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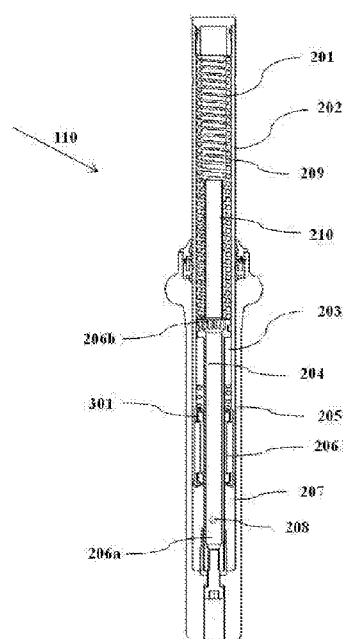


Fig. 2

(57) Abstract: The present invention relates to a suspension assembly (110) for a two-wheeled vehicle. The suspension assembly (110) comprises an outer tube (205), an inner tube (202) slidably connected to the outer tube (205), a piston (206) including a piston rod (206a) having a piston head (206b), an elastic member (209) disposed inside the inner tube (202). The suspension assembly (110) includes a guide member (210) disposed coaxial to the elastic member (209) and above the piston head (206b) of the piston (206). The guide member (210) is capable of receiving a damping fluid during at least a compression stroke of the suspension assembly (110). The guide member (210) retains the damping fluid during at least a compression stroke and facilitates more efficient extension stroke resulting in better damping response of the suspension assembly (110).

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SUSPENSION ASSEMBLY

TECHNICAL FIELD

[0001] The present subject matter relates generally to a suspension assembly for a two-wheeled vehicle. More particularly but not exclusively, the present invention relates to damping response of the suspension assembly for the two-wheeled vehicle.

BACKGROUND

[0002] Typically, vehicle layout design for a scooter type vehicle features a step-through frame and a flat surface called as a floorboard used for disposing legs of a rider when the rider puts his/her feet on the floorboard. Further, the scooter features bodywork, including a front leg shield and body that conceals all or most of the mechanisms. Since, most of the parts in the scooter are concealed by the body, the body parts are to be designed such that they fit into the body space achieving optimum utilization of space in the scooter. Traditionally, the scooter wheels are smaller than conventional motorcycle wheels. The smaller size of the scooter, lower handle bar height in addition to compact packaging of front suspension assembly and smaller wheels requires a suspension assembly of the vehicle to be smaller and compact. It is also noted that owing to space constraints, exterior form of vehicle, packaging of headlight assembly parts and front to rear cover portions along with a utility box features, typically scooters tend to have a suspension assembly clamped with only a lower triple clamp and an upper triple clamp is not used. Therefore, taking space constraint and the typical vehicle layout of the scooter into consideration, the suitable small suspension assembly is used in the scooter type vehicle.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003] The detailed description is given with reference to the accompanying figures. The same numbers are used throughout the drawings to reference like features and components.

[0004] **Fig. 1** shows a side view of a two-wheeled vehicle having a front suspension assembly according to the present invention.

[0005] **Fig. 2** illustrates a typical suspension assembly according to an embodiment.

[0006] **Fig. 3** illustrates working of the suspension assembly under compression stroke in accordance with an embodiment.

[0007] **Fig. 4** illustrates working of the suspension assembly under extension stroke in accordance with an embodiment.

[0008] **Fig. 5** illustrates a graphical representation of the energy dissipated by the suspension assembly.

[0009] **Fig. 6** illustrates a guide member according to an embodiment.

[0010] **Fig. 7** illustrates a guide member according to another embodiment.

[0011] **Fig. 8** illustrates a detailed view of a top portion of a suspension assembly according to a first embodiment.

[0012] **Fig. 9** illustrates a detailed view of a top portion of a suspension assembly according to a second embodiment.

[0013] **Fig. 10** illustrates a detailed view of a top portion of a suspension assembly according to a third embodiment.

[0014] **Fig. 11** illustrates a suspension assembly according to another embodiment of the present invention.

DETAILED DESCRIPTION

[0015] Typically, the telescopic type of small suspension assembly used in a two-wheeled vehicle, for example, scooters operates under two modes, viz., an extension stroke, and a compression stroke. For the proper working of the compression stroke and the extension stroke, the oil present inside the suspension assembly should be made adequately available. Further, the load carrying capacity of the suspension assembly depends on a compression spring design, space available for the compression spring and the quantity of oil filled inside the suspension assembly. In any typical suspension assembly of the scooter, the oil quantity is optimized to strike a balance between damping energy and allowable pressure ratio of the suspension assembly as well as a peak oil pressure inside the suspension assembly. Due to the limited stroke and small size of the suspension assembly, the allowable oil quantity and peak pressure ratio of the suspension assembly is limited. Additionally, the smaller length results in rapid rate of rise of pressure ratio during stroking of the suspension. Further, the quantity available for oil being limited inside the suspension assembly, the energy dissipation of the

suspension assembly is hampered resulting in discomfort to the rider. The oil quantity in the suspension assembly of the scooters is also restricted by the suspension assembly design having permissible pressure limitations. Due to which, the less oil quantity leads to inadequate damper response (a lag is observed in the damping response of the suspension assembly) leading to poor suspension system providing poor riding comfort to the rider.

[00016] However, there are means by which oil quantity can be increased. For example, increasing oil quantity also increases the pressure ratio beyond permissible limit and leads to poor durability of an oil seal disposed inside the suspension assembly. Further, another method includes, increasing the oil quantity by increasing the diameter of the suspension assembly, but leads to increased cost as well as high mass/inertia of the vehicle. The increased mass/inertia is detrimental to vehicle ride comfort and vehicle handling.

[00017] Therefore, the present invention discloses a front suspension assembly for a two-wheeled vehicle enabling proper damping response for the suspension assembly. The front suspension assembly capable of achieving required damping response for better ride comfort and vehicle handling is required. Further, the front suspension assembly should be capable of overcoming the above said design constraints and include features to provide adequate oil return area in the suspension assembly, for proper working of the suspension assembly, which helps in better energy dissipation. The problem of lag in the damping response is overcome according to the present invention by making the damping fluid readily available for working of the suspension assembly without increasing the oil quantity. According to the present invention, the damping fluid is efficiently used during the extension stroke and the compression stroke in the suspension assembly.

[00018] According to an embodiment of the present invention, the suspension assembly for a two-wheeled vehicle comprises of an outer tube, an inner tube slidably connected to the outer tube, a piston including a piston head and a piston rod is disposed with the inner tube. The piston facilitates the flow of damping fluid across during an extension stroke and a compression stroke of the suspension assembly. The inner tube includes an extension chamber and a compression chamber. The damping fluid flows from the extension chamber to the compression chamber during the extension stroke of the suspension assembly and the damping fluid flows from the compression chamber to the extension chamber during the compression stroke of the

suspension assembly. The suspension assembly further includes an elastic member disposed inside the inner tube and the elastic member is capable of undergoing compression and extension during the compression stroke and the extension stroke respectively.

