Title: TELESCOPIC PROTECTION DEVICE FOR A BRAKE PISTON ROD AND VEHICLE

Abstract: A protection device for a piston rod (2) of a brake piston of a brake yoke (1), comprising a protective cover (3) arranged both for the brake yoke and for a portion (2') of the piston rod which is intended to protrude towards a brake disc, and adapted to protectively surrounding at least the portion of the piston rod which protrudes from the brake yoke and to expanding and contracting in the course of a reciprocating movement of the piston rod. The protection device is distinguished in particular in that the protective cover (3) comprises at least one telescopically arranged tubular metal protective element (4) adapted to forming a substantially watertight tube. The invention also relates to a vehicle.
TELESCOPIC PROTECTION DEVICE FOR A BRAKE PISTON ROD AND VEHICLE.

TECHNICAL FIELD

5 The present invention relates to a protection device according to the introductory part of the attached claim 1.

The invention also relates to a vehicle according to claim 10.

10 BACKGROUND

Protecting a piston rod of a brake piston of a brake yoke from dirt etc. involves using, at least for trucks and buses, a rubber bellows which is adapted to protectively surrounding the piston rod and expands and contracts in the course of a reciprocating movement during a braking cycle.

A rubber bellows of this kind entails several disadvantages. For example, repeated expansion and contraction resulting in cracking over time. Moreover, the rubber ages, not least in conurbation environments and winter road salting, both of which contribute to embrittlement and cracking. Rubber is also temperature-sensitive and does not tolerate temperatures over about 250ºC, which occur in, for example, urban bus operation and other warm applications. Rubber bellows of the kind indicated consequently require frequent maintenance attention and replacement.

25 OBJECT OF THE INVENTION

The object of the present invention is to provide a solution to the problems described above and present a protection device which is resistant even under, in this context, extremely arduous conditions, despite long periods of exposure, with continuing overall functionality.
SUMMARY OF THE INVENTION

The object as above is achieved with a device and a vehicle which exhibit features according to the independent claims 1 and 10 respectively.

Further advantages are afforded by features according to the dependent claims.

BRIEF DESCRIPTION OF THE DRAWING

The present invention will be understood better with reference to the following detailed description read together with the attached drawing, in which the same reference notations refer to the same parts and in which

- Fig. 1 depicts schematically in axial section a first preferred embodiment of a protection device according to the present invention.

In Fig. 1, ref. 1 denotes part of a schematically depicted brake yoke supporting a brake piston (not depicted) with a piston rod 2 (for the sake of clarity not depicted sectionally) adapted to pressing brake blocks (not depicted) against a brake disc (not depicted), said piston rod being arranged with an outer portion 2' protruding towards the brake disc, in this case to the right in the drawing.

To protect the piston rod from, inter alia, dirt and water, a protective cover 3 is provided both for the brake yoke and for said portion of the piston rod protruding towards the brake disc and comprises and is extended by at least one telescopic metal protective element 4, but preferably at least two, here three, mutually telescopic tubular metal protective elements 4 arranged to form a preferably substantially watertight tube.

According to the version depicted, the protective elements 4 are of mutually increasing cross-section towards the end 5 of the piston rod which is intended to point towards the
brake disc, with the result that the cross-section of the tube of the protective cover decreases progressively towards the piston rod end 5.

It is preferable that the protective elements be arranged in mutually sealing pairs. According to the embodiment depicted, the protective element with the larger cross-section in a pair of protective elements, a first protective element 4", as for example depicted for the protective elements 4', 4" of the pair 4', 4", has at its inner shell surface 6 a seal 7 adapted to externally, preferably wipingly, sealing against the outer shell surface 8 of the second protective element 4' of the pair, which second protective element has a smaller cross-section than the first protective element 4", as illustrated in Fig. 1.

According to preferred embodiments, said seal comprises a high-temperature-resistant seal 7', e.g. a Teflon seal or a graphite seal 7', which should tolerate temperatures substantially higher than 300°C.

Also according to preferred embodiments, there are protective elements which comprise an internal flange 9 at the end 10 which is intended to point towards the brake disc, an external flange 11 at the end 12 which is intended to point away from the brake disc, the flanges 9, 11 being adapted to acting as stop flanges.

It is also preferable that a corresponding seal 7, T be arranged at the fastening 3' of the protective cover 3 (the tube) in the brake yoke and be adapted to sealing, preferably wipingly, against the outer shell surface 8 of the protective element 4' " situated nearest to the brake yoke.

