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(54) **BUFFER STOP**

(57) A buffer stop, comprising a mounting base and a buffer stop cap made of rubber material, the buffer stop cap and the mounting base being connected to one another to enclose a sealed accommodating cavity, and the accommodating cavity being filled with a fluid medium; and further comprising a buffer cylinder and an elastic member arranged in the accommodating cavity, the buffer cylinder comprising a cylinder body and a piston, the piston being provided with a damping hole, and the elastic member being connected to the piston; one of the cylinder body and the elastic member interacts with the buffer stop cap, and the other of the cylinder body and the elastic member interacts with the mounting base. The present buffer stop has better buffering and stopping performance, better facilitates adjustment, and can conveniently form compression rigidity curves of more shapes, so as to better meet usage requirements.

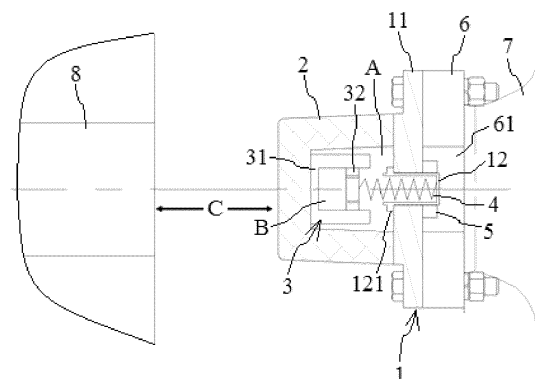


FIG. 1

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Description

[0001] The present application claims the priority to Chinese Patent Application No. 202210051136.X, titled "BUFFER STOP", filed with the China National Intellectual Property Administration on January 17, 2022, the entire disclosure of which is incorporated herein by reference.

FIELD

[0002] The present application relates to the technical field of stop structures, and in particular to a buffer stop.

BACKGROUND

[0003] A conventional buffer stop, being applied to a rail vehicle or the like, is generally a rubber buffer stop, which is made of a single material and has a limited buffering and stopping performance. Furthermore, based on characteristics of rubber, a relation between its stiffness and a compression distance thereof is simply a non-linear curve (a compression stiffness curve). Adjusting the compression stiffness curve can only be achieved by changing the type of rubber, which leads to a limited adjusting range.

SUMMARY

[0004] An object of the present application is to provide a buffer stop, which has a good buffering and stopping performance, and facilitates adjusting and easily forms various compression stiffness curves, so as to better satisfy using demands.

[0005] To solve the above technical problem, a buffer stop provided according to the present application includes:

a mounting seat, and a stopping cap made of a rubber material, and the stopping cap is connected to the mounting seat to enclose and form an accommodation cavity being sealed, and the accommodation cavity is filled with a fluid medium; and

a buffer cylinder and a resilient member provided in the accommodation cavity, and the buffer cylinder includes a cylinder body and a piston, the piston is provided with a damping hole, the piston is connected with the resilient member, one of the cylinder body and the resilient member is configured to interact with the stopping cap, and the other one of the cylinder body and the resilient member is configured to interact with the mounting seat.

[0006] Applying the above structure, in a case that the stopping cap contacts a to-be-stopped component and is compressed and deformed, both the stopping cap itself and the fluid medium in the accommodation cavity can resist the above deformation. Furthermore, the fluid medium in a cavity formed being enclosed by the cylinder body and the piston can enter the accommodation cavity through the damping hole. After being damped by the damping hole, the fluid medium is more difficult to flow out of the buffer cavity, which can resist the deformation of the stopping cap to a greater degree. Moreover, in a case that the piston contacts a bottom wall portion of the cylinder body, the resilient member can directly resist the deformation of the stopping cap. In this way, the buffer stop according to the present application has multiple forms of buffering and stopping, therefore having a better buffering and stopping performance.

