

(12) Patent Application Publication **(10) Pub. No.: US 2003/0126983 A1**
Pfingst **(43) Pub. Date: Jul. 10, 2003**

(30) **Foreign Application Priority Data**

Dec. 14, 2001 (DE)..... DE 101 61 436.5

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Publication Classification

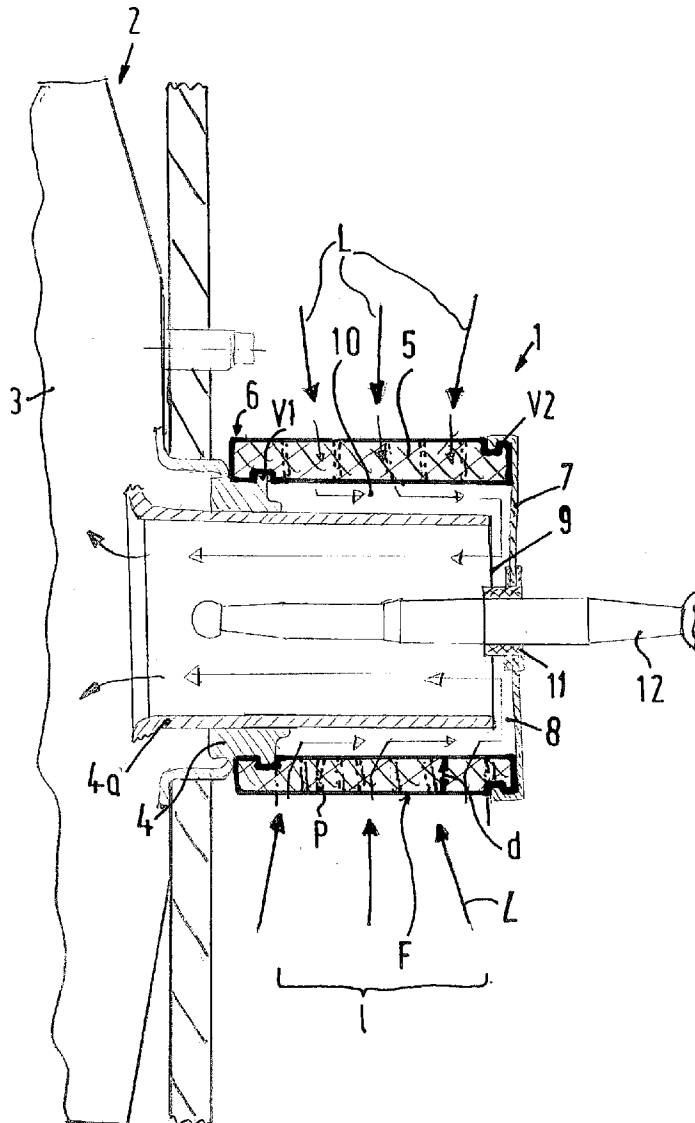
(51) **Int. Cl.⁷** **F01B 31/00**
(52) **U.S. Cl.** **92/86**

