



(11) **EP 1 234 638 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:  
**28.08.2002 Bulletin 2002/35**

(51) Int Cl.7: **B25B 27/06**

(21) Application number: **02001384.3**

(22) Date of filing: **19.01.2002**

(84) Designated Contracting States:  
**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU**  
**MC NL PT SE TR**  
 Designated Extension States:  
**AL LT LV MK RO SI**

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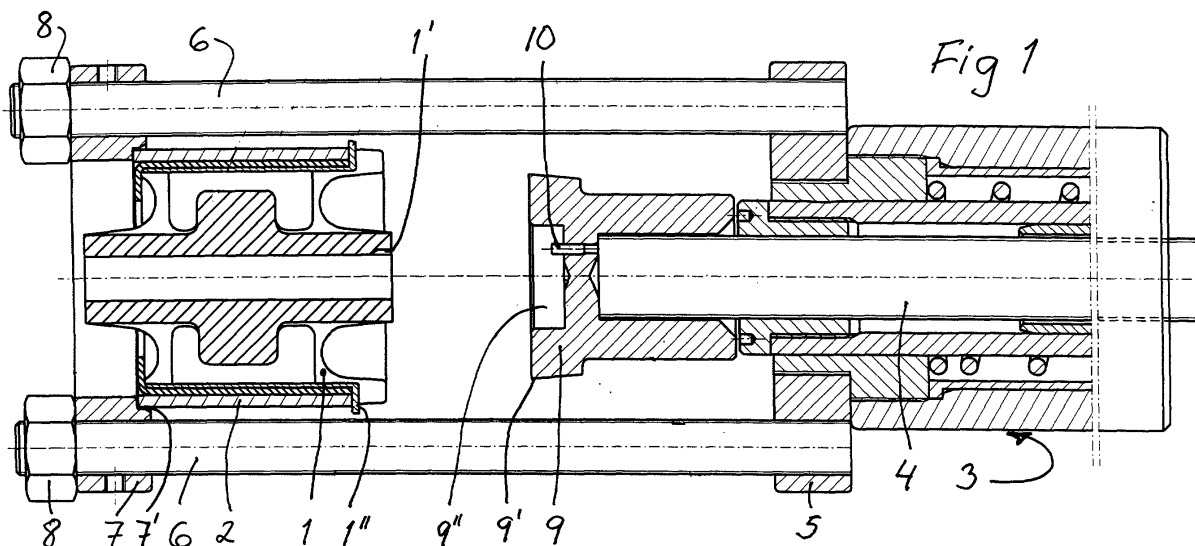
(30) Priority: **27.02.2001 SE 0100654**

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(54) **A tool for dismounting and mounting a hydrostatic bush**

(57) A tool for removing a cylindrical hydrostatic bush (1) from a cylindrical bush housing (2) and for subsequent mounting of a new bush in the housing has a push rod (4) movable towards the bush housing (2) in the axial direction of the latter by means of an actuator

(3) and a counter-means (8) at the opposite side of the bush housing for supporting the latter against the force on the bush (1) from the push rod, which may either be provided with a punch mandrel (9) for pushing out the interior parts of the bush or with a press plate (12) for pressing a new bush into the bush housing.



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## Description

### Technical Field

[0001] The present invention relates to a tool for removing a cylindrical hydrostatic bush from a cylindrical bush housing and for subsequent mounting of a new bush in the housing.

### Background of the Invention

[0002] For example in an axle design of a car, a hydrostatic bush (also called Silentbloc®) is used for damping purposes. The hydrostatic bush is arranged with a tight fit in a fixed bush housing and has a central opening for receiving a rod-shaped member to be damped.

[0003] When the bush is worn-out or damaged and has to be replaced, problems are encountered. The bush is pushed or pressed into position in its housing, until a flange of a bush sleeve abuts the end of the bush housing. As the outer diameter of the bush housing may be smaller than that of sleeve flange, it may be difficult to push the bush out of the housing in the return direction as compared to the mounting, as there is no possibility to apply or mount a counterstay. The force required to remove the bush from its housing may vary depending on the tolerances and the building-up of rust and other contaminants, but may be quite considerable.

[0004] Another possibility could be to use a sharp-edged withdrawing tool to be inserted between the bush housing and the bush sleeve, but in this case there is a risk for damages to the housing and the tool.

[0005] When a worn-out hydrostatic bush has been removed, it is desired to mount a new one in the bush housing as simply and quickly as possible, preferably by means of the same tool as was used for the dismantling.

### The Invention

[0006] A simple and sturdy but yet effective tool without the disadvantages set forth above is according to the invention attained in that the tool has a push rod movable towards the bush housing by means of an actuator and a counter-means at the opposite side of the bush housing for supporting the latter against the force on the bush from the push rod, which may either be provided with a punch mandrel for pushing out the interior parts of the bush or with a press plate for pressing a new bush into the bush housing.