[0007] In addition, since the buffer stop in the present application is provided with the fluid medium, the damping hole, the resilient member and other multiple components having the buffering and stopping performance, in specific practice, compression stiffness curves with various shapes can be formed by adjusting the type of the fluid medium, the size of the damping hole and the type of the resilient member, in cooperation with adjusting the material of the stopping cap, thereby better satisfying using demands.

[0008] In one embodiment, the mounting seat includes a body and a barrel body, and the body is provided with a thread hole, the barrel body includes a peripheral wall portion and a bottom wall portion, the peripheral wall portion is assembled to the thread hole by thread, and the other one of the cylinder body and the resilient member is configured to interact with the bottom wall portion.

[0009] In another embodiment, a portion of the peripheral wall portion located in the accommodation cavity is provided with a limiting component, and the limiting component is for limiting in cooperation with the body.

[0010] In another embodiment, the buffer stop further includes a locking nut, and the locking nut is screwed onto the peripheral wall portion, and abuts against a face of the body away from the accommodation cavity.

[0011] In another embodiment, the resilient member is a spring, and a portion of the spring is located in the barrel body, and abuts against the bottom wall portion.

[0012] In another embodiment, the mounting seat is made of a metal material; and/or, a coating is provided on an inner

wall surface of the stopping cap.

[0013] In another embodiment, the buffer stop further includes a spacer, and the spacer is arranged between the mounting seat and a to-be-mounted component.

[0014] In another embodiment, the spacer is made of a non-metallic material.

[0015] In another embodiment, the spacer is provided with an avoidance hole.

[0016] In another embodiment, the fluid medium is at least one of a gas medium and a liquid medium.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] FIG. 1 is a schematic view showing the structure of a specific embodiment of a buffer stop according to the present application.

Reference numerals in FIG. 1:

[0018]

1	mounting seat,	11	body,
12	barrel body,	121	limiting component,
2	stopping cap,	3	buffer cylinder,
31	cylinder body,	32	piston,
4	resilient member,	5	locking nut,
6	spacer,	61	avoidance hole,
7	to-be-mounted component,	8	to-be-stopped component,
A	accommodation cavity.		

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0019] For those skilled in the art to better understand technical solutions of the present application, the present application will be further described in detail in conjunction with drawings and specific embodiments hereinafter.

[0020] Referring to FIG. 1, and FIG. 1 is a schematic view showing the structure of a specific embodiment of a buffer stop according to the present application.

[0021] As shown in FIG. 1, a buffer stop is provided in the present application, and is arranged between a to-be-mounted component 7 and a to-be-stopped component 8. Specifically, the buffer stop may be mounted to the to-be-mounted component 7, and can stop the to-be-stopped component 8 for preventing the to-be-stopped component 8 from directly hitting the to-be-mounted component 7.

[0022] Herein, specific types of the to-be-mounted component 7 and the to-be-stopped component 8 are not limited in the embodiments of the present application, which is actually related to application situations of the buffer stop. When applied to a rail vehicle, for example, the to-be-mounted component 7 is a bogie frame in specific, and the to-be-stopped component 8 is a center pin in specific.

[0023] In addition, a stopping direction of the buffer stop is not limited in the embodiments of the present application either. When applied to the rail vehicle, for example, the buffer stop may be used for stopping in a lateral direction, for stopping in a longitudinal direction, or for stopping in a vertical direction.

[0024] Definitions of the above "lateral direction", "longitudinal direction" and "vertical direction" are all based on the rail vehicle. Specifically, a length direction of the rail vehicle is taken as the longitudinal direction, a width direction of the rail vehicle is taken as the lateral direction, and a direction perpendicular to a plane formed by the lateral direction and the longitudinal direction is taken as the vertical direction, and the vertical direction is also called an up-down direction.

[0025] The above buffer stop includes a mounting seat 1, and a stopping cap 2 made of a rubber material.