[00019] Along with the compression chamber and the extension chamber, a damping fluid reservoir is also present in the suspension assembly. It is desirable that abundant damping fluid is present in the damping fluid reservoir for smooth working of the extension stroke and the compression stroke.

[00020] During compression stroke of the suspension assembly, the damping fluid flows from compression chamber to the extension chamber, some of the damping fluid gets splashed into the area between the elastic member and it may happen that the amount of damping fluid got splashed in the area in between the elastic member may not return quickly to the extension chamber during consecutive extension stroke. Due to which, the amount of damping fluid available for corresponding stroke is not sufficient, which in turn affects the damping response of the suspension assembly. Therefore, it is desirable to retain considerable amount of damping fluid either in the compression chamber or the extension chamber for efficient working of respective compression stroke and the extension stroke.

[00021] According to an embodiment of the present invention, the damping fluid is made abundant in the suspension assembly by inserting a guide member in the suspension assembly. The guide member is disposed above the piston head so that the stroke of the suspension assembly is retained without any compromise. The guide member is a hollow cylindrical member and is configured to allow the damping fluid flow through it during compression stroke and extension stroke of the suspension assembly. During the compression stroke of the suspension assembly, the damping fluid moves from the compression chamber to the extension chamber and some amount of damping fluid also reaches the damping fluid situated above the piston head. During this stroke, the damping fluid gets substantially stored in a laminar region created by the guide member disposed above the piston head. Therefore, the guide member functions as a retaining member to retain adequate amount of damping fluid. Hence, the damping fluid is prevented from getting splashed into the area between the elastic member and instead gets substantially retained in the guide member portion. Conventional suspension assembly has an air column above an oil reservoir which acts like an air spring or an air suspension during

stroking of the suspension assembly. Therefore, abundant damping fluid is made available for the corresponding extension stroke by the guide member. Hence, a smooth return of the piston during the extension stroke is ensured due to the damping fluid made available by the guide member. Therefore, a good damping response is achieved by the suspension assembly and a more efficient working of the suspension assembly is achieved.

[00022] According to an embodiment of the present invention, the guide member includes a base structure capable of being seated on the piston head. The guide member includes an opposite head including a through hole that allows damping fluid to flow through it. The guide member further includes a main body defined in between the base structure and the opposite end.

[00023] According to another embodiment of the present invention, one of the ends of the guide member is adapted to be seated on the piston head of the piston and the other head is covered by a covering member. In this case, the guide member includes circumferentially disposed one or more provisions on the main body. According to another embodiment, the damping fluid flows inside the guide member and the damping fluid is let out through the one or more provisions.

[00024] According to an embodiment of the present invention, the base structure is detachably attachable to the piston head of the piston. According to another embodiment of the present invention, the base structure is fixedly attachable to the piston head.

[00025] According to another embodiment of the present invention, better damping response is achieved in the suspension assembly by suppressing creation of bubbles or by avoiding air to flow through the damping orifices and passages of the suspension inside the suspension assembly.

[00026] According to another embodiment of the present invention, the air suspension column is created inside the suspension assembly by providing a sealing member. The sealing member for example, is an elastic member having a circular cross section.

[00027] According to another embodiment of the present invention, the air suspension column is created inside the suspension assembly by providing a snap ring in addition to the sealing member. The snap ring has a circular cross-section.

[00028] According to yet another embodiment of the present invention, the air suspension column is created inside the suspension assembly by providing a plain washer and an elastic washer.

[00029] All the embodiments as aforesaid are aiming to seal the air inside the suspension assembly.

[00030] The operation of the suspension assembly capable of achieving better damping response is understood in detail by the following description of the drawings.

[00031] **Fig. 1** shows a side view of the scooter type vehicle. The two-wheeled vehicle **100** has a frame assembly made up of several tubes welded together, which usually supports a body of the said vehicle. The two-wheeled vehicle has a steerable front wheel (**101**) and a driven rear wheel (**102**). The frame assembly of the vehicle is an elongated structure, which typically extends from a forward end to a rearward end of the vehicle. It is generally convex in shape, as viewed from a side elevation view. The said frame assembly includes a head tube (not shown), a main frame (**108**) and may have a sub-frame. The sub-frame is attached to the main frame using appropriate joining mechanism. The frame assembly is covered by a plurality of vehicle body covers including a front panel (**103**), a rear cover (**104**), a panel front bottom (**105**), and a side panel (**106**).

[00032] A handlebar assembly (**111**) and a seat assembly (**107**) are supported at opposing ends of the frame assembly and a generally open area is defined there between known as floorboard (**113**), which functions as a step through space. The seat assembly (**107**) for a driver and a pillion is placed forward to a fuel tank (not shown) and rear side of floorboard (**113**). A front fender (**109**) is provided above the front wheel (**101**) to avoid the two-wheeled vehicle (**100**) and its occupants from being splashed with mud. Likewise, a rear fender (**114**) is placed between the fuel tank (not shown) and the rear wheel (**102**), and to the outer side in the radial direction of the rear wheel (**102**). The rear fender (**114**) inhibits rainwater or the like from being thrown up by the rear wheel (**102**).

[00033] A suspension assembly (**110**) includes a pair of front forks, typically telescopic in nature. The rear suspension assembly comprises of at least one rear suspension (**115**) preferably on the left side of the vehicle. However, a vehicle with two rear suspensions, namely on the left

side and the right side is also possible. For the safety of the user and in conformance with the traffic rules, a headlight (116) in the front portion of the two-wheeled vehicle (100) and a tail light (112) in the rear portion of the two-wheeled vehicle (100) is also provided.

[00034] Fig. 2 illustrates a typical suspension assembly of a two-wheeled vehicle according to an embodiment. The different parts present in the typical suspension assembly (110) include an outer tube (205), and an inner tube (202) slidably connected to the outer tube (205). A damping fluid actuates the inner tube (202). The suspension assembly (110) also includes a piston (206) including a piston rod (206a) having a piston head (206b) at one end along with an elastic member (209), and a guide member (210). A compression damping orifice (208), an extension damping orifice (204), a check valve (301), a compression chamber (207), an extension chamber (203) and a fluid reservoir (201) are also provided in the suspension assembly (110) described in accordance with an embodiment of the present subject matter. Typically, the suspension assembly (110) works under the two strokes, namely, the compression stroke and the extension stroke. The working of the suspension assembly (110) under two different strokes can be understood in detail by the following description.

