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Remarks:
A request for correction of descripton has been filed pursuant to Rule 139 EPC. A decision on the request will be taken during the proceedings before the Examining Division (Guidelines for Examination in the EPO, A-V, 3.).

(54) **Apparatus for supporting a pulling device**

(57) The invention relates to an apparatus for supporting a pulling device (10) which is able to pull a tubular component (20) such as an atomiser from a cylindrical channel (21) in a cylinder head (12) of an engine, which comprises a supporting plate (6) having an annular supporting surface (7) with a centre line (9), and supporting means (4) for supporting the supporting plate (6) on the cylinder head (12) as the centre line is positioned above the cylindrical channel (21).
In accordance with the present invention the supporting means (4) comprise a base plate (4) which on one side of the centre line (9) is provided with supporting surfaces, and wherein one or more supporting surfaces with the larger distance to the centre line can be pressed to the cylinder head (12) by means of a clip (1,2,3).

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Description

[0001] The present invention relates to an apparatus in accordance with the preamble of claim 1. Such apparatus are known. In said known devices the supporting plate is supported by elements, which adjust support at various locations around the cylindrical channel on the cylinder head afsteunen. Since a cylinder head does not have a regular surface near the cylindrical channels, the supporting means for the various adjacent cylindrical channels in a cylinder head have to be made to size time and again, which is time consuming. In order to avoid this drawback the apparatus according to the invention is as defined in claim 1. The supporting plate can now adjust support on a part of the cylinder head which is spaced from the cylindrical channels. At some distance from the cylindrical channels the shape of the cylinder head is more regular, so that the base plate can adjust support on the cylinder head in an identical way, resulting in a saving of time.

[0002] In accordance with an embodiment of the invention the apparatus is as defined in claim 2. In this way the base plate can be pressed in a stable way against a flat finished surface, zoals tegen the afdichtingsvlak of a valve cover.

[0003] In accordance with an embodiment of the invention the apparatus is as defined in claim 3. Hierdoor kan the base plate op eenvoudige wijze langs a rand zoals the rand of a afdichtingsrand of the valve cover verplaatst worden.

[0004] In accordance with an embodiment of the invention the apparatus is as defined in claim 4. Hierbij wordt op efficiente wijze gebruik gemaakt of in the cylinder head aanwezige boutgaten, wherein verstellen of the base plate in lengterichting of the motor op eenvoudige wijze te realiseren is.

[0005] In accordance with an embodiment of the invention the apparatus is as defined in claim 5. Pulling-out the tubular component is simplified herewith.

[0006] In accordance with an embodiment of the invention the apparatus is as defined in claim 6. This embodiment enables to establish in one part the direction of the centre line and the position of the supporting surfaces with respect to each other in a simple and accurate way.

[0007] The invention will now be illustrated further by the following embodiment with reference to the accompanying drawings, in which:

- Figure 1 is a sectional view along I-I through a part of a cylinder head at the position of an atomiser with pulling device coupled to the atomiser;
- Figure 2 a plane view of part of the cylinder head of Figure 1;
- Figure 3 a perspective view of an apparatus according to the invention, gemonteerd op a cylinder head, in deze uitvoeringsvorm with a aan the atomiser gekoppeld pulling device, voorzien van a set instelbare schotelveren;
- Figure 4 a bovenaanzicht of the apparatus according to the invention, zoals getoond in Figure 1;
- Figure 5 a verticale dwarsdoorsnede langs the lijn A-A of Figure 4; and
- Figure 6 a verticale dwarsdoorsnede langs the lijn B-B of Figure 4

[0008] In the various figures the same reference numbers indicate the same or essentially the same parts and/or functions.

