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(54) DEVICE FOR GRIPPING DIESEL ENGINE INJECTORS

(57) A device (1) for gripping diesel engine injectors (I), of the type comprising a threaded end (F) which is adapted to remain exposed from the corresponding seat on the engine head (T) and is associated with a connecting body (C) and with a grip ring (G); the device (1) comprises a substantially C-shaped main body (2), provided with a block (3) which is associated with a coupling seat (4) that can be associated with an extraction bar (102) and with a fork (5) that can be associated with said injector (I) at the corresponding grip ring (G), which are mutually associated by means of at least one connecting wall (7); the device (1) furthermore comprises a clamping element (8) associated with the fork (5) of the main body (2) so as to form between them a retention seat (9) in the extraction direction of the grip ring (G) of the injector (I) and means (10) for the temporary connection of the main body (2) and of the clamping element (8); a contrast plate (11) supports the clamping element and is provided with a portion (12) for anchoring to the block (3), the temporary connecting means (10) being interposed between the anchoring portion (12) of the contrast plate (11) and the block (3) of the main body (2).

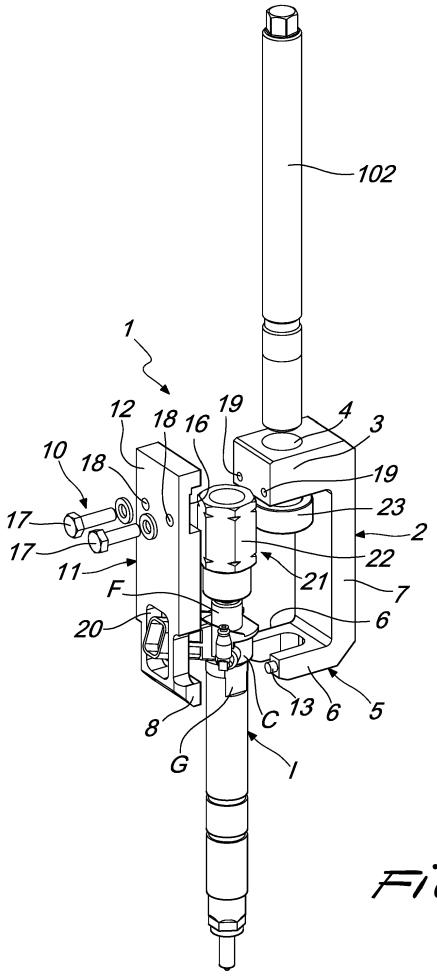

Fig. 1

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Description

[0001] The present invention relates to a device for gripping diesel engine injectors.

[0002] Injectors are known which are accommodated in adapted seats provided in the heads of diesel engines to introduce atomized fuel in the combustion chamber. In particular, injectors are known which are provided, proximate to the threaded end designed to remain protruding outside the corresponding seat, with a plastic connection body below which a grip ring is provided.

[0003] If, due to wear or deformations, the injectors remain jammed in the corresponding seats, it is necessary to use for their removal adapted extraction tools provided with a device for gripping the injector.

[0004] For example, in order to grip the intact injector a grip device is known which comprises a substantially C-shaped main body and is constituted by a disk provided with a seat for coupling with a threaded extraction bar and by a fork provided with a pair of prongs which are adapted to surround laterally the injector at the corresponding ring and are connected by a vertical connecting wall.

[0005] However, under the traction force that must be applied to remove the injector, the prongs of the fork may open or the main body itself may be deformed, rendering the operation difficult if not ineffective.

[0006] In order to obviate these drawbacks at least partly, a version of a grip device is known in which there is a grip half-ring which couples to the fork of the main body to form a retention seat for the grip ring of the injector by means of transverse screws for temporary connection.

[0007] In this manner, the risk that the prongs of the fork might be deformed or that the device might lose grip on the injector is avoided.

[0008] However, these grip devices require having a certain space in an axial direction in the region for coupling between the main body and the half-ring in order to be able to insert the connecting screws.

[0009] These injector grip devices of the known type are not free from drawbacks, which include the fact that they cannot be used for types of injectors and engines that have small maneuvering spaces in an axial direction.

[0010] For this very reason, depending on the type of injector and motor on which one must intervene, it may be necessary to remove the connecting body in order to allow an adequate grip of the body of the injector.

[0011] However, in this case the injector cannot be reused and necessarily has to be replaced, with a considerable cost increase of the maintenance intervention.