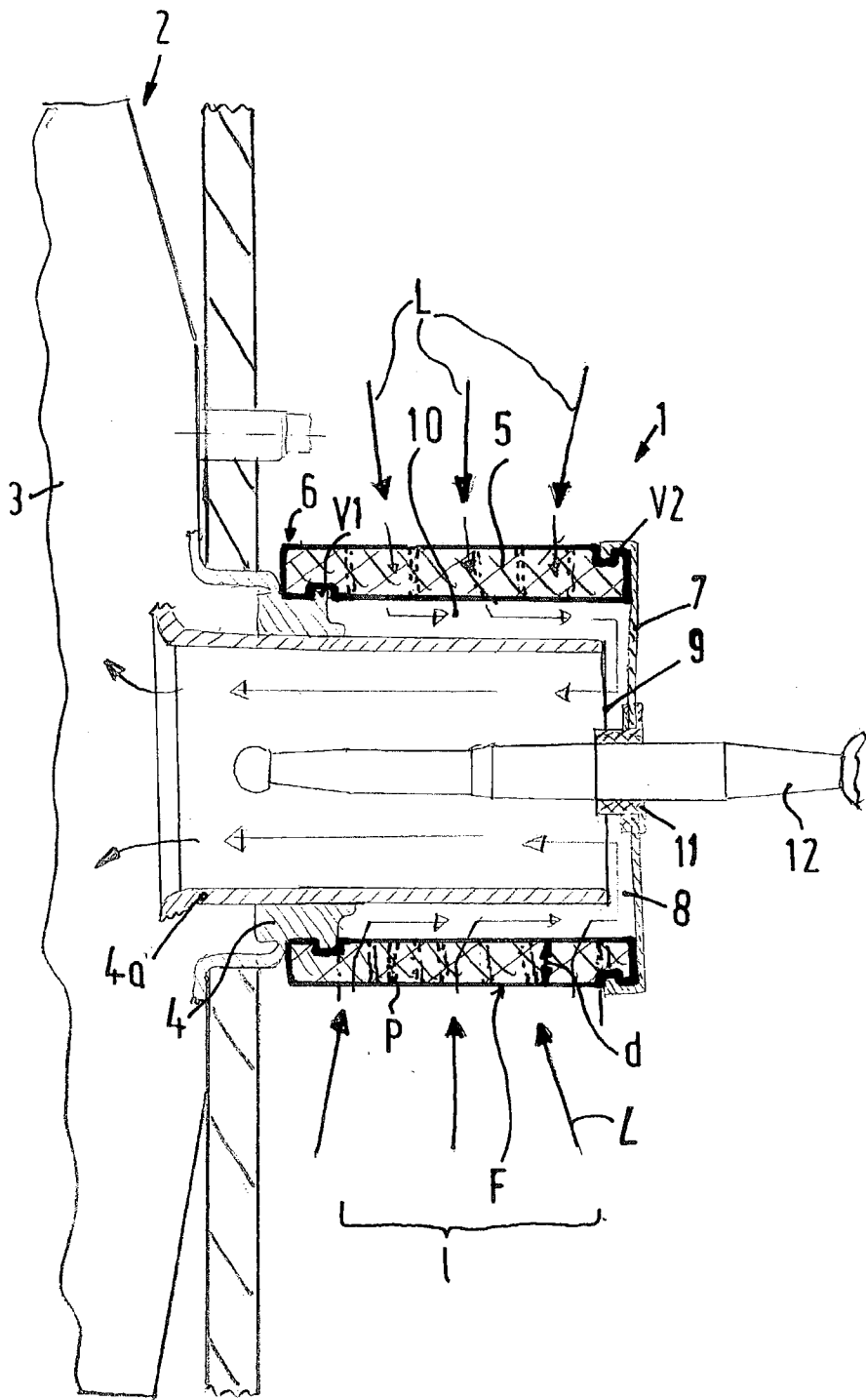
(57) **ABSTRACT**

In the case of an intake noise muffler for a brake booster, a gas-permeable and noise muffling filter element, which is of plastic, is provided as the filter element for the intake air and extends along the entire length of the distributor housing or of a sleeve of a control valve housing.

(21) Appl. No.: **10/319,809**

(22) Filed: **Dec. 16, 2002**





INTAKE NOISE MUFFLER AND METHOD OF MAKING AND USING SAME

BACKGROUND AND SUMMARY OF THE INVENTION

[0001] This application claims the priority of German Patent Document 101 61 436.5, filed on Dec. 14, 2001, the disclosure of which is expressly incorporated by reference herein.

[0002] The invention relates to an intake noise muffler for a brake booster, comprising a filter element on a pedal-side control valve housing.

[0003] From German Patent Document DE 40 27 562 C2, a brake booster is known which has a control valve housing enclosed by bellows and having feeds for intake air to the brake booster by way of air inlet openings which are covered by a filter element consisting of a sound absorbing material.

[0004] It is an aspect of certain preferred embodiments of the invention to provide an intake noise muffler which can be installed in a simple manner and causes an efficient method of operation with respect to the noise muffling and flow resistance when taking in air into the brake booster.

[0005] According to certain preferred embodiments of the invention, this aspect can be achieved in that the housing is surrounded by the filter element, which is gas-permeable and noise muffling, constructed as a tube, which filter element is further constructed in a dimensionally stable manner and with a plurality of pores and is tightly closed off on a face side by way of a cap. Additional advantageous characteristics are contained below and in other embodiments.