[0009] Figures 1 and 2 tonen a deel of a cylinder head 12 of a dieselmotor. Zoals gebruikelijk zijn in the cylinder head 12 atomisers 20 gemonteerd, die voor brand-stoftoevoer in the verbrandingsruimte of the dieselmotor zorgen. In the hier getoonde uitvoeringsvoorbeeld is in the cylinder head 12 a camshaft 22 gemonteerd, die kan roteren in a lagering 14. The camshaft 22 bedient kleppen (niet getoond) in the cylinder head 12 and is in a camshaftruimte gemonteerd, die aan the bovenzijde afsluitbaar is door a valve cover (niet getoond). The valve cover wordt op a bewerkt mounting surface 15 gemonteerd with behulp of bouten, die in boutgaten 16 worden geschroefd.

[0010] The atomiser 20 with a centre line 13 is mounted in a narrow cilindrisch channel 21, which on the upper part will become somewhat wider and later a montage-opening 19 vormt. Tijdens gebruik maakt the onderzijde of the atomiser 20 deel uit of the verbrandingsruimte and dikwijls komen er verbrandingsgassen in the nauwe ruimte tussen the atomiser 20 and the cylindrical channel 21. Hierdoor ontstaat veelal a versnelde corrosie, with als gevolg dat the atomiser 20 kan komen vast te zitten in the cylindrical channel 21 and the atomiser 20 moet dan with grote kracht uit the cylindrical channel 21 getrokken worden. Deze situatie is hier getoond. The atomiser 20 is aan the bovenzijde voorzien of schroefdraad 11, waarin a spindle 10 is geschroefd. Daarbij liggen the centre line 13 of the atomiser 20 and a centre line 9 of the spindle 10 in elkaars verlengde. The spindle 10 steekt door a opening 18 in a supporting plate 6 and op the spindle 10 is a nut 8 geschroefd. The nut 8 rust op a thrust bearing 7 dat in the supporting plate 6 is bevestigd.

[0011] The supporting plate 6 is with koppelplaten 5 mounted on a base plate 4 bevestigd, die with supporting surfaces 17 op the mounting surface 15. rust. Bouten 3 klemmen a strap 1 and daaronder the base plate 4 tegen the mounting surface 15. Daarbij zijn the bouten 3 in the boutgaten 16 geschroefd. Omdat the boutgaten 16 niet altijd op a gewenste plaats zullen zitten zijn in the strap 1 and in the base plate 4 sleufgaten 23 aangebracht, zodat voor elke positie of the base plate 4 door the strap 1 voldoende klemkracht op the base plate 4 kan worden uitgeoefend. Through the klemforce the base plate 4 is firmly supported on the cylinder head 12, so that the nut 8 is firmly supported and the nut 8 will be able to exert sufficient upwarde force on the spindle 10. By this upward force, the atomiser 20 is pulled out of the cylinder head

12 by screwing the nut 8 on the spindle 10. In order to pull out a subsequent atomiser 20 from the cylinder head 12 the base plate 4 is brought to a subsequent position and the procedure is then repeated.

[0012] In the embodiment illustrated the centre line 13 of the atomiser 20 is perpendicular to the mounting surface 15 and kan the centre line 9 of the thrust bearing 7 dus ook loodrecht op the vlak of the supporting surfaces 17 staan. The zal duidelijk zijn dat deze hoek ook ongelijk aan 90 graden kan zijn.

[0013] In the embodiment shown steunen the supporting surfaces 17 tegen the mounting surface 15 of the valve cover. The supporting surfaces 17 kunnen ook steunen op andere bij voorkeur bewerkte delen of the cylinder head 12 which is present next to the in a rij staande atomisers 20 aanwezig is. Voorbeelden hiervan zijn bewerkte delen of the camshaft 22 of the daarmee verbonden onderdelen of op the zijkant of the cylinder head 12 aanwezige bewerkings- of afstelvlakken. The is daarbij niet nodig dat the supporting surfaces 17 of the base plate 4 in a vlak liggen.

[0014] The embodiment shown in Figures 3 to 6, inclusive, is essentially similar to the embodiment shown in Figures 1 and 2, except that the pulling spindle is provided now with a set of adjustable Belleville washers, essentially as disclosed in non-prepublished Dutch patent application 1031097, which is herein incorporated by reference.

