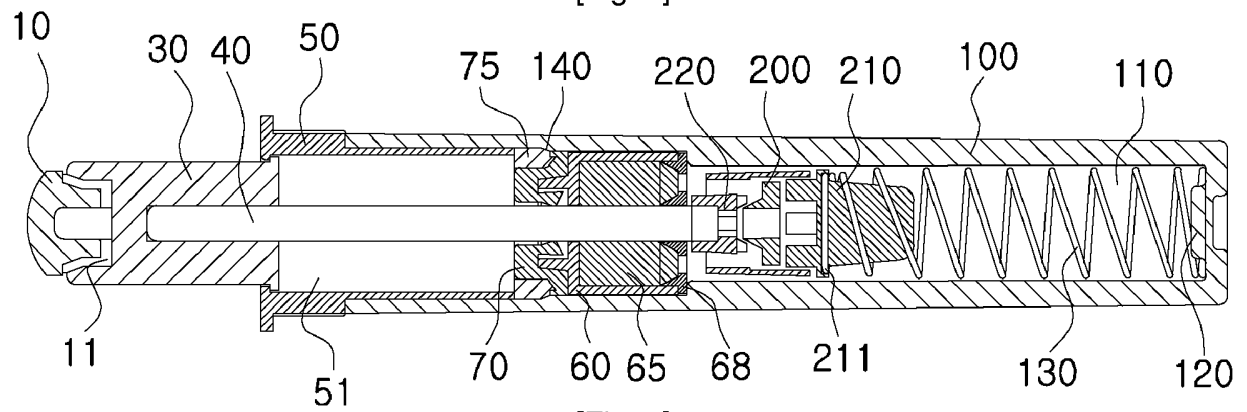
Claims

- [1] 1. A door damper which comprises a housing body of which one end is opened, and which has an enlarged diameter in an opened direction and has two stepped portions and a spring mounting protrusion on an inner wall thereof, and in which an oil seal and an oil seal ring are disposed at one of the stepped portions so as to form an oil chamber; a piston rod inserted into the housing body; a cylinder guide disposed at one end of the piston rod in the oil chamber so as to be moved along the inner wall of the housing body; a first check valve fixed to a distal end of the cylinder guide; a second check valve movably disposed between the cylinder guide and the first check valve; a spring disposed between the first check valve and the spring mounting protrusion; a tube guide bush disposed at the other stepped portion of the housing body; a tube type member disposed in the tube guide bush; a space guide bush inserted into an opening portion of the housing body and having a flange portion; a bumper fixing cap disposed at the other end of the piston rod; and a bumper disposed so as to be apart from the bumper fixing cap in a desired gap, characterized in that,
- the cylinder guide is formed with a mounting groove, in which the piston rod is inserted, and a hole at a center portion thereof, and a receiving groove at an opposite side of the mounting groove, and an outer circumference of the cylinder guide has a smaller diameter than a diameter of the inner wall of the housing body,
- the first check valve has a cross shape, and a spring groove in which a spring can be disposed is formed at an outer surface of the first check valve, and an upper end of the cross shape is dug in a desired depth,
- the second check valve is movably disposed between the cylinder guide and the first check valve and formed with a hole at a center portion thereof, and a edge portion of the second check valve is formed to be inserted into the cylinder guide, a front end of the second check valve is a protrusion of which an outer circumference is inclined.
- [2] 2. The door damper according to Claim 1, wherein the second check valve is formed of silicon.
- [3] The door damper according to Claim 1, wherein the protrusion of the second check valve has the same shape and size as the receiving groove formed in the cylinder guide.