[0012] The aim of the present invention is to eliminate the drawbacks noted above of the background art, by providing a device for gripping diesel engine injectors that allows to apply an adequate grip in order to extract intact injectors even in situations in which the geometry of the engine and/or of the injector on which one must intervene have small maneuvering spaces.

[0013] Within this aim, an object of the present invention is to be able to keep the injector intact without requiring the removal of the plastic connecting body in order to allow reuse where possible, reducing intervention costs.

[0014] A further object of the present invention is to be effective and reliable, allowing the transmission of an adequate traction force in the extraction direction to the injector without the risk of undergoing deformations and failures.

[0015] Another object of the present invention is to have a structure that is simple, relatively easy to provide in practice, safe in use, effective in operation, and relatively modest in cost.

[0016] This aim and these and other objects which will become better apparent hereinafter are all achieved by the present device for gripping diesel engine injectors, of the type comprising a threaded end which is adapted to remain exposed from the corresponding seat on the engine head and is associated with a connecting body and with a grip ring, comprising a substantially C-shaped main body, provided with a block which is associated with a coupling seat that can be associated with an extraction bar and with a fork that can be associated with said injector at the corresponding grip ring, which are mutually associated by means of at least one connecting wall, a clamping element associated with the fork of said main body so as to form between them a retention seat in the extraction direction of the grip ring of said injector, and means for the temporary connection of said main body and of said clamping element, characterized in that it comprises a contrast plate which supports said clamping element and is provided with a portion for anchoring to said block, the connecting means being interposed between the anchoring portion of the contrast plate and the block of the main body.

[0017] Further characteristics and advantages of the present invention will become better apparent from the detailed description of a preferred but not exclusive embodiment of a device for gripping diesel engine injectors, illustrated by way of nonlimiting example in the accompanying drawings, wherein:

Figure 1 is an exploded perspective view of a device for gripping diesel engine injectors, according to the invention;

Figure 2 is a partially sectional view of a grip device according to the invention, inserted in a tool for extracting injectors during use;

Figure 3 is a sectional view, taken along the line III-III of Figure 2;

Figures 4 and 5 are perspective views of the main body of the grip device according to the invention;

Figures 6 and 7 are perspective views of the contrast plate of the grip device according to the invention.

[0018] With particular reference to the figures, the reference numeral 1 generally designates a device for gripping diesel engine injectors.

[0019] The device 1 is adapted to be used to extract a conventional injector I from the corresponding seat on the head T of a diesel engine. The injector I is of the type provided with a threaded end F which is adapted to remain exposed from the corresponding seat on the head T of the engine and is associated with a connecting body C made of plastic and with a grip ring G.

[0020] The device 1 can be incorporated in a conventional tool 100 for extracting injectors I, of the type that comprises a bridge 101 for supporting a threaded extraction bar 102 adapted to be arranged on the head T of the engine in order to perform the intervention for removal of the injector I from its seat.

[0021] In any case, during use the device 1 must be associated with an extraction bar 102.

[0022] Furthermore, the device 1 can be inserted in a kit which comprises various tools for the complete extraction of injectors I and parts of injectors from the corresponding seat on the head T of diesel engines.

[0023] The device 1 comprises a substantially C-shaped main body 2 provided with a block 3, associated with a seat 4 for coupling to the extraction bar 102, and with a fork 5 that is adapted to be arranged with the corresponding prongs on opposite sides of the injector I at the corresponding ring G, which are mutually connected by means of a connecting wall 7.

[0024] Furthermore, the device 1 comprises a clamping element 8 which is adapted to be associated with the fork 5 so as to form between said elements a seat 9 for retention in the extraction direction (indicated by the arrow E in the figures) of the injector I and means 10 for temporary connection of the main body 2 and of the clamping element 8.

[0025] The device 1 comprises a contrast plate 11 which supports at one end the clamping element 8 and at the opposite end a portion 12 for anchoring to the block 3 of the main body 2. The temporary connection means 10 are interposed between the block 3 and the anchoring portion 12, so as to contain the axial space occupation of the device 1 at the fork 5.

[0026] Preferably, the contrast plate 11 and the clamping element 8 are formed integrally and monolithically.

[0027] In this manner, the clamping element 8 keeps the prongs 6 of the fork 5 gripped on the ring G of the injector I during the intervention and the contrast plate 11 stiffens the main body 2, avoiding its deformation under stress.

[0028] The device 1 comprises a pair of connecting pins 13 which are inserted in corresponding hollows 14 and 15 formed respectively at the ends of the prongs 6 and in the clamping element 8.