Claims

1. Apparatus for supporting a pulling device (10) which is able to pull a tubular component (20) such as atomiser from a cylindrical channel (21) in a cylinder head (12) of an engine, which comprises a supporting plate (6) having an annular supporting surface (7) with a centre line (9), and supporting means (4) for supporting the supporting plate on the cylinder head as the centre line is positioned above the cylindrical channel, **characterised in that** the supporting means comprise a base plate (4) which on one side of the centre line (9) is provided with supporting surfaces (17), and wherein one or more supporting surfaces with the larger distance to the centre line can be pressed to the cylinder head (12) by means of a clip (1,2,3).

2. Apparatus according to claim 1, wherein the supporting surfaces (17) are positioned in one plane.

3. Apparatus according to claim 1 or 2, wherein the supporting surfaces (17) are positioned in two essentially parallel lines.

4. Apparatus according to claim 1, 2 or 3, wherein the clip comprises a strap (1) which can be pulled against the base plate (4) using one or more bolts (3).

5. Apparatus according to any one of the previous claims, wherein the pulling device comprises a spindle (10) having a nut (8), and the supporting plate (6) comprises a thrust bearing (7) to support the nut.

6. Apparatus according to any one of the previous claims, wherein the supporting plate (6) and the base plate (4) form an assembled part.

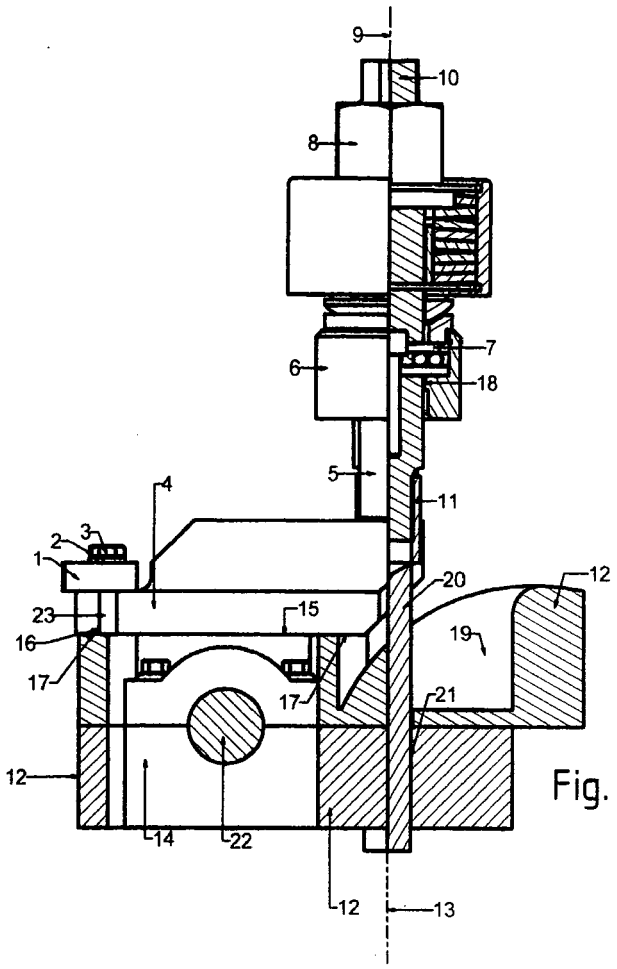
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Fig. 1