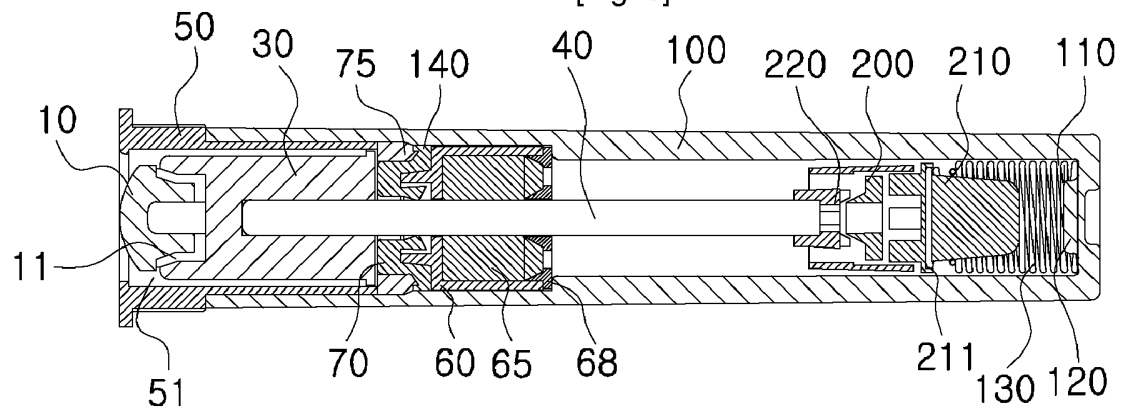
[Fig. 1]

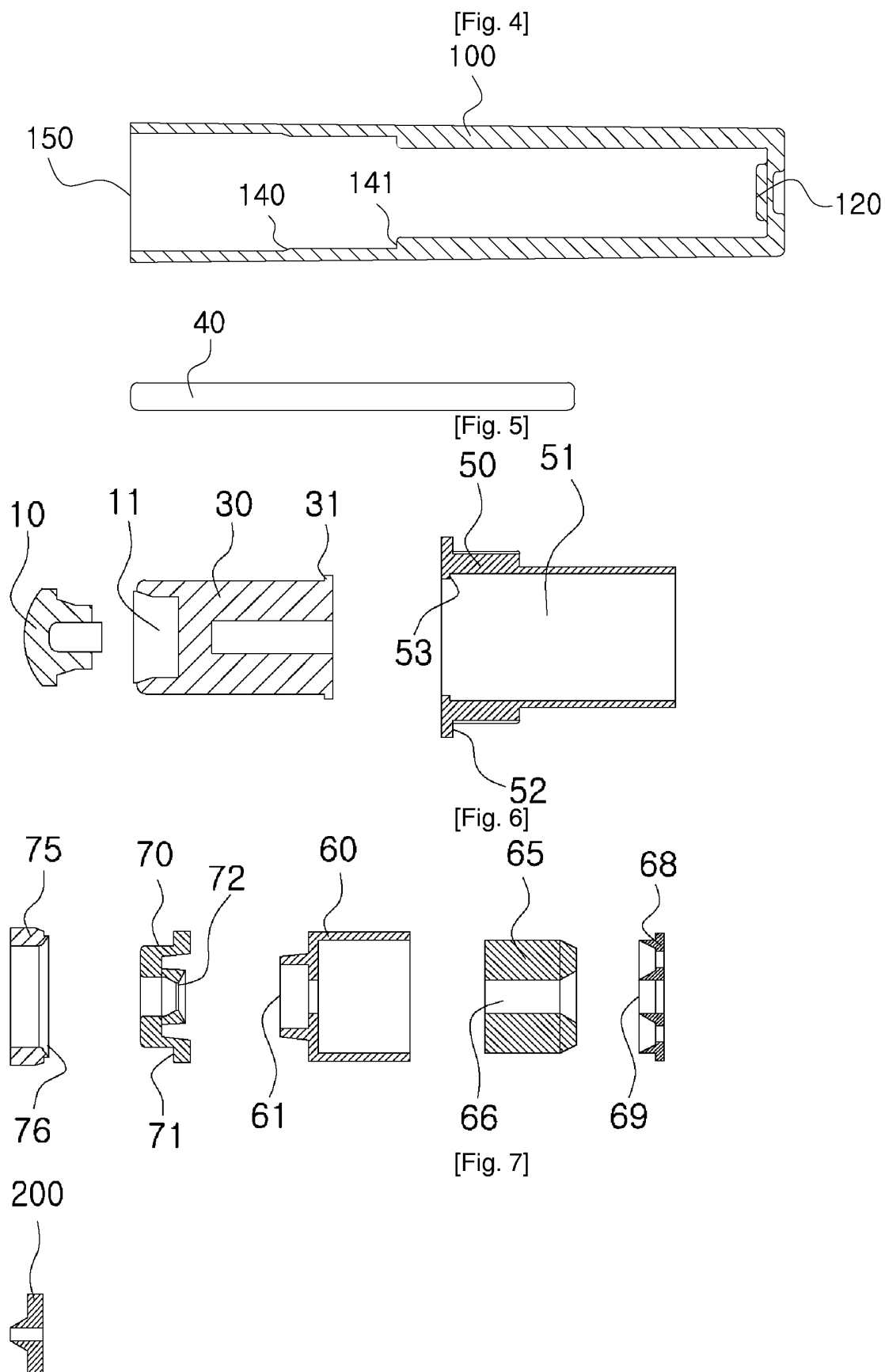


[Fig. 2]