[00035] Fig. 3 illustrates working of the compression stroke of the suspension assembly. As the suspension assembly (110) compresses, the volume in the compression chamber (207) decreases and the volume in the extension chamber (203) increases. As a result, the damping fluid present inside the compression chamber (207) is compressed and starts flowing to the extension chamber (203) through the compression damping orifice (208). The check valve (301) is open during the compression stroke and allows the flow of the damping fluid only from the compression chamber (207) into the extension chamber (203). Some amount of damping fluid also reaches the fluid reservoir (201) during the compression stroke. It is always desirable to have the damping fluid readily available in the fluid reservoir (201) for the succeeding strokes. In the present embodiment, the damping fluid should be readily available for the following extension stroke. In accordance with an embodiment, to facilitate smooth return of the scattered damping fluid, the guide member (210) is provided in the fluid reservoir (201) and the guide member (210) is placed upon the piston head (206b). Most of the damping fluid flowing into the fluid reservoir (201) gets accumulated in the guide member (210) disposed upon the piston head (206b). The guide member (210) acts as a receiving member for the damping fluid flowing into

the fluid reservoir (201) during the compression stroke from the compression chamber (207). The scattering of the damping fluid can be reduced due to the presence of the guide member (210) and therefore, the damping fluid is made adequately available for the succeeding extension stroke and a lag is not observed in the damping response provided by the suspension assembly (110).

[00036] Fig.4 illustrates working of the suspension assembly (110) during the extension stroke. The extension stroke of the suspension assembly (110) always follows the compression stroke and the extension stroke is followed by the compression stroke, the cycle continues. Hence, during the extension stroke, the compressed elastic member (209) is released from the compressed state making the cylindrical member assume its original position thereby extending the suspension assembly (110). In the present embodiment, it can be observed that, during the extension stroke, when the suspension assembly (110) is extended, the area of the extension chamber (203) decreases. In accordance with the present embodiment, the damping fluid tries to escape to the compression chamber (207) from the extension chamber (203). The check valve (301) is closed during the working of the extension stroke, and hence, the damping fluid has to escape to the compression chamber (207) through the extension orifice (204) located in the upper part of the piston (206) and present inside of the extension chamber (203). Therefore, the damping fluid flows from the extension chamber (203) into the piston (206) through the extension damping orifice (204), flows downwards and finally enters into the compression chamber (207) through a relatively bigger compression damping orifice (208). The guide member (210) makes the damping fluid readily available. The damping fluid available in the guide member (210), which is collected during the compression stroke readily, flows down into the compression chamber (207) during the extension stroke. Hence, the efficient working of the compression stroke and the extension stroke is achieved according to the present invention. The effective damping response achieved by the suspension assembly can be illustrated with the help of the following figure.

[00037] Fig. 5 illustrates a comparative study of the graphical representation of damping response of the suspension assembly. The graphical representation as shown in the figure is a comparative study of the damping response of the suspension assembly with guide member and a conventional suspension assembly without guide member. The curve (230) indicates the

damping response of the suspension assembly with guide member. Whereas, the dotted curve **220** indicates the damping response of the suspension assembly without guide member.

[00038] Typically the area enclosed by the curve in the graphical representation indicates the damping response of the suspension assembly. Therefore, bigger area enclosed by the curve indicates a good damping response and a small area enclosed by the curve indicates a poor damping response of the suspension assembly. The area enclosed by the various points of the curve **PQRS** indicate the damping response of the suspension assembly. It is inferred from the figure that the curve **PQRS** is obtained by the damping response of the suspension assembly incorporating the guide member and the curve **ABCD** is obtained without using the guide member. The curve **PQRS** encloses a larger area compared to the curve **ABCD** representing the dotted curve (**220**). Therefore, the suspension assembly including the guide member (**210**) gives better damping response.

[00039] A smooth curve is formed by an area enclosed by a plurality of points **P**, **Q**, **R**, and **S**. The point **P** is the beginning of the extension stroke. The highest point **Q** is obtained in the graph when the front fork is just extended and not fully extended. It can be observed from the figure that from point **P** to point **Q** a smooth curve is obtained. The smooth curve indicates that the compressed elastic member is not suddenly released during the extension stroke. The front fork employing the present invention prevents the sudden release of the elastic member. Hence, a better damping response is obtained through the present invention. A similar smooth curve achieving better damping response is obtained from point **Q** to point **R**.

[00040] The understanding of the damping response indicated by the curve can be better understood with working of the suspension assembly in different working strokes including compression stroke and extension stroke. Point **P** is the beginning of the extension stroke of the suspension assembly including the guide member. The point **Q** is the highest point obtained in the graph when the suspension assembly is extended substantially midway and not fully extended. According to the present invention, during compression stroke of the suspension assembly, sufficient damping fluid is made available in a laminar portion created by the guide member, this also ensures that good amount of damping fluid is present in the fluid reservoir too. Therefore, for the corresponding extension stroke which occurs immediately after the compression stroke, a sufficient amount of damping fluid is available making elastic member

release slowly by preventing sudden release of the compressed elastic member from the compression stroke. Therefore, a smooth release of the elastic member is ensured and a corresponding smooth curve is obtained from point **P** and point **Q** leading to good vehicle comfort performance. Whereas, referring to the dotted curve (220), during compression stroke, from point **A** to point **B**, a smooth curve is not obtained, instead, a sudden fall in the energy dissipation is observed. Therefore, a better damping is not obtained in conventional suspension assembly.

[00041] Furthermore, when the suspension assembly is fully extended, as indicated by a curve from point **Q** to point **R**, again a smooth curve is obtained, indicating smooth extension of the suspension assembly. Again from point **R** to point **S**, the suspension assembly undergoes compression stroke and the elastic member is compressed, but not fully compressed. Again during the compression stroke, the damping fluid enters into the laminar region created by the guide member to facilitate smooth extension of the suspension assembly in the corresponding extension stroke. Finally, from point **S** to point **P**, the suspension assembly is fully compressed and the damping response obtained is lesser than that of the damping response obtained when the suspension assembly is extended as seen from point **P** to point **Q**. Even when the suspension assembly is fully compressed, a minimum amount of damping response is observed as depicted by the point **R**, **S** and, **P** in the graph. Therefore, the suspension assembly employing the proposed invention prevents sudden jerks or sudden shocks from reaching the rider by preventing rapid and smooth return of the compressed elastic member during the extension stroke.

[00042] **Fig. 6** illustrates the guide member according to an embodiment. The guide member (210) is a tubular structure with a base structure (601) and includes an opposite end (602). The guide member (210) is capable of being seated over the piston head (206b) (not shown) with the help of the base structure (601) at one end of the guide member (210). The guide member (210) functions as a damping fluid retaining member during the compression stroke of the suspension assembly (110) and the damping fluid retained by the guide member (210) is made readily available for the succeeding strokes. Therefore, the guide member (210) enables efficient working of the suspension assembly (110) and as a result, better damping response is achieved. It can be observed from the figure that the opposite end (602) of the guide

member (210) is open (605) according to an embodiment. The opposite end (602) enables a small portion of the damping fluid to be supplied to the fluid reservoir (201) during the compression stroke and is also made available to the elastic member (209). Therefore, in accordance with an embodiment, the presence of the guide member (210) in the suspension assembly (110) results in the increased efficiency of the suspension assembly in providing improved damping response.