[0029] The anchoring portion 12 is provided with a slot 16 for the accommodation of one side of the block 3, so as to constrain in the extraction direction E the main body 2 and the contrast plate 11.

[0030] The temporary connection means 10 have at least one and more preferably two screws 17 inserted through respective through holes 18 formed in the anchoring portion 12 and engaged in corresponding threaded holes 19 formed in the block 3.

[0031] More precisely, the through holes 18 are formed at the slot 16 and the corresponding threaded holes 19 laterally to the coupling seat 4.

[0032] The anchoring plate 12 is provided with at least one slot 20 for the exit of the connecting body C of the injector I during use.

[0033] The shape, dimension and position of the slot 20 can vary as a function of the type of injector I on which one must intervene.

[0034] Advantageously, the coupling seat 4 passes through the block 3 in the extraction direction E and the device 1 also comprises guiding means 21 for the insertion of the extraction bar 102, which are adapted to be accommodated in the inside curve of the main body 2, between the block 3 and the threaded end F of the injector I.

[0035] The guiding means 21 comprise a sleeve 22 which is threaded internally and is adapted to be coupled at one side to the threaded end F of the injector I and at the opposite side to the threaded bar 102.

[0036] The sleeve 22 is of the type of a conventional long nut in order to facilitate its coupling with the threaded end F of the injector I by using a key-like tool of the known type.

[0037] Furthermore, the guiding means 21 comprise a bush 23, inside which the extraction bar 102 that connects the sleeve 22 to the block 3 is inserted so as to pass through.

[0038] The bush 23 occupies, in the extraction direction E, the free space in the inside curve of the main body 2 between the block 3 and the sleeve 22, further stiffening the device 1.

[0039] It is possible to provide bushes 23 of different lengths as a function of the type of injector I on which one must intervene.

[0040] Furthermore, in this manner the traction in the extraction direction E imparted on the extraction bar 102 is transferred directly to the threaded end F of the injector I through the sleeve 22 and in the region of the ring G of said injector through the fork 5 and the clamping element 8.

[0041] The operation of the present invention is as follows.

[0042] For the extraction of an injector I jammed in its seat on the head T of the engine, the sleeve 22 is screwed onto the corresponding threaded end F.

[0043] The main body 2 is arranged with the corresponding fork 5 at the ring G of the injector I and the contrast plate 11 is arranged adjacently, locking it with the screws 17 and the pins 13.

[0044] The bush 23 is arranged between the block 3 and the upper end of the sleeve 22 and the extraction bar 102 is inserted by screwing it into the coupling seat 4 until it passes through said bush in order to screw partially into the sleeve 22.

[0045] At this point the injector I is extracted according

to conventional methods, optionally with the aid of a supporting bridge 101, by acting on the extraction bar 102 manually, with an impact mass or with an actuation piston.

[0046] In practice it has been found that the described invention achieves the intended aim and objects, and in particular the fact is stressed that the grip device according to the invention has a reduced axial space occupation in the clamping region around the injector grip ring, so that it can be used even in situations with small maneuvering spaces, allowing to transfer to the injector an adequate extraction action without the need to remove the connecting body.

[0047] Furthermore, the grip device according to the invention is effective and reliable, since it allows to optimize the transfer to the injector of the traction action in the extraction direction, without the occurrence of deformations of said device or accidental releases of the injector being processed.

[0048] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

[0049] All the details may further be replaced with other technically equivalent elements.

[0050] In practice, the materials used, as well as the contingent shapes and dimensions, may be any according to the requirements without thereby abandoning the protective scope of the claims that follow.

[0051] The disclosures in German Utility Model 202016103790.5 from which this application claims priority are incorporated herein by reference.

[0052] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A device (1) for gripping diesel engine injectors (I), of the type comprising a threaded end (F) which is adapted to remain exposed from the corresponding seat on the engine head (T) and is associated with a connecting body (C) and with a grip ring (G), comprising
   a substantially C-shaped main body (2), provided with a block (3) which is associated with a coupling seat (4) that is associated with an extraction bar (102) and with a fork (5) that can be associated with said injector (I) at the corresponding grip ring (G), which are mutually associated by means of at least one connecting wall (7),
   a clamping element (8) associated with the fork (5) of said main body (2) so as to form between them a retention seat (9) in the extraction direction of the grip ring (G) of said injector (I),
   and means (10) for the temporary connection of said main body (2) and of said clamping element (8),
   characterized in that it comprises a contrast plate (11) which supports said clamping element and is provided with a portion (12) for anchoring to said block (3), the temporary connecting means (10) being interposed between the anchoring portion (12) of the contrast plate (11) and the block (3) of the main body (2).