[0006] A principal advantage achieved by way of certain preferred embodiments of the invention is that a filter element is used as an intake noise muffler which has an optimal noise-muffling effect while the flow resistance of the intake air is low. For this purpose, the distributor housing of the brake booster is surrounded by a gas-permeable and noise muffling filter element which, in particular, is constructed as a tube, has a dimensionally stable construction, is constructed with a plurality of pores and, on the face-side, is tightly closed off by a cap. By way of this construction of the filter element, the extent of the noise muffling and the amount of the flow resistance can be optimally adjusted. In particular, the filter element is of a porous sintered material. A possible versatile usability of the filter element can be influenced by the forming, particularly by the size, of the pores as well as by the wall thickness of the tube element.

[0007] Since the intake surface of the filter element has a length which is formed between a connection at the distributor housing and another connection on the cap, a maximally large intake surface can be created, whereby the target conflict of the noise muffling and the flow resistance can be favorably influenced.

[0008] By the use of a porous sintered plastic material for the filter element, a maximal noise muffling is possible while the flow resistance is low, and furthermore, the filter element has a dimensionally stable construction, whereby no additional support or support housing is required.

[0009] The filter element is preferably arranged coaxially to the sleeve of a housing of the brake booster and extends

close to the cap, in which case the intake air can be fed in a labyrinth-type manner to the housing. In particular, the filter element extends beyond the entire possible length of this sleeve of the housing so that an inflow space for the intake air is formed between the face-side cap of the filter element and a mouth opening of the sleeve.

[0010] In the face-side cap of the filter element, a receiving device is provided for an operating rod of the brake booster.

[0011] According to additional embodiments of the invention, the filter element as well as the cap may comprise an identical gas-permeable and noise-muffling material. Furthermore, the filter element may be constructed in one piece with the cap and may jointly comprise a gas-permeable and noise-muffling material as a whole.

[0012] Summarizing, advantages of the filter element according to certain preferred embodiments of the invention are the following: The used material for the filter element is a porous-sintered plastic material (such as polyethylene) which has a large noise-muffling effect while the flow resistance is low. The noise muffling and the flow resistance can be adjusted by way of the used pore size and the wall thickness of the filter element.

[0013] The target conflict of the noise muffling and the flow resistance is favorably influenced by the use of an intake surface which is as large as possible.

[0014] As a result of the free shaping of the mechanically firm, sintered material of the filter element, an adaptation to the existing space and thus a further enlargement of the intake surface can be achieved in a simple manner.

[0015] By using a material which is dimensionally stable at a vacuum, no additional support or support housing is required, as is the case when noise mufflers of a soft foam (for example, a polyurethane foam) are used. Such a known support or support housing would reduce the actual intake surface.

[0016] Other objects, advantages and novel features of the present invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWING

[0017] **FIG. 1** shows a sectional view of an intake noise muffler comprising a filter element made of a porous sintered plastic material.

DETAILED DESCRIPTION OF THE DRAWING

[0018] An intake noise muffler **1** for a brake booster **2**, which is not shown in detail, has a filter element **5** constructed as a tube on its control valve housing **4**, **4a**. This filter element **5** is fastened by way of one end **6** to the housing **4** and, at its other end, which faces away, is closed off on the face-side by a cap **7**.

[0019] The filter element **5** is of a porous sintered material and is constructed to be dimensionally stable, that is, self-supporting. The indicated arrows represent the feeding of intake air **L** into the brake booster **2**. As a result of the plurality of pores **P** in the wall of the filter element **5**, the intake air **L** can be optimally fed to the brake booster **2**. The

filter element 5 extends along the entire length I of the distributor housing 4, 4a as well as beyond it, for forming a spatial gap 8 between the free end of a sleeve 4a of the housing 4 and the closing-off cap 7. By way of this spatial gap 8, the intake air L is fed to a mouth opening 9 of the sleeve 4a. The exterior surface F of the filter element 5 has a length I which is formed between a connection V1 on the housing 4, 4a and a connection V2 on the cap 7.

[0020] The filter element 5 is preferably arranged coaxially with respect to the sleeve 4a of the housing 4 so that an annulus 10 is formed, by way of which the intake air L is fed to the face-side mouth opening 9.

[0021] A receiving device 11 for an operating rod 12 of the brake booster 2 is provided in the cap 7.

[0022] The filter element 5 and the cap 7 may be produced from the same material. In addition, the filter element 5 with the cap 7 may be one piece of the same material.