According to the invention, the protective elements are substantially made of metal, preferably stainless steel or aluminium.

The function of the protection device according to the invention is probably substantially and sufficiently indicated above.
By means of the telescopically arranged protective elements of the protective cover (the tube), this piston rod performs in the course of its reciprocating movement a braking cycle and is sealed from the surroundings by the seals arranged between the elements. The metal protective elements are high-temperature-resistant like the seals, resulting in a non-ageing protective cover and thereby eliminating the need for maintenance and replacement.

The invention thus affords extremely substantial advantages over the state of the art.

The invention is described above in relation to preferred embodiments and embodiment examples.

Further embodiments and minor additions and modifications are of course conceivable without departing from the basic concept of the invention.

Thus embodiments are conceivable with only two protective elements, one of them fastened to, or arranged telescopically and sealingly relative to, the brake yoke, and the other arranged telescopically relative to the first and to the piston rod.

As already indicated above, embodiments are also conceivable in which a single telescopically arranged tubular metal protective element is adapted to forming a substantially watertight tube. Such a protective element corresponds to the protective element 4" and is therefore telescopically insertable and withdrawable relative to the brake yoke and sealed against the brake yoke and is so arranged relative to the undepicted piston rod that the protective cover is adapted to expanding and contracting in the course of a reciprocating movement of the piston rod.

An advantage of having more than one protective element telescopically relative to the brake yoke is that the insertion length in the brake yoke is reduced.
According to preferred embodiments, devices according to the invention are intended for, inter alia, trucks and buses, particularly buses for tourist traffic in urban environments.

The invention is therefore not to be regarded as limited to the embodiments indicated above but may be varied within its scope indicated by the attached claims.
CLAIMS

1. A protection device for a piston rod of a brake piston of a brake yoke, comprising a protective cover arranged both for the brake yoke and for a portion of the piston rod which is intended to protrude towards a brake disc, and adapted to protectively surrounding at least the portion of the piston rod which protrudes from the brake yoke and to expanding and contracting in the course of a reciprocating movement of the piston rod, characterised in that the protective cover (3) comprises at least one telescopically arranged tubular metal protective element (4) adapted to forming a substantially watertight tube.

2. A device according to claim 1, characterised in that it comprises at least two mutually telescopic protective elements.

3. A device according to claim 1 or 2, characterised in that the protective elements are of mutually increasing cross-section in the direction away from the end (5) of the piston rod which points towards the brake disc.

4. A device according to claim 1, 2 or 3, characterised in that the protective elements are arranged in mutually sealing pairs.

5. A device according to claim 4, characterised in that the protective element (4") with the larger cross-section in a pair (4', 4") of protective elements has at its inner shell surface (6) a seal (7) adapted to externally, preferably wipingly, sealing against the outer shell surface (8) of the other protective element (4') of the pair.

6. A device according to claim 5, characterised in that a corresponding seal (7, 7') is arranged at the fastening (3') of the protective cover in the brake yoke (1) and is adapted to sealing, preferably wipingly, against the outer shell surface (8) of the protective element (4'") situated nearest to the brake yoke.
7. A device according to claim 5 or 6, characterised in that said seal (7) comprises a high-temperature-resistant seal (7'), e.g. a Teflon seal or a graphite seal (7).

8. A device according to any one of claims 1-7, characterised in that it comprises protective elements which have an internal flange (9) at the end (10) which is intended to point towards the brake disc, and an external flange (11) at the end (12) which is intended to point away from the brake disc, which flanges are adapted to acting as stop flanges.

9. A device according to any one of claims 1-8, characterised in that said protective elements (4) are made of stainless steel or aluminium.

10. A vehicle, characterised in that it comprises protection devices according to any of claims of 1-9.

11. A vehicle according to claim 10, characterised in that it is a bus or a truck, especially a bus for tourist traffic in urban environments.
INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2007/050554

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet
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)

IPC: F16D, F16J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE, DK, FI, NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Further documents are listed in the continuation of Box C.

Date of the actual completion of the international search 4 December 2007

Date of mailing of the international search report 07-12-2007

Name and mailing address of the ISA/Swedish Patent Office Box 5055, S-102 42 STOCKHOLM Facsimile No. + 46 8 666 02 86

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Use the application number as username.
The password is RSSSDLIOOD.

Paper copies can be ordered at a cost of 50 SEK per copy from PRV InterPat (telephone number 08-782 28 85).

Cited literature, if any, will be enclosed in paper form.
## INTERNATIONAL SEARCH REPORT
### Information on patent family members

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