2. The device (1) according to claim 1, **characterized in that** it comprises a pair of connecting pins (13) which are inserted in corresponding hollows (14, 15) formed at the ends of the prongs (6) of said fork (5) and in said clamping element (8).

3. The device (1) according to claim 1, **characterized in that** said anchoring portion (12) comprises a slot (16) for accommodating one side of said block (3).

4. The device (1) according to claim 1, **characterized in that** said temporary connection means (10) comprise at least one screw (17) which is inserted through at least one through hole (18) formed in said anchoring portion (12) and engaged in a corresponding threaded hole (19) formed in said block (3).

5. The device (1) according to claims 3 and 4, **characterized in that** said at least one through hole (18) is formed at said slot (12) and **in that** the corresponding threaded hole (19) is formed laterally to said coupling seat (4).

6. The device (1) according to claim 1, **characterized in that** said contrast plate (11) comprises at least one slot (20) for the exit of the connecting body (C) of said injector (I).

7. The device (1) according to claim 1, **characterized in that** said coupling seat (4) is a through seat and there are guiding means (21) for the insertion of said extraction bar (102) which are accommodated in the inside curve of said main body (2) between said block (3) and the threaded end (F) of said injector (I).

8. The device (1) according to claim 7, **characterized in that** said guiding means (21) comprise an internally threaded sleeve (22) that is adapted to be coupled at one end to the threaded end (F) of said injector (I) and at the other end to said extraction bar (102).

9. The device (1) according to claim 8, **characterized in that** said guiding means (21) comprise a bush (23) inside which said extraction bar (102), adapted to connect said block (3) and said sleeve (22), is inserted so as to pass through.

10. The device (1) according to claim 1, **characterized in that** said contrast plate (11) and said clamping element (8) are formed integrally and monolithically.

11. A tool (100) for the extraction of injectors (I), **characterized in that** it comprises a supporting bridge (101) for an extraction bar (102) which is associated with a grip device (1) according to one or more of the preceding claims.

12. A kit for the complete extraction of injectors and injector parts from the corresponding seat in the head of diesel engines, **characterized in that** it comprises a device (1) according to one or more of claims 1-10.