[0026] The mounting seat 1 is for assembly of the buffer stop at the to-be-mounted component 7, to determine a mounting position of the buffer stop. The assembly manner between the mounting seat 1 and the to-be-mounted component 7 may not be limited, and can be varied according to actual demands by those skilled in the art in specific practice, as long as mounting reliability is satisfied. For example, the mounting seat 1 and the to-be-mounted component 7 may be connected by a connector such as a screw, a bolt or the like, which can make reference to FIG. 1, to facilitate mounting and dismounting of the buffer stop. Or, the mounting seat 1 and the to-be-mounted component 7 may be connected by bonding, welding, or other manners.

[0027] The material of the mounting seat 1 may not be limited, and can be selected according to actual demands by those skilled in the art in specific practice, as long as using demands are satisfied. As a preferred solution, the mounting seat 1 is made of a metal material. In this way, the mounting seat 1 has relatively high structural strength, and can effectively resist abrasion during mounting and using, and the service life is relatively long. Furthermore, many mounting manners can be selected for the mounting seat 1 made of a metal material, which can facilitate assembly between the mounting seat 1 and the to-be-mounted component 7. Moreover, a hole portion (such as a thread hole thereafter) and other structures can be easily machined on the mounting seat 1.

[0028] The stopping cap 2 is connected to the mounting seat 1 to enclose and form an accommodation cavity A being sealed, and the accommodation cavity A is filled with a fluid medium. The connection manner between the stopping cap 2 and the mounting seat 1 may not be limited, and is related to the material of the mounting seat 1 in specific. Taking the above mounting seat 1 made of a metal material as an example, the stopping cap 2 and the mounting seat 1 may be connected by vulcanization process.

[0029] Further, the buffer stop further includes a buffer cylinder 3 and a resilient member 4 being arranged in the accommodation cavity A. The buffer cylinder 3 includes a cylinder body 31 and a piston 32, the piston 32 is provided with a damping hole (not labeled in the drawings), and the piston 32 is connected with the resilient member 4. One of the cylinder body 31 and the resilient member 4 interacts with the stopping cap 2, and the other one of the cylinder body 31 and the resilient member 4 interacts with the mounting seat 1.

[0030] To facilitate description, a cavity formed and enclosed by the cylinder body 31 and the piston 32 is referred to as a buffer cavity B.

[0031] Applying the above structure, in a case that the stopping cap 2 contacts a to-be-stopped component 8 and is compressed and deformed, both the stopping cap 2 itself and the fluid medium in the accommodation cavity A can resist the above deformation. Furthermore, the fluid medium in the buffer cavity B can enter the accommodation cavity A through the damping hole. After being damped by the damping hole, the fluid medium is more difficult to flow out of the buffer cavity B, which can resist the deformation of the stopping cap 2 to a greater degree. Moreover, in a case that the piston 32 contacts a bottom wall portion of the cylinder body 31, the resilient member 4 can directly resist the deformation of the stopping cap 2. In this way, the buffer stop provided in the present application has multiple forms of buffering and stopping, therefore having a better buffering and stopping performance.

[0032] In addition, since the buffer stop according to the present application is provided with the fluid medium, the damping hole, the resilient member 4 and other multiple components having the buffering and stopping performance, in specific practice, compression stiffness curves with more shapes can be formed by adjusting the type of the fluid medium, the size of the damping hole and the type of the resilient member 4, in cooperation with adjusting the material of the stopping cap 2, thereby better satisfying using demands.

[0033] Specific adjustments to the compression stiffness curve include but are not limited to: adjustments to the material of the stopping cap 2, adjustments to the size of the stopping cap 2, adjustments to the type of the fluid medium, adjustments to the size of the buffer cylinder 3, adjustments to the size of the damping hole, and adjustments to the type of the resilient member 4.