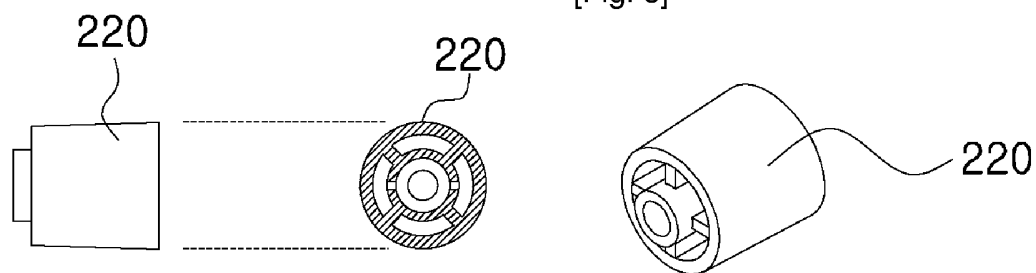


[Fig. 3]

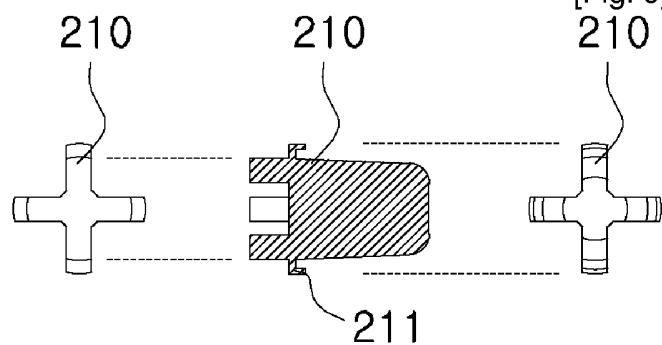




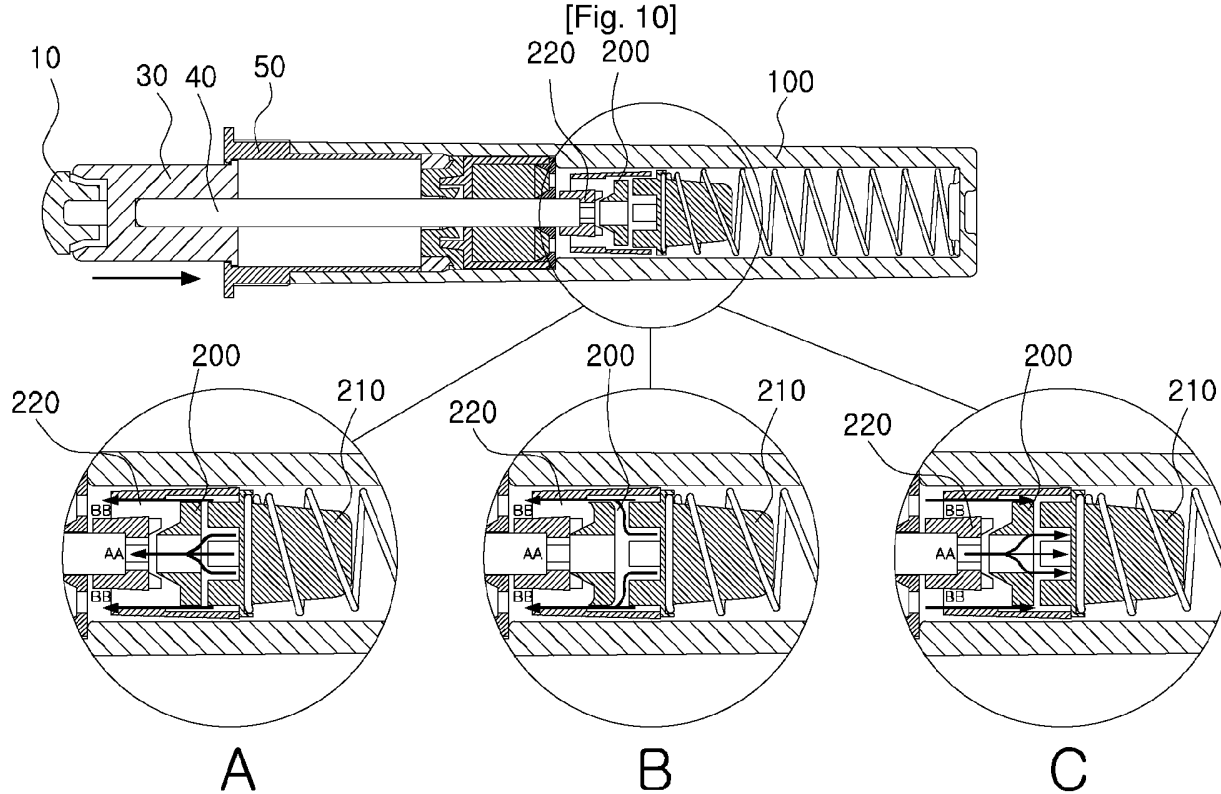
[Fig. 8]