[0007] The basic thought behind this tool is that the bush is not removed from its housing in the direction opposite the mounting direction, which is most natural, but that the major portion of the bush is pressed out of the housing in the same direction as the mounting direction.

## The Drawings

[0008] The invention will be further described below under reference to the accompanying drawings, in which

Fig 1 is a section through a tool according to the invention with a punch mandrel in position for expelling a hydrostatic bush from a bush housing therefore,

Fig 2 is a section through a press plate (also shown in Fig 5) for alternative use in the tool according to the invention,

Fig 3 is an end view of the punch mandrel shown in Fig 1,

Fig 4 illustrates the expulsion of the bush from the housing, and

Fig 5 illustrates the introduction of a new bush in the housing.

### Detailed Description of a Preferred Embodiment

[0009] A so called hydrostatic bush 1 is most clearly shown in Fig 5 but also in Figs 1 and 4. A hydrostatic bush is also called Silentbloc®. It is for example used for damping purposes in the rear axle design in certain cars. It is cylindrical and is mounted in a cylindrical fixed bush housing 2, as is shown in Figs 1 and 2.

[0010] Originally, the bush 1 is been mounted from the right to the left in Fig 1 into the bush housing 2, until the bush flange 1" engages the right end of the bush housing 2.

[0011] A new tool to be described has been developed for dismantling or removing a worn-out hydrostatic bush 1 and for subsequent mounting of a new hydrostatic bush in the bush housing.

[0012] This tool comprises an actuator 3 of a suitable type, for example a single-acting hydraulic cylinder with a spring return. The actuator, which does not *per se* form any part of the invention, is not further described. In the shown case it has a threaded push rod 4, which enables a mechanical adjustment of its stroke. It has a front ring 5, to which distance rods 6 are attached.

[0013] A counter-ring 7 is slidingly arranged on the distance rods 6 and has an end shoulder 7' for engagement with the left end of the bush housing 2. The inner diameter of the counter-ring 7 is greater than the outer diameter of the bush 1 to as to allow passage of the latter. Removable nuts 8 are arranged at the ends of the distance rods 6.

[0014] A punch mandrel 9 has a sleeve-shaped end to the right in the drawing for arrangement on the end of the push rod 4. At its opposite or forward end it has a relieved cutting edge 9' for cutting through interior parts of the hydrostatic bush 1. Its cross-sectional area is smaller than that of the hydrostatic bush 1. The forward end of the punch mandrel 9 has a socket 9" for engaging a central portion of the bush 1, as appears in

Fig 4.

[0015] As the bush 1 in a practical case also contains metallic parts, the punch mandrel 9 has side portions removed as shown in Fig 3. In order to guide the punch mandrel 9 into proper position for obviating cutting contact with these metallic parts, it is provided in the socket 9" with a guide pin 10 for engagement with a corresponding notch 1' in the central portion of the hydrostatic bush.

[0016] With the tool arranged with the counter ring 7 against the fixed bush housing 2, the push rod 4 provided with the punch mandrel 9 is advanced by the actuator 3 in the direction of the arrow in Fig 4. The mandrel 9 has a smaller diameter than the bush 1, which means that the internal parts of the bush are partly broken and pushed out to the left in the drawing. The remaining sleeve 1" may thereafter easily be manually removed.