[00043] Fig. 7 illustrates a guide member in accordance with another embodiment. The guide member (210) is configured to include a base structure (601), a main body (603), one or more provisions (606), and an opposite end (602). The one or more provisions (606) are disposed circumferentially on the main body (603) of the guide member (210). The guide member (210) is capable of being seated over the piston head (206b) (not shown). It can be observed from the figure that the opposite end (602) of the guide member (210) remains closed according to the present embodiment. The opposite end (602) is covered by a covering member (604).

[00044] During the compression stroke, the damping fluid gets collected in the main body (603) of the guide member (210) and the damping fluid is allowed to flow to the fluid reservoir (201) (not seen in the figure) through the one or more provisions (606) provided on the main body (603) of the guide member (210). Hence, the presence of the guide member (210) in the suspension assembly (110) increases the volume of the damping fluid in the fluid reservoir (201). The increased volume of the damping fluid readily available for each of the compression stroke and the extension stroke results in achieving better damping response by the suspension assembly (110).

[00045] According to yet another embodiment, the guide member (210) can also be a part of the piston (206) such that the guide member (210) and the piston (206) are a single integrated part. According to yet another embodiment, the guide member (210) is configured to have variable lengths and geometry.

[00046] The other advantages of employing a guide member in the suspension assembly according to the present invention include easy assembly of the guide member in the suspension assembly. Further, the guide member can be separately mounted. Further advantages include, the servicing of the suspension assembly can be carried out similar to that of the existing suspension assembly. Furthermore, the guide member can also be used as a support structure and as a guide

for the elastic member. The support and guide advantages provided by the guide member to the elastic member improve the elastic member durability resulting in overall enhanced performance of the suspension assembly.

[00047] **Fig. 8** illustrates a detailed view of a top portion of a suspension assembly according to a first embodiment. The suspension assembly, in the present case is a front fork. The top portion (701) of the inner tube (202) of the suspension assembly (110) is sealed by incorporating a sealing member (701b). The sealing member (701b) ensures that the air inside the suspension assembly remains sealed and thereby creating air suspension inside the suspension assembly (110). The air suspension reduces the stress created on the elastic member (209) due to loads. Therefore, a better damping response is achieved. The sealing member (701b) is disposed circumferentially on an outer surface of a bolt cap (701a) fastened to the top most portion of the top portion (701) of the suspension assembly (110). The sealing member (701b) is capable of being seated inside a groove (701c) formed on the outer surface of the bolt cap (701a). The groove (701c) is configured to accommodate the sealing member (701b) there within.

[00048] Additionally, the sealing member (701b) prevents the oil from leaking out of the suspension assembly. Therefore, a more efficient working of the suspension assembly is achieved.

[00049] **Fig. 9** illustrates a detailed view of a top portion of a suspension assembly according to a second embodiment. In addition to the sealing member (701b) is used to create air suspension inside the suspension assembly (110), a snap ring (702) is disposed above the sealing member (701b). Any chances of air escaping out of the suspension assembly after incorporating a sealing member (701b) is further prevented by the snap ring (702).

[00050] **Fig. 10** illustrates a detailed view of a top portion of a suspension assembly according to a third embodiment. In the present embodiment, the air suspension is created by using one or more washers used to seal the top most portion of the top portion of the suspension assembly. The one or more washers include a plain washer (703), for example, a metal washer, sealing the suspension assembly (110) at the top most portion. Just below the plain washer (703), another washer, a second washer (704), made of elastic material is disposed. Any leaking that may occur out of the second washer (704) is further prevented by the plain washer (703).

Therefore, a more reliable and a more efficient damping response of the suspension assembly are achieved.

[00051] **Fig. 11** illustrates a suspension assembly according to another embodiment of the present invention. The suspension assembly **(110)** includes a pair of front forks comprising a right fork **(110a)** and a left fork **(110b)**. At least one fork of the pair of front forks of the suspension assembly **(110)** extends above a lower bracket **(705)**. Further, a steering shaft **(707)** extends upward from the lower bracket **(705)**. The extended portion **(706)** of at least one fork of the pair of front forks of the suspension assembly **(110)** is in the upward direction and extends above the lower bracket **(705)**. The extended portion **(706)** provides more damping fluid storage area inside the pair of front forks of the suspension assembly **(110)**. The more damping fluid enables to achieve better damping response compared to the conventional suspension assembly. Thereby achieving more rider comfort.

[00052] According to another embodiment of the present invention, the extended portion **706** has a minimum extension of about approximately 10mm and can extend upwards according to the requirements of the two-wheeled vehicle **(100)**. Further, the upward extension of the extended portion **(706)** is dependent upon other interfering parts that are required to be packaged in the available space in the two-wheeled vehicle **(100)**.

[00053] Although the subject matter has been described in considerable detail with reference to certain embodiments thereof, other embodiments are possible. It is to be understood that the appended claims are not necessarily limited to the features described herein. Rather, the features are disclosed as embodiments of the suspension assembly of a two-wheeled vehicle **(100)**.

I/We Claim:

1. A suspension assembly (110) for a two-wheeled vehicle (100) comprising:
 - an outer tube (205);
 - an inner tube (202) slidably connected to said outer tube (205), said inner tube (202) capable of housing an extension chamber (203) and a compression chamber (207) there within;
 - a piston (206) including a piston rod (206a) having a piston head (206b) at one end, said piston (206) being disposed within said inner tube (202) and capable of facilitating flow of damping fluid across said extension chamber (203) and said compression chamber (207);
 - an elastic member (209) disposed inside the inner tube (202), said elastic member (209) is compressed during a compression stroke of said suspension assembly (110), and said elastic member (209) extends during an extension stroke of said suspension assembly (110); and
 - a guide member (210) disposed substantially coaxial to said elastic member (209) and above the piston head (206b) of the piston (206), said guide member (210) is capable of receiving damping fluid at least during said compression stroke of said suspension assembly (110).
2. The suspension assembly (110) as claimed in claim 1, wherein said guide member (210) includes a base structure (601) capable of being seated on the piston head (206b), an opposite end (602) including a through hole (605), and a main body (603) defined in between the base structure (601) and the opposite end (602).
3. The suspension assembly (110) as claimed in claim 1, wherein said guide member (210) and said base structure (601) is any one of circular, square or rectangular shaped.
4. The suspension assembly (110) as claimed in claim 2, wherein said base structure (601) is detachably attached to the piston head (206b).
5. The suspension assembly (110) as claimed in claim 2, wherein said base structure (601) is fixedly attached to the piston head (206b).
6. The suspension assembly (110) as claimed in claim 2, wherein said opposite end (602) is covered by a covering member (604) and the main body (603) includes circumferentially disposed one or more provisions (606).