[0034] The above fluid medium may be a liquid medium, such as oil, and the above buffer cylinder is also referred to as an oil cylinder in this implementation. Or, the above fluid medium may be a gas medium, such as air, and the above buffer cylinder is also referred to as an air cylinder in this implementation. The gas medium has a relatively high compressibility, and can further improve the buffering and stopping performance of the buffer stop according to the present application. Or, the above fluid medium may include both the liquid medium and the gas medium. The gas medium is provided in the liquid medium in the form of a gas bag, by which the gas medium and the liquid medium are isolated from each other.

[0035] To make the stopping cap 2 better enclose the fluid medium, a coating is provided on an inner wall surface of the stopping cap 2, such that the rubber and the fluid medium are isolated from each other, which can reduce corrosion of the rubber by the fluid medium.

[0036] Further, the mounting seat 1 further includes a body 11 and a barrel body 12, and the body 11 is provided with a thread hole, the barrel body 12 includes a peripheral wall portion and a bottom wall portion, the peripheral wall portion is assembled to the thread hole by a thread, and the other one of the cylinder body 31 and the resilient member 4 interacts with the bottom wall portion.

[0037] By such arrangements, by screwing the barrel body 12, an assembly position of the barrel body 12 at the body 11 can be adjusted, thereby changing a distance between the bottom wall portion and the stopping cap 2, so as to adjust a pre-tightening force of the resilient member 4. In this way, the compression stiffness curve of the buffer stop according to the present application can be adjusted without replacing components, thereby further increasing the adjustability of the buffer stop and therefore better satisfying using demands.

[0038] The type of the above resilient member 4 can be various, as long as using demands are satisfied. For example, the resilient member 4 may be a resilient element of various forms such as a spring, a resilient ball, a resilient block or the like. In the solution illustrated in the drawings, as shown in FIG. 1, the resilient member 4 is a spring, and the spring is located in the barrel body 12. In this way, the barrel body 12 serves as a limiting and supporting component. An inner

peripheral wall surface of the barrel body 12 can limit the spring in a radial direction, so as to prevent the spring drifting in the radial direction, thereby ensuring stability of the spring in use.

[0039] Further, a portion of the peripheral wall portion located in the accommodation cavity A is provided with a limiting component 121, and the limiting component 121 is for limiting in cooperation with the body 11 to prevent the barrel body 12 from being separated from the body 11.

[0040] Herein, the specific form of structure of the above limiting component 121 is not limited in the embodiments of the present application, as long as the above technical effects can be achieved. For example, the limiting component 121 may be an annular plate formed by an outer wall surface of the peripheral wall portion extending outwards along the radial direction. Or, the limiting component 121 is a protrusion formed by the outer wall surface of the peripheral wall portion extending outwards along the radial direction, and the protrusion does not go around along a circumferential direction. At this time, the limiting component 121 may only include one protrusion or multiple protrusions. In a case that multiple protrusions are provided, the multiple protrusions are distributed and spaced apart from each other along the circumferential direction.

[0041] From the perspective in FIG. 1, the above limiting component 121 is for limiting the movement of the barrel body 12 to the right, so as to prevent the barrel body 12 from being separated from the body 11 along a direction away from the accommodation cavity A. In addition, a left-movement limiting component may be added for limiting the movement of the barrel body 12 to the left, so as to further prevent the barrel body 12 from being separated from the body 11 along a direction close to the accommodation cavity A.

[0042] The above left-movement limiting component is a locking nut 5 in specific. The locking nut 5 is screwed on the peripheral wall portion, and abuts against a face of the body 11 away from the accommodation cavity A, so as to prevent the barrel body 12 from moving too much in a direction towards an interior of the accommodation cavity A. Meanwhile, the locking nut 5 can also lock a mounting position of the barrel body 12 with respect to the body 11, and can eliminate a thread backlash between the barrel body 12 and the body 11, so as to reduce a possibility that the barrel body 12 moves along an axial direction.