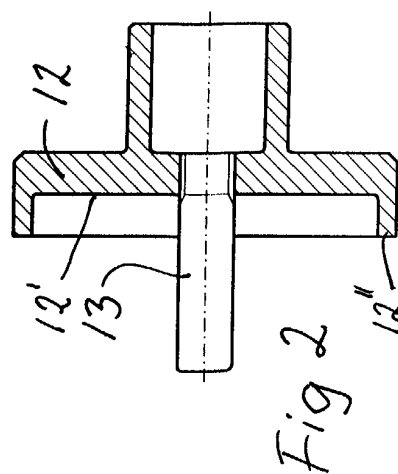
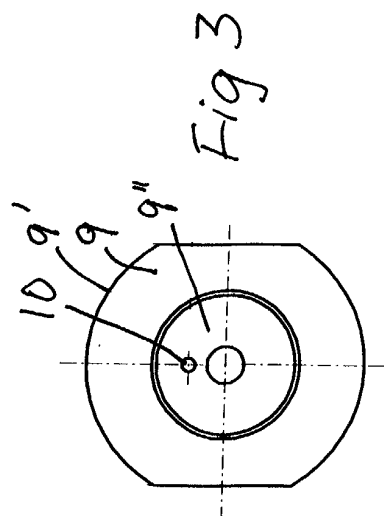
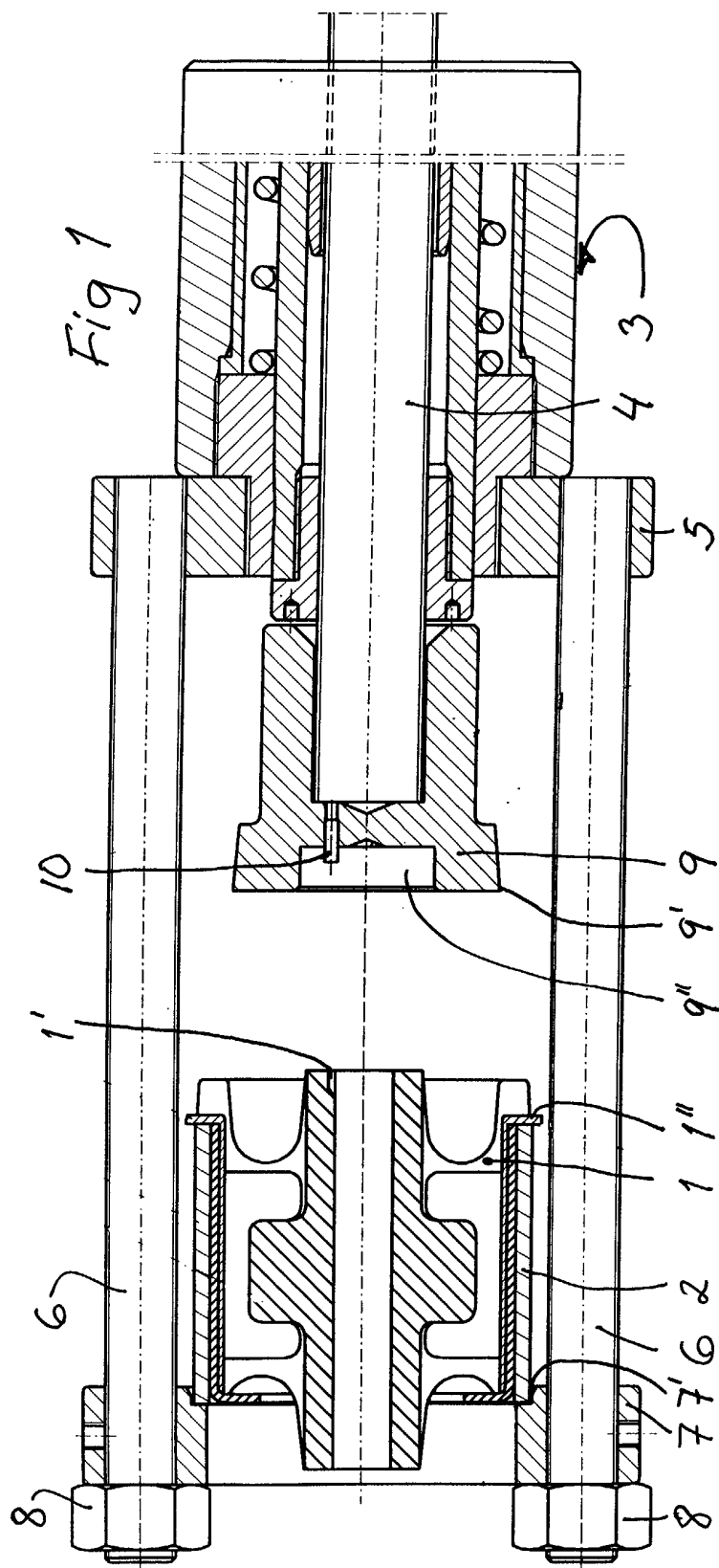
[0017] The bush housing 2 is now ready for the mounting of a new hydrostatic bush 1, as is depicted in Fig 5. For this purpose the previously used punch mandrel 9 is replaced by a press plate 12 with a sleeve shaped portion for arrangement on the push rod 4. The press plate 12 has a central portion 12' for engagement with the central portion of the bush 1 and a ring 12" for engagement with the bush sleeve 1", as is shown in Fig 5. It also has a center pin 13 for guiding insertion in a center hole in the hydrostatic bush 1. The press plate 12 has a diameter corresponding to the overall diameter of the bush 1. By pushing against the central portion of the bush 1 and the flange of the bush sleeve 1" the press plate 12 can press the new hydrostatic bush 1 into the bush housing 2 without any damage to the bush.