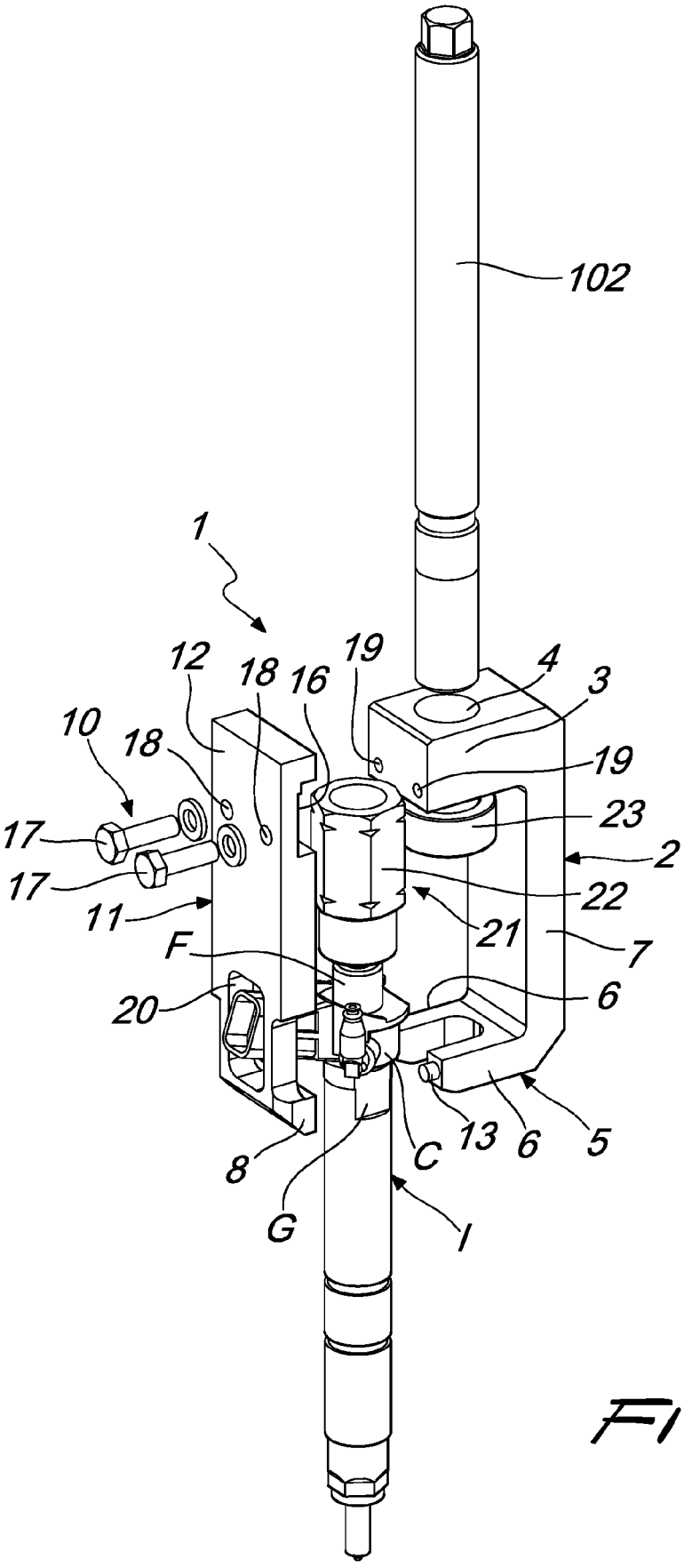

Fig. 1

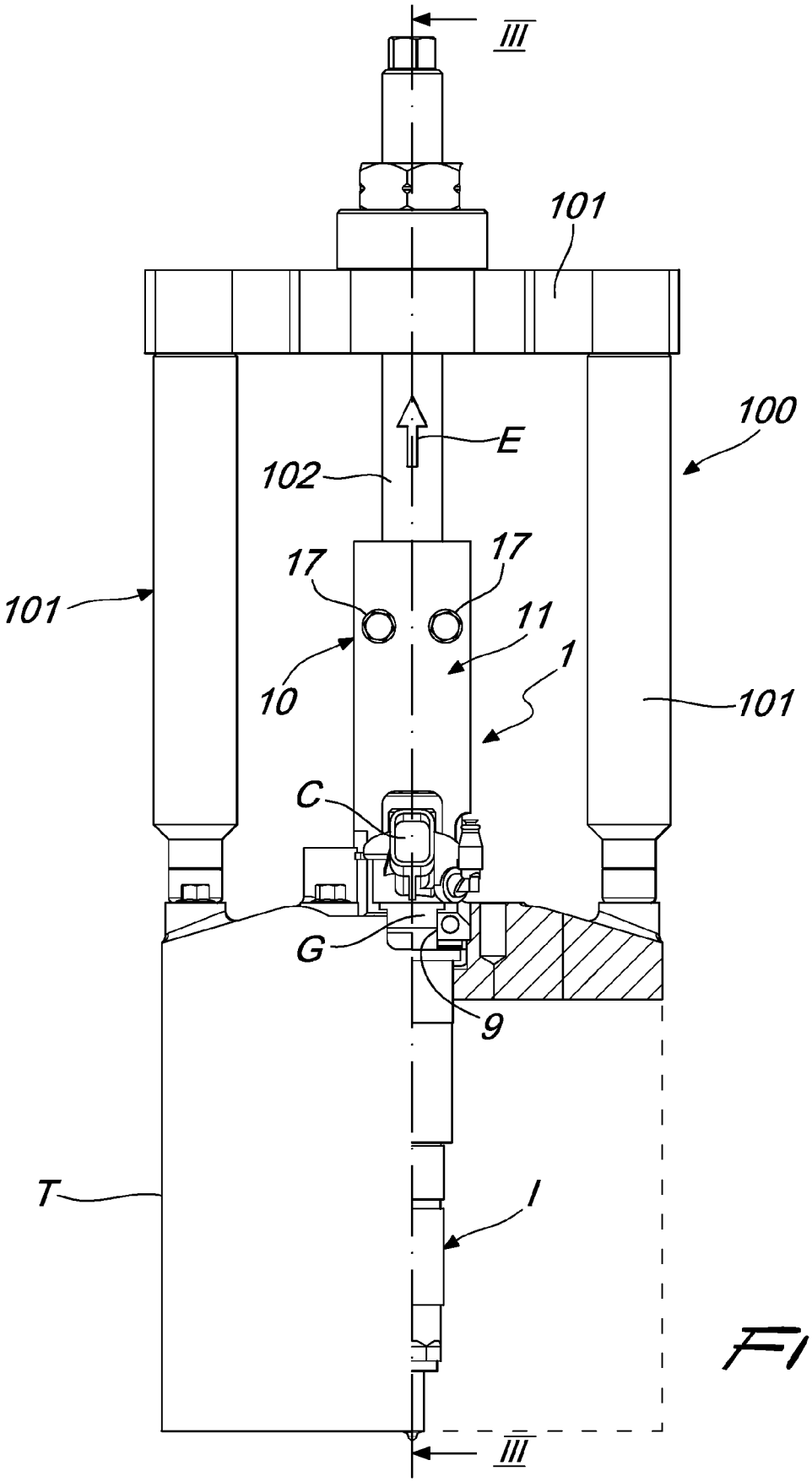

Fig. 2

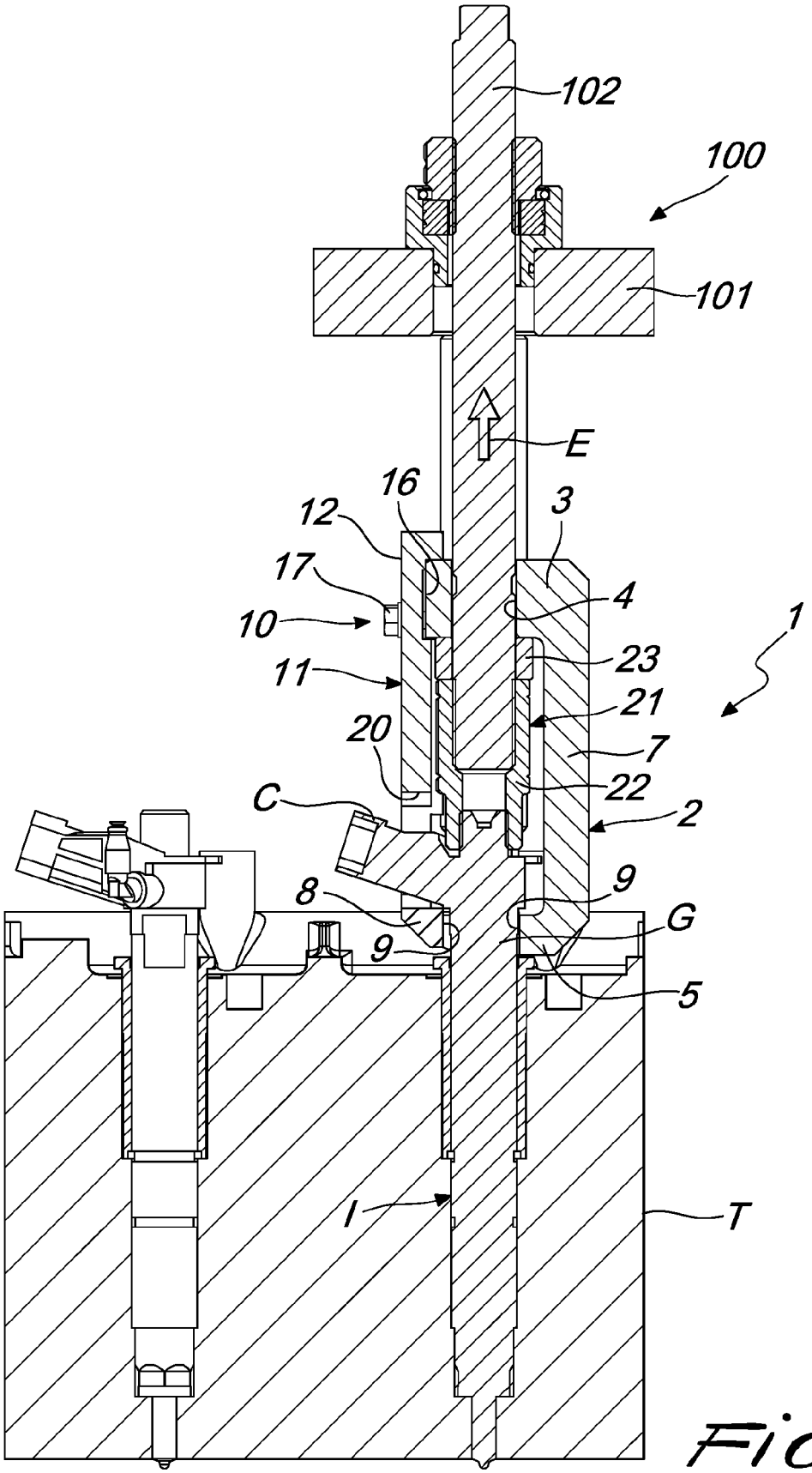

Fig. 3