[0043] The buffer stop according to the present application further includes a spacer 6, and the spacer 6 is arranged between the mounting seat 1 and the to-be-mounted component 7, which can reduce direct abrasion between the mounting seat 1 and the to-be-mounted component 7. It is more important that, the size of the spacer 6 can be adjusted during mounting, to further change a stop gap C between the stopping cap 2 and the to-be-stopped component 8, so as to satisfy different mounting space requirements, thereby further enlarging a range of application of the buffer stop.

[0044] Herein, the material of the buffer stop is not limited in the embodiments of the present application, and can be configured according to actual demands by those skilled in the art in specific practice. As a preferred solution, the above spacer 6 is made of a non-metallic material, such as PTFE (Poly tetra fluoroethylene) or the like, which can reduce abrasion of the mounting seat 1 and the to-be-mounted component 7 by the spacer 6.

[0045] Further, the spacer 6 is provided with an avoidance hole 61 to avoid mounting of the locking nut 5 and operation to the barrel body 12.

[0046] Deformation situations of the buffer stop in use is briefly described in conjunction with FIG. 1 in the embodiments of the present application hereinafter.

[0047] In a case that the to-be-stopped component 8 contacts the stopping cap 2, the buffer stop according to the present application starts to work, and performs as follows. The stopping cap 2 is compressed and drives the cylinder body 31 to move towards a side where the to-be-mounted component 7 is. During this process, the piston 32 is basically kept at its position under the action of the resilient member 4, and the fluid medium in the buffer cavity B flows to the accommodation cavity A through the damping hole. In a case that the cylinder body 31 moves towards the side, where the to-be-mounted component 7 is, to a preset position, the piston 32 contacts the bottom wall portion of the cylinder body 31. Then, the resilient member 4 is compressed and deformed.

[0048] The embodiments described hereinabove are only preferred embodiments of the present application. It should be noted that, for those skilled in the art, a few of improvements and modifications may be made without departing from the principle of the present application, and these improvements and modifications are also deemed to fall into the protection scope of the present application.

Claims

1. A buffer stop, comprising:

a mounting seat (1), and a stopping cap (2) made of a rubber material, wherein the stopping cap (2) is connected to the mounting seat (1) to enclose and form an accommodation cavity (A) being sealed, and the accommodation cavity (A) is filled with a fluid medium; and
a buffer cylinder (3) and a resilient member (4) provided in the accommodation cavity (A), wherein the buffer

cylinder (3) comprises a cylinder body (31) and a piston (32), the piston (32) is provided with a damping hole, the piston (32) is connected with the resilient member (4), one of the cylinder body (31) and the resilient member (4) is configured to interact with the stopping cap (2), and the other one of the cylinder body (31) and the resilient member (4) is configured to interact with the mounting seat (1).

- 5
2. The buffer stop according to claim 1, wherein the mounting seat (1) comprises a body (11) and a barrel body (12), the body (11) is provided with a thread hole, the barrel body (12) comprises a peripheral wall portion and a bottom wall portion, the peripheral wall portion is assembled to the thread hole by a thread, and the other one of the cylinder body (31) and the resilient member (4) is configured to interact with the bottom wall portion.
- 10
3. The buffer stop according to claim 2, wherein a portion of the peripheral wall portion located in the accommodation cavity (A) is provided with a limiting component (121), and the limiting component (121) is for limiting in cooperation with the body (11).
- 15
4. The buffer stop according to claim 2, comprising a locking nut (5), wherein the locking nut (5) is screwed onto the peripheral wall portion, and abuts against a face of the body (11) away from the accommodation cavity (A).
5. The buffer stop according to claim 2, wherein the resilient member (4) is a spring, and a portion of the spring is located in the barrel body (12), and abuts against the bottom wall portion.
- 20
6. The buffer stop according to any one of claims 1 to 5, wherein
the mounting seat (1) is made of a metal material; and/or
a coating is provided on an inner wall surface of the stopping cap (2).
- 25
7. The buffer stop according to any one of claims 1 to 5, comprising a spacer (6), wherein the spacer (6) is arranged between the mounting seat (1) and a to-be-mounted component (7).
- 30
8. The buffer stop according to claim 7, wherein the spacer (6) is made of a non-metallic material.
9. The buffer stop according to claim 7, wherein the spacer (6) is provided with an avoidance hole (61).
- 35
10. The buffer stop according to any one of claims 1 to 5, wherein the fluid medium is at least one of a gas medium and a liquid medium.