7. The suspension assembly **(110)** as claimed in claim 1, wherein said piston includes said guide member **(210)**.
8. The suspension assembly **(110)** as claimed in claim 1, wherein said suspension assembly (110) includes a right fork **110a** and a left fork **110b** comprising an extended portion **(706)**.
9. The suspension assembly **(110)** as claimed in claim 8, wherein said extended portion **(706)** extends in the range of 10mm-100mm.
10. A two-wheeled vehicle **(100)** comprising suspension assembly **(110)** as claimed in any of the preceding claims.

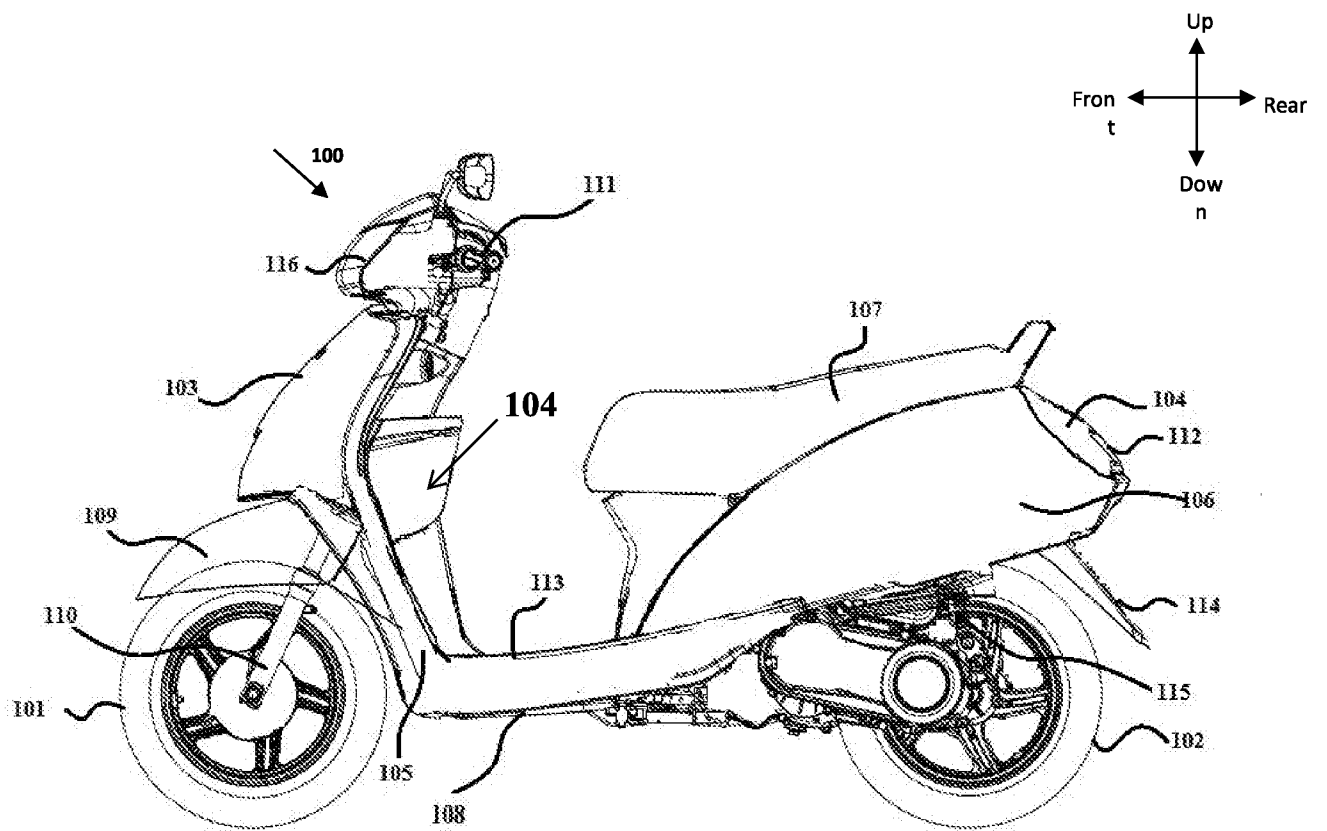


Fig. 1