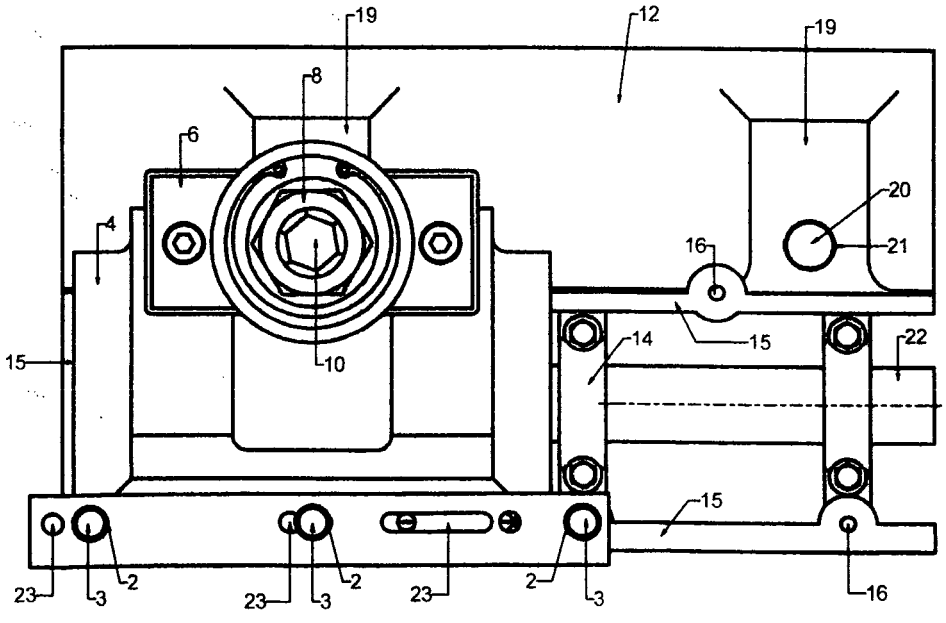
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Fig. 2