[0023] The foregoing disclosure has been set forth merely to illustrate the invention and is not intended to be limiting. Since modifications of the disclosed embodiments incorporating the spirit and substance of the invention may occur to persons skilled in the art, the invention should be construed to include everything within the scope of the appended claims and equivalents thereof.

What is claimed is:

1. Intake noise muffler for a brake booster, comprising a filter element on a pedal-side control valve housing, wherein the housing is surrounded by the filter element, which is gas-permeable and noise muffling, constructed as a tube, which said filter element is further constructed in a dimensionally stable manner and with a plurality of pores and is tightly closed off on a face side by way of a cap.

2. Intake noise muffler according to claim 1, wherein the filter element is made of a porous sintered plastic material.

3. Intake noise muffler according to claim 1, wherein intake air can be fed along an entire exterior surface of the filter element to an interior of the housing by way of a face-side mouth opening.

4. Intake noise muffler according to claim 2, wherein intake air can be fed along an entire exterior surface of the filter element to an interior of the housing by way of a face-side mouth opening.

5. Intake noise muffler according to claim 3, wherein the exterior surface of the filter element has a length which is formed between a connection on the housing and a connection on the cap.

6. Intake noise muffler according to claim 4, wherein the exterior surface of the filter element has a length which is formed between a connection on the housing and a connection on the cap.

7. Intake noise muffler according to claim 1, wherein a maximal noise muffling with a low flow resistance can be adjusted as a function of a size of the pores and a wall thickness (d) of the filter element.

8. Intake noise muffler according to claim 2, wherein a maximal noise muffling with a low flow resistance can be adjusted as a function of a size of the pores and a wall thickness of the filter element.

9. Intake noise muffler according to claim 3, wherein a maximal noise muffling with a low flow resistance can be adjusted as a function of a size of the pores and a wall thickness of the filter element.

10. Intake noise muffler according to claim 1, wherein the filter element is arranged coaxially to a sleeve of the housing and extends close to the cap, and intake air can be fed in a labyrinth-type manner by way of a face-side space and an adjoining annulus to an interior of the housing.

11. Intake noise muffler according to claim 2, wherein the filter element is arranged coaxially to a sleeve of the housing and extends close to the cap, and intake air can be fed in a labyrinth-type manner by way of a face-side space and an adjoining annulus to an interior of the housing.

12. Intake noise muffler according to claim 3, wherein the filter element is arranged coaxially to a sleeve of the housing and extends close to the cap, and intake air can be fed in a labyrinth-type manner by way of a face-side space and an adjoining annulus to an interior of the housing.

13. Intake noise muffler according to claim 7, wherein the filter element is arranged coaxially to a sleeve of the housing and extends close to the cap, and intake air can be fed in a labyrinth-type manner by way of a face-side space and an adjoining annulus to an interior of the housing.

14. Brake booster comprising the intake noise muffler of claim 1, wherein the face-side cap of the filter element has a receiving device for an operating rod of the brake booster.

15. Intake noise muffler according to claim 1, wherein the filter element and the face-side cap consist of an identical gas-permeable and noise muffling material.

16. Intake noise muffler according to claim 2, wherein the filter element and the face-side cap consist of an identical gas-permeable and noise muffling material.

17. Intake noise muffler according to claim 7, wherein the filter element and the face-side cap consist of an identical gas-permeable and noise muffling material.

18. Intake noise muffler according to claim 1, wherein the filter element is constructed in one piece with the cap and consists of a gas-permeable and noise muffling material.

19. Intake noise muffler according to claim 2, wherein the filter element is constructed in one piece with the cap and consists of a gas-permeable and noise muffling material.

20. Intake noise muffler according to claim 10, wherein the filter element is constructed in one piece with the cap and consists of a gas-permeable and noise muffling material.

21. A method of using an intake noise muffler comprising utilizing the intake noise muffler of claim 1.

22. A method of making an intake noise muffler comprising making the intake noise muffler of claim 1.

23. A method of making an intake noise muffler for a brake booster, comprising:

surrounding a pedal-side control valve housing with a gas-permeable and noise muffling filter element which is constructed as a tube, the filter element being dimensionally stable and having a plurality of pores, and

tightly closing off a face side of the filter element by way of a cap.

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