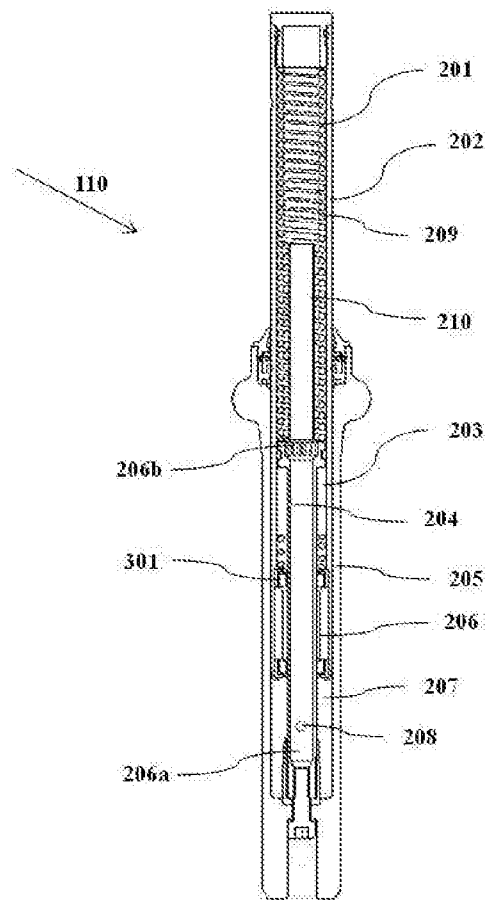


Fig. 2

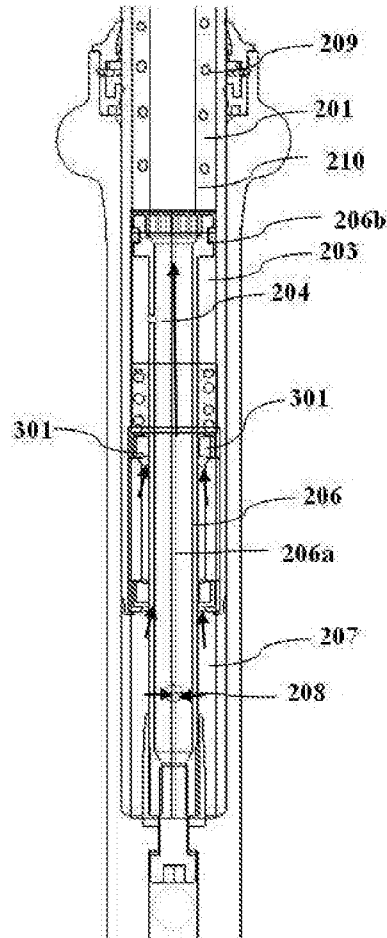


Fig. 3

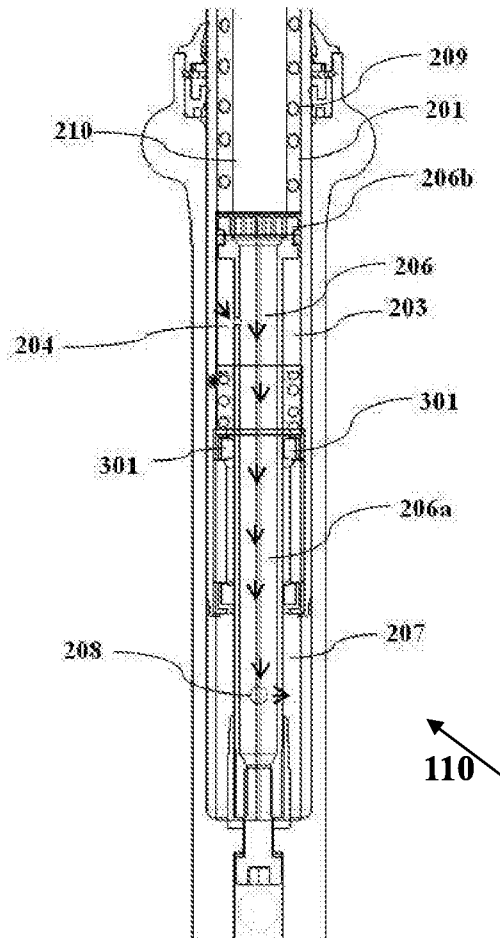


Fig. 4

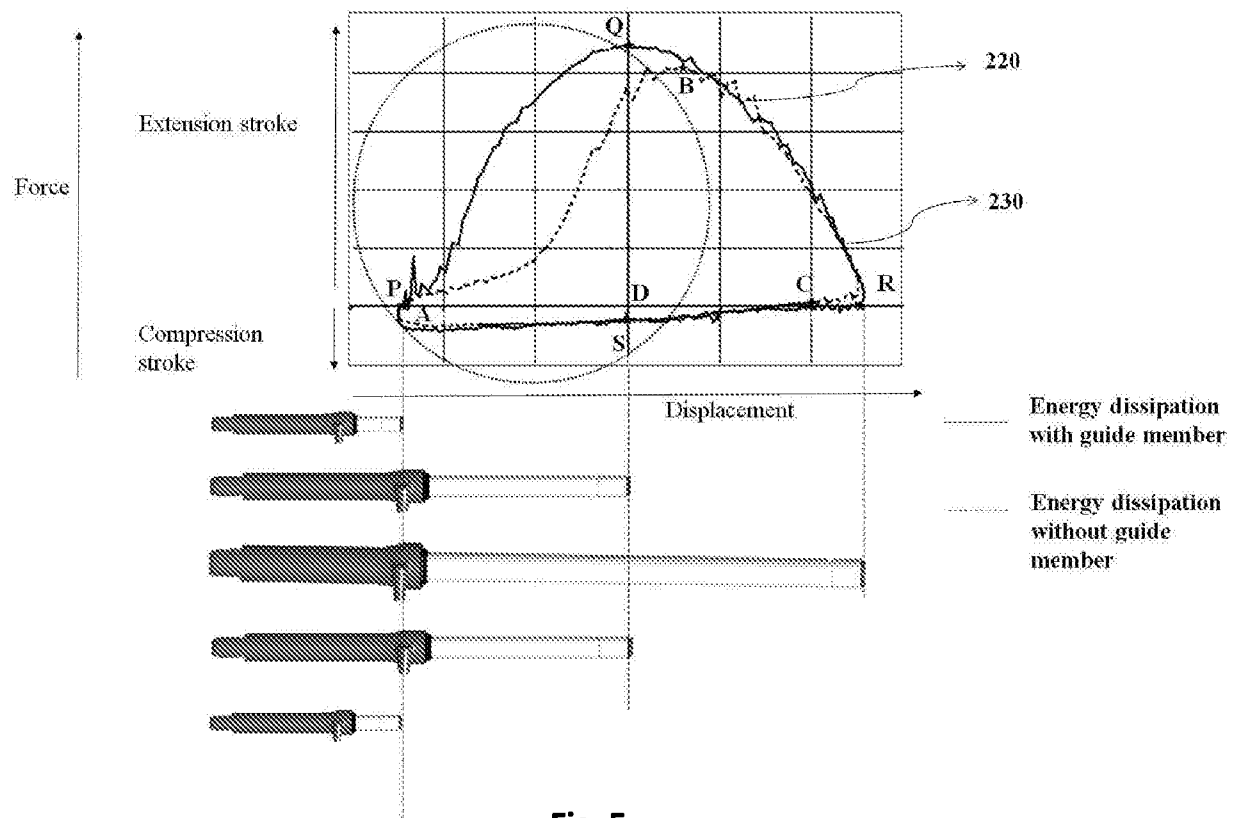


Fig. 5

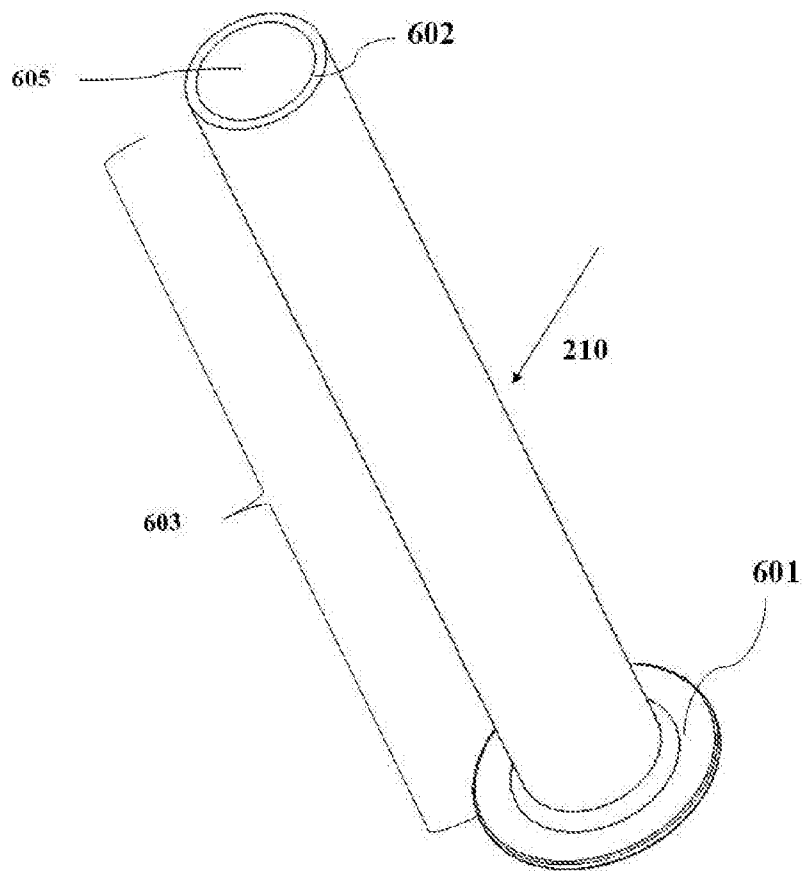


Fig. 6

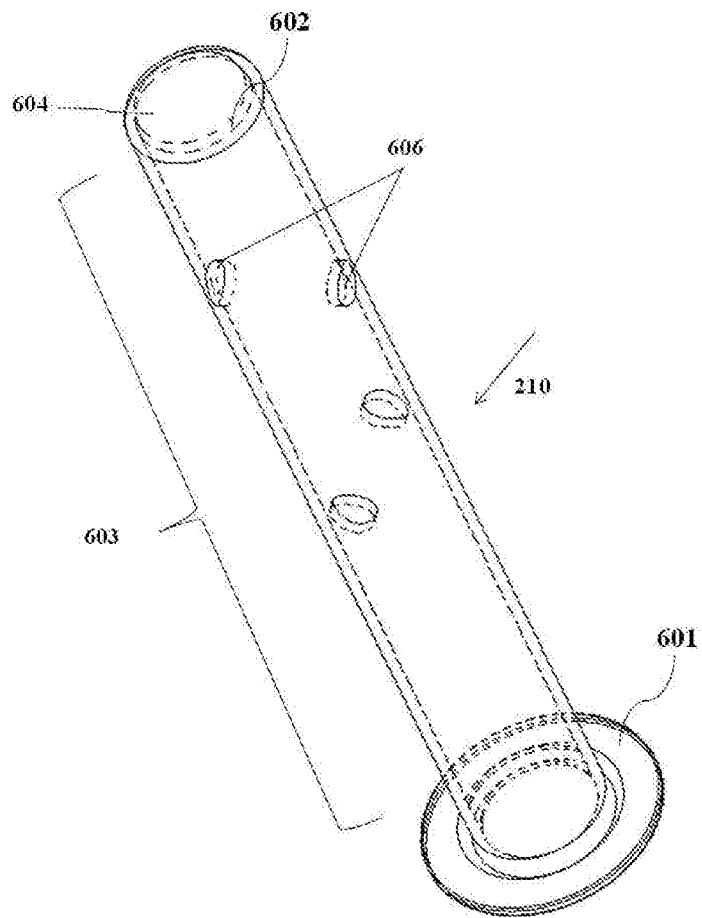


Fig. 7

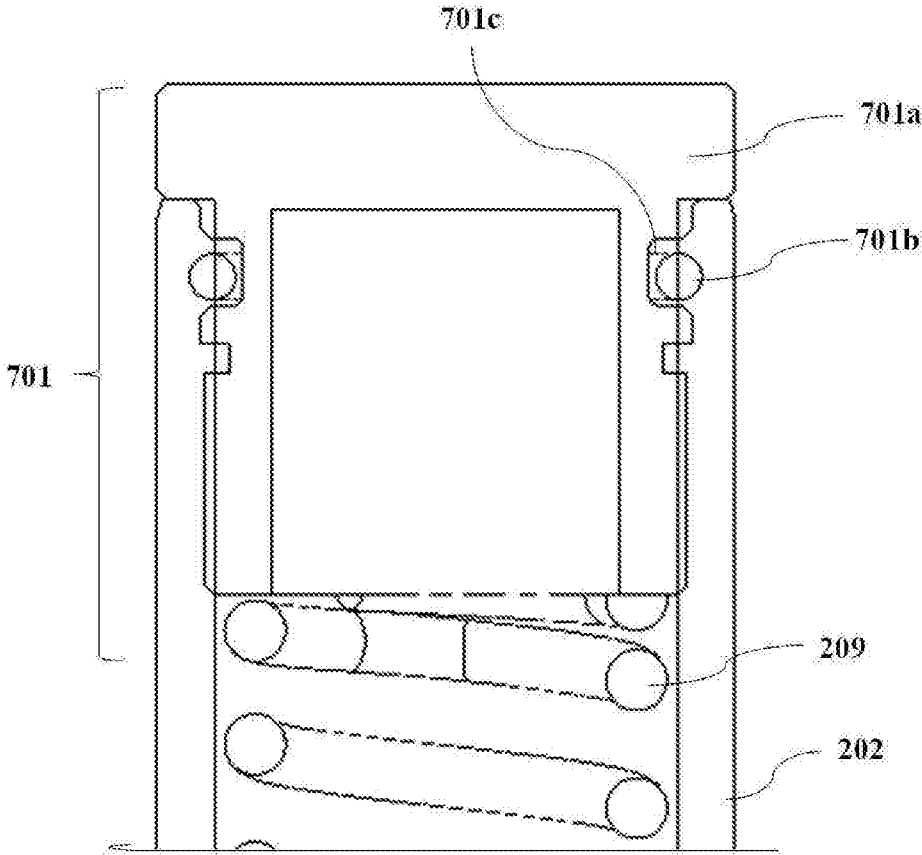


Fig. 8

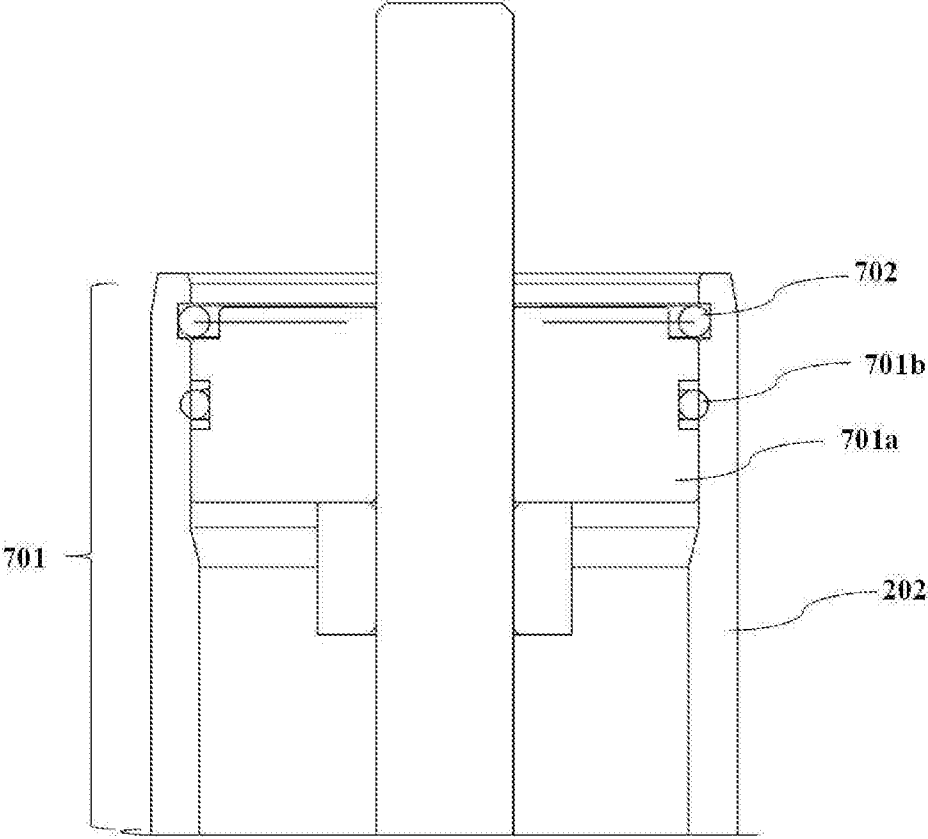


Fig. 9

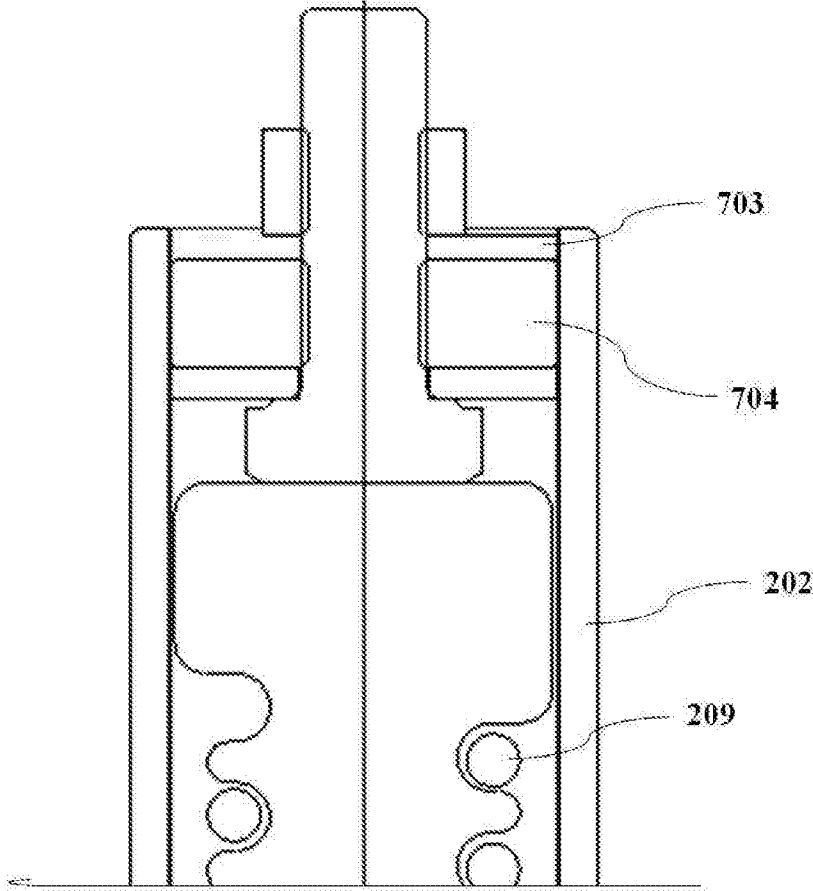


Fig. 10

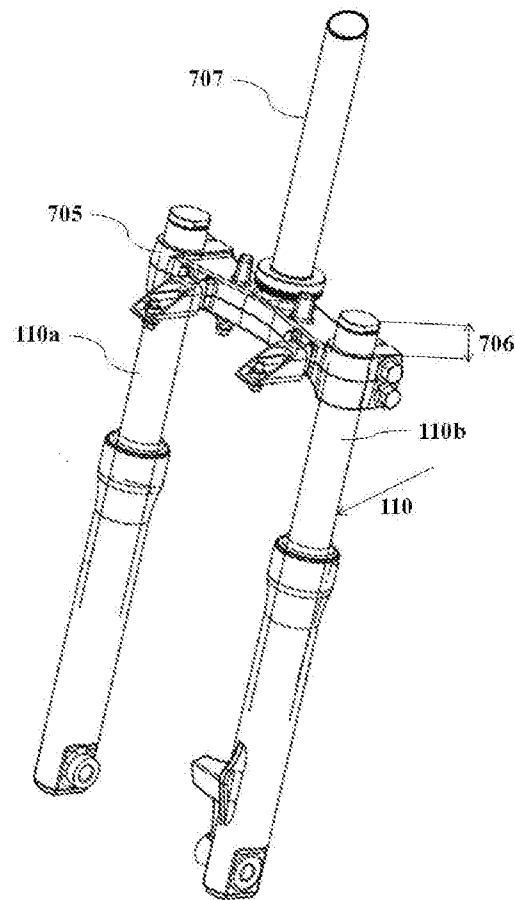


Fig. 11

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2017/056083

A. CLASSIFICATION OF SUBJECT MATTER
B62K25/08, F16F9/32, B60G15/06 Version=2018.01

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)

B62K, F16F, B60G

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)

Patseer, IPO Internal Database, Google Patents

Keywords: suspension or damper or shocker *, tube or cylinder, spring or elastic reservoir or chamber or tank, guide or piston or rod

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO2008087660 A1 (RENGARAJAN BABU et al.) 24 July 2008 (24-07-2008) Page 5; line 14-18, Page 10; line 8-14, claim 1	1-10
A	JP2016136045 A (NAKAJIMA YUJI) 28 July 2016 (28-07-2016) Para 22	1-10
A	US4589528 A (AXTHAMMER LUDWIG et al.) 20 May 1986 (20-05-1986) Para 1; line 5-30	1-10
A	WO2016112309 A1 (REYBROUCK KOENRAAD et al.) 14 Jul 2016 (14-07-2016) Abstract, Fig 2	1-10

☐ 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

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"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

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

08-02-2018

Date of mailing of the international search report

08-02-2018

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/IB2017/056083

Citation	Pub.Date	Family	Pub.Date
US 4589528 A	20-05-1986	DE 3231739 A1	01-03-1984
		GB 2125930 A	14-03-1984
WO 2016112309 A1	14-07-2016	US 2016201751 A1	14-07-2016