## Claims

1. A tool for removing a cylindrical hydrostatic bush (1) from a cylindrical bush housing (2) and for subsequent mounting of a new bush in the housing, **characterized by** a push rod (4) movable towards the bush housing (2) in the axial direction of the latter by means of an actuator (3) and by a counter-means (7) at the opposite side of the bush housing for supporting the latter against the force on the bush (1) from the push rod, which may either be provided with a punch mandrel (9) for pushing out the interior parts of the bush or with a press plate (12) for pressing a new bush into the bush housing.
2. A tool according to claim 1, **characterized in that** the counter-means is a ring (7) arranged on distance rods (6) attached to the actuator (3).
3. A tool according to claim 2, **characterized in that** the counter-ring (7) has an end shoulder (7') for engagement with the bush housing (2).
4. A tool according to claim 2, **characterized in that**

the inner diameter of the counter-ring (7) is greater than the outer diameter of the bush (1).

5. A tool according to claim 1, **characterized in that** the punch mandrel (9) has a smaller cross-sectional area than the hydrostatic bush (1) and has a relieved cutting edge (9') in its front.
6. A tool according to claim 5, **characterized in that** the punch mandrel (9) has a sleeve-shaped back end for arrangement on the push rod (4).
7. A tool according to claim 5, **characterized in that** the punch mandrel (9) has side portions removed and is provided with a guide pin (10) for cooperation with a corresponding notch (1') in the hydrostatic bush (1).
8. A tool according to claim 1, **characterized in that** the press plate (12) has a diameter corresponding to that of the hydrostatic bush (1).
9. A tool according to claim 8, **characterized in that** the press plate (12) has a central portion (12') for engagement with the central portion of the bush (1) and a ring (12") for engagement with its sleeve flange (1") .
10. A tool according to claim 8, **characterized in that** the press plate (12) has a sleeve-shaped back end for arrangement on the push rod (4).
11. A tool according to claim 8, **characterized in that** the press plate (12) has a center pin (13) for guiding insertion in a center hole in the hydrostatic bush (1).



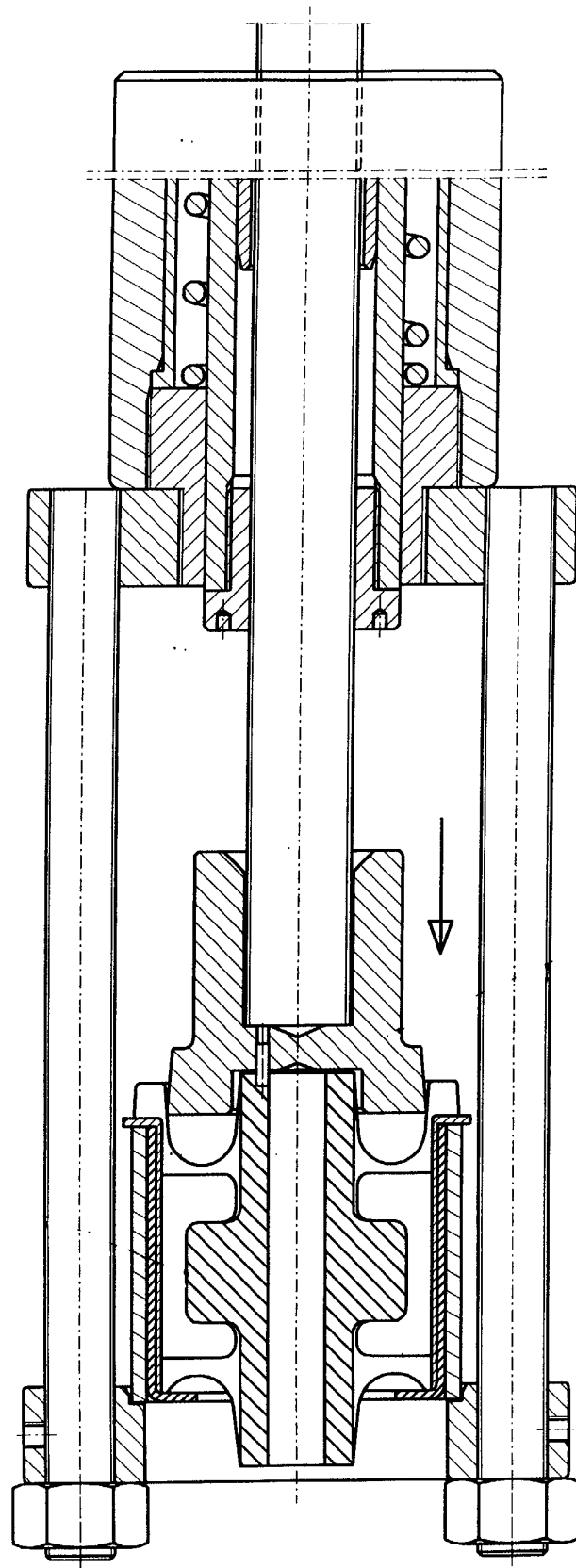


Fig 4