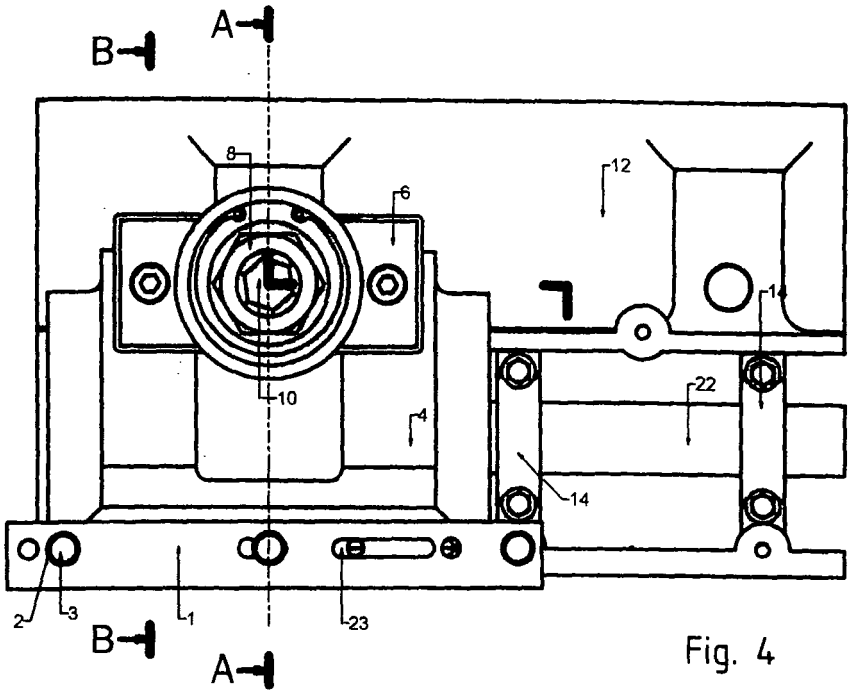

Fig. 4

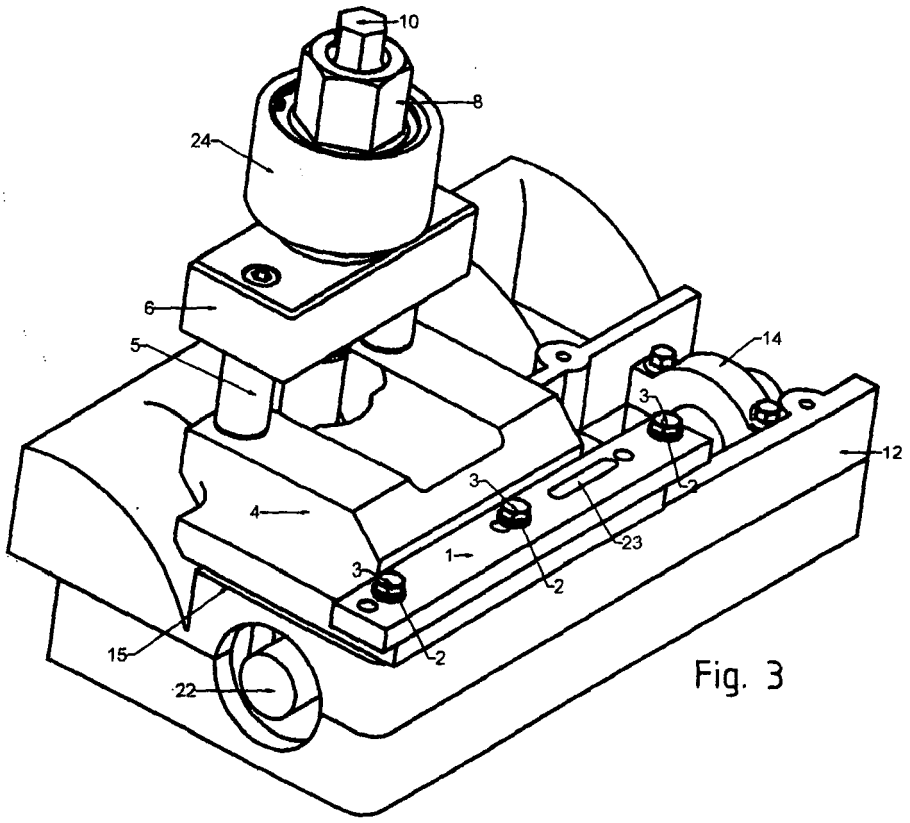

Fig. 3

A-A (1 : 1)

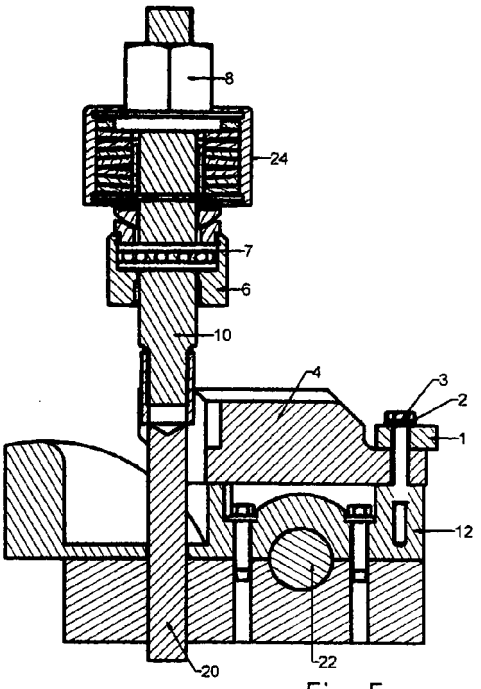

Fig. 5

B-B (1 : 1)

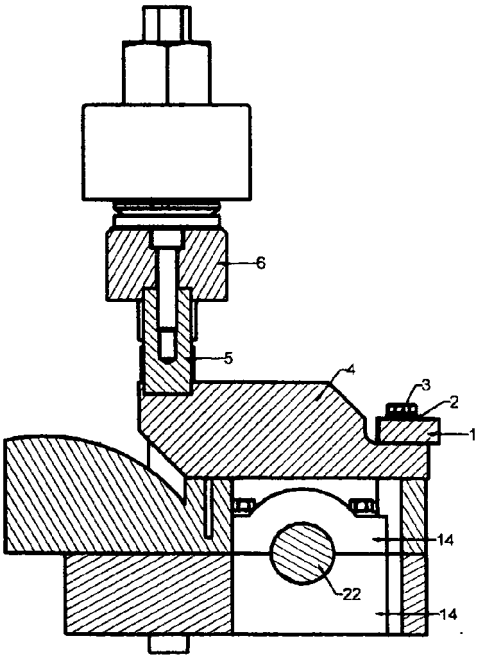

Fig. 6

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- DE 1031097 **[0014]**