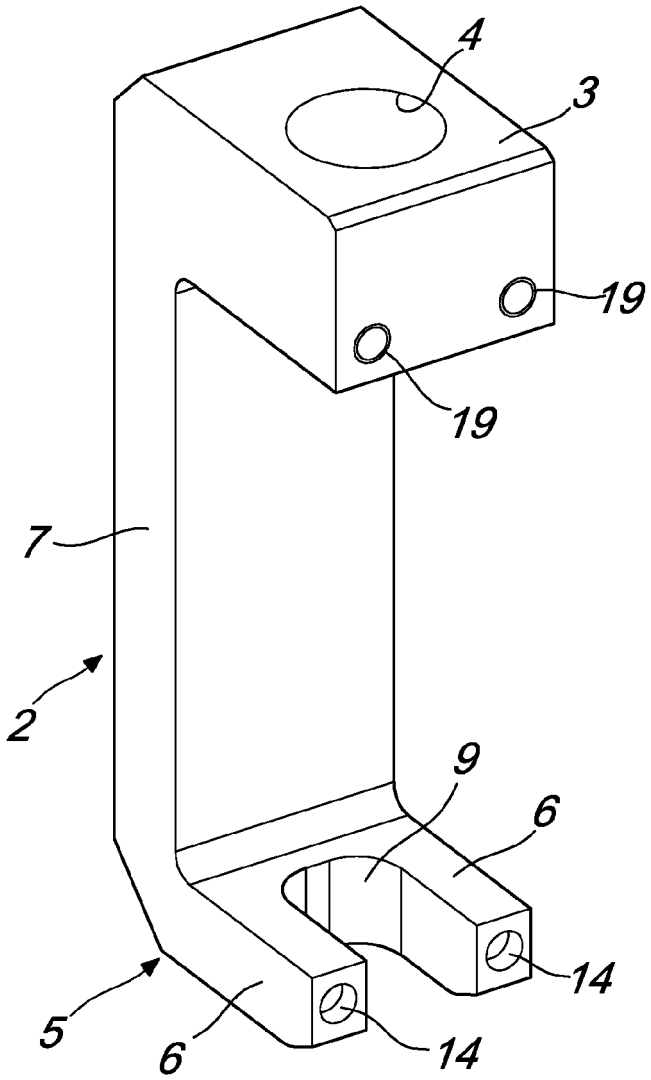

Fig. 4

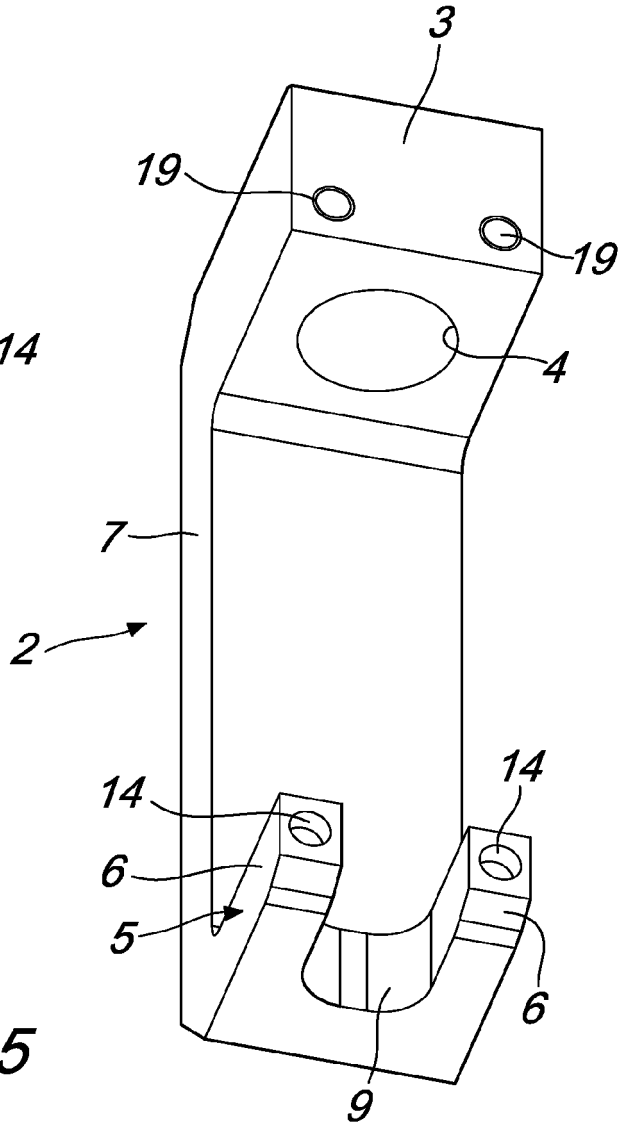

Fig. 5

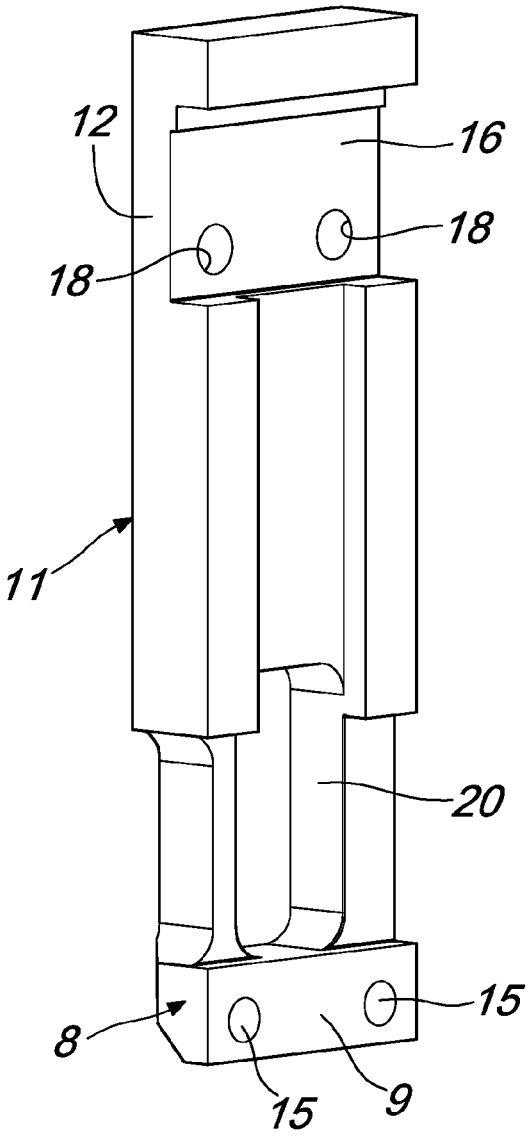