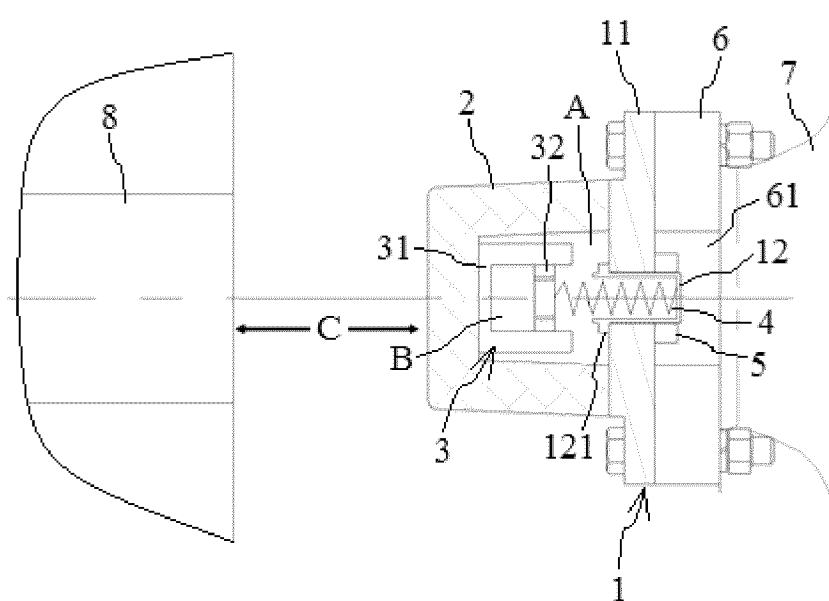


FIG. 1

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2022/135149

A. CLASSIFICATION OF SUBJECT MATTER

B61F5/50(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B61F,F16F

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)

CNTXT: DWPI; CJFD: 止挡, 缸, 活塞, 孔, 隙, 液体, 流体, 气体, 弹性, 弹簧; stop, piston, cylinder, hole, gap, liquid, fluid, air, gas, elastic, spring

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
PX	CN 114228769 A (CRRC QINGDAO SIFANG CO., LTD.) 25 March 2022 (2022-03-25) claims 1-10	1-10
A	CN 213473139 U (BYD CO., LTD.) 18 June 2021 (2021-06-18) description, paragraphs 0028-0037, and figures 1-5	1-10
A	CN 214367449 U (JINAN B.DON MACHINERY EQUIPMENT CO. LTD.) 08 October 2021 (2021-10-08) entire document	1-10
A	CN 208760632 U (BYD CO., LTD.) 19 April 2019 (2019-04-19) entire document	1-10
A	CN 110352170 A (WOERNER AUTOMATISIERUNGSTECHNIK GMBH) 18 October 2019 (2019-10-18) entire document	1-10
A	CN 106641084 A (SHENYANG JIANZHU UNIVERSITY) 10 May 2017 (2017-05-10) entire document	1-10

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

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“&” document member of the same patent family

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Name and mailing address of the ISA/CN

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INTERNATIONAL SEARCH REPORT

International application No. PCT/CN2022/135149

C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	WO 2020231972 A1 (TENNECO AUTOMOTIVE OPERATING CO INC) 19 November 2020 (2020-11-19) entire document	1-10

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Information on patent family members

International application No.

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Form PCT/ISA/210 (patent family annex) (July 2022)

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