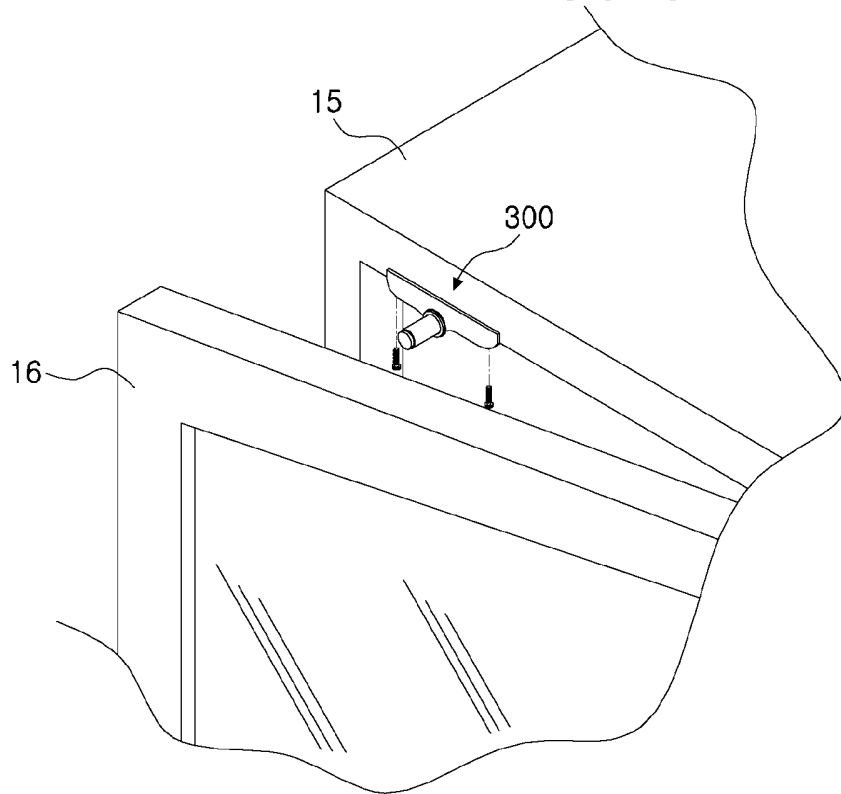
[Fig. 9]



[Fig. 10]



[Fig. 11]



INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2004/002111

A. CLASSIFICATION OF SUBJECT MATTER

IPC7 A47B 96/00

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)
IPC7 A47B 96/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Korean Patents and applications for inventions since 1975
Korean Utility models and applications for Utility models since 1975
Japanese Utility models and application for Utility models since 1975

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 14-286076 A(JULIUS BLUM GMBH) 2002/10/03 see the whole documents.	1-3
A	JP 16-036885 A(ARTURO SALICE SPA)2004/02/05 see the whole documents.	1-3
A	KR 20-321920 Y(JAE HONG, KIM) 2003/07/22 see the whole documents.	1-3
A	KR 20-294107 Y(JAE HONG, KIM) 2002/10/22 see the whole documents.	1-3
A	US 2003-141638 AA(SALICE LUCIANO) 2003/07/31 see the whole documents.	1-3

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

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