Fig. 6

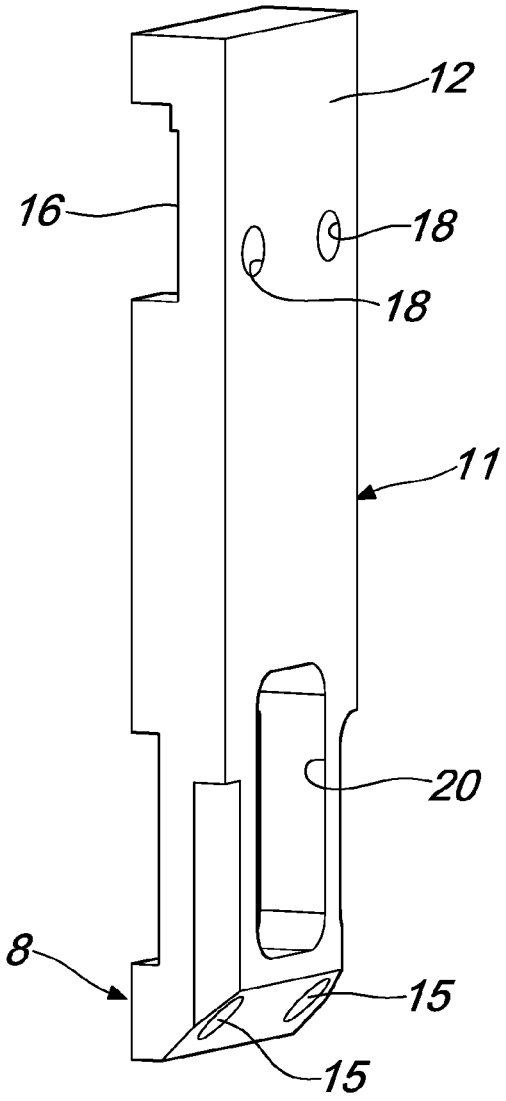

Fig. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 17 18 0316

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	11 December 2017	Pastramas, Nikolaos

CATEGORY OF CITED DOCUMENTS

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