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(54) **IMPACT TOOL**

(57) An impact tool (1) comprising a guiding stem (2) along which a striking assembly (3) is associated slidingly; the guiding stem (2) is provided with a first end (4) designed to be associated temporarily with a component being worked, and with a second end (5), arranged opposite to the first end, at which there is a stroke limiting abutment (6) of the striking assembly (3); the striking assembly (3) comprises at least one substantially box-like body (7) which forms inside it a chamber (8) inside which at least one striking body (9) is accommodated movably so as to occupy only partially its internal volume.

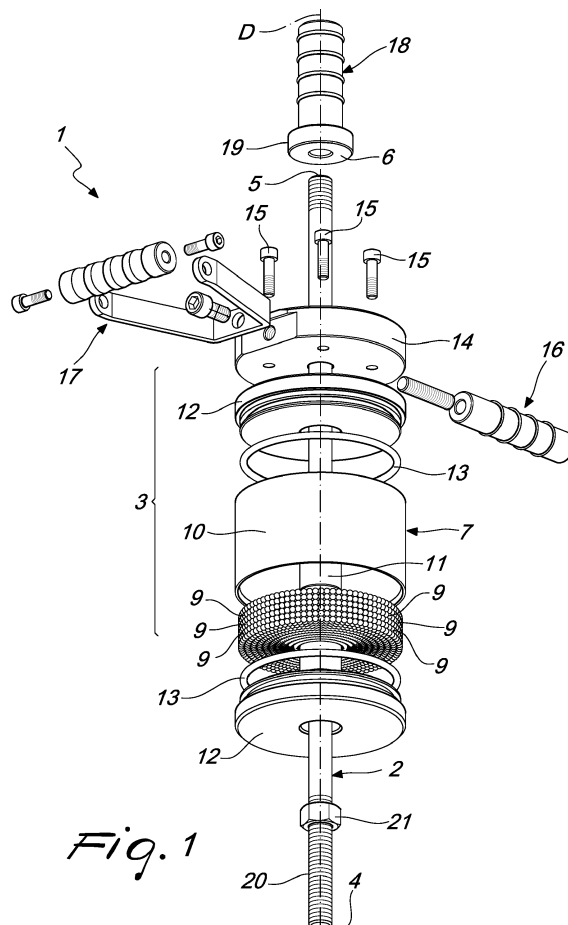


Fig. 1

Description

[0001] The present invention relates to an impact tool.

[0002] Impact tools are known which are used in various kinds of work in body shops and car repair shops. These tools, for example, are used for the extraction of mechanical components of the vehicles that are jammed in their seats, such as injectors, bearings, bushings, hubs or gears, or in the working of metal plates or other deformed components.

[0003] Impact tools of the known kind are constituted essentially by a guiding stem along which a striking mass is associated slidingly. The guiding stem has a first end designed to be connected, directly or by means of adapted accessories, to a component being worked, and a second end, arranged opposite to the first one, at which there is a stroke limiting abutment of the striking mass.

[0004] The striking mass is constituted generally by at least one rigid body made of heavy material. Modular solutions are also known in which the striking mass is composed of a combination of rigid bodies that have a chosen overall weight and are mutually connected so as to slide integrally along the guiding stem.

[0005] In use, the first end of the stem is connected to a component being worked and the operator manually actuates forcefully the sliding of the striking mass in a direction away from said first end until it strikes the stroke limiting abutment.

[0006] In the impact, the force imparted by the striking mass to the stroke limiting abutment through the guiding stem is transferred to the component being worked, applying thereto a traction.

[0007] These conventional tools are not free from drawbacks, which include the fact that when the striking mass strikes the stroke limiting abutment, a rebound effect occurs which produces a high loss of energy peak of the blow imparted by the operator, and therefore the effectiveness of the single blow is reduced and multiple blows may be necessary in order to obtain the desired result, with a consequent increase in intervention times and a higher workload for the assigned workers.

[0008] Moreover, when the striking mass strikes the stroke limiting abutment, a reaction force is transmitted to the operator who holds the tool, with the risk that he might lose the grip of said tool or might suffer physical injury.

[0009] Moreover, in the impact, through the stem, a reaction force is discharged, the direction of which is opposite with respect to the desired traction on the component being worked, with the risk that it might further jam or be deformed, possibly to the point of breaking.

[0010] The aim of the present invention is to eliminate the drawbacks noted above of known tools by providing an impact tool that allows to contain, if not to avoid, the rebound effect, achieving greater effectiveness and greater comfort for the operator in performing work.

[0011] Within this aim, an object of the present invention is to provide an impact tool that avoids risks and

inconveniences for the operators and preserves the integrity of the components being worked.

[0012] Another object of the present invention is to provide an impact tool that is versatile in use, being able to adapt easily to the execution of different kinds of work on various mechanical components.

[0013] Another object of the present invention is to provide an impact tool that is simple, relatively easy to provide in practice, safe in use and effective in operation, as well as relatively low in cost.

[0014] This aim and these and other objects which will become better apparent hereinafter are all achieved by the present impact tool comprising a guiding stem along which a striking assembly is associated slidingly, the guiding stem being provided with a first end designed to be associated temporarily with a component being worked, and with a second end, arranged opposite to the first end, at which there is a stroke limiting abutment of the striking assembly, characterized in that said striking assembly comprises at least one substantially box-like body which forms inside it a chamber inside which at least one striking body is accommodated movably so as to occupy only partially its internal volume.

[0015] Further characteristics and advantages of the present invention will become better apparent from the detailed description of a preferred but not exclusive embodiment of an impact tool, illustrated by way of non limiting example in the accompanying drawings, wherein:

Figure 1 is a schematic exploded perspective view of an impact tool according to the invention;

Figure 2 is a schematic sectional view of the tool according to the invention;

Figure 3 is a schematic perspective view of the tool according to the invention used for the extraction of an injector from the corresponding seat on the head of a vehicle engine;

Figure 4 is a schematic perspective view of the tool according to the invention used for the extraction of a hub from the wheel assembly of a vehicle;

Figure 5 is a schematic perspective view of the tool according to the invention provided with an accessory for performing body shop work.

[0016] With particular reference to these figures, the reference numeral 1 generally designates an impact tool.

[0017] The tool 1 comprises a guiding stem 2, along which a striking assembly 3 is associated slidingly. The guiding stem 2 has a linear extension along a direction of intervention D and is provided with a first end 4, designed to be associated temporarily with a component being worked, and with a second end 5, arranged opposite to the first end, at which there is a stroke limiting abutment 6 of the striking assembly 3 in the direction away from the first end 4.

[0018] The striking assembly 3 comprises at least one substantially box-like body 7, which forms inside it a chamber 8 inside which at least one striking body 9 is

accommodated movably so as to occupy only partially its internal volume.

[0019] In use, the at least one striking body 9 is free to move within the chamber 8 due to the stress imparted by the operator to the striking assembly 3.

[0020] Preferably, the striking assembly 3 comprises a plurality of striking bodies 9 which are accommodated within the chamber 8 so as to occupy only partially its internal volume.

[0021] Even more preferably, the striking bodies 9 are loose, i.e., they are free to move with respect to each other inside the chamber 8 under the effect of the action imparted by the operator to the striking assembly 3.

[0022] In the embodiment shown, the striking bodies 9 are constituted by a plurality of balls, for example made of metal.

[0023] Alternative embodiments in which the striking bodies 9 can have different shapes and dimensions are not excluded. For example, the striking bodies 9 can be constituted by granules of sand or other material.

[0024] The total weight of the striking bodies 9 accommodated in the chamber 8 and the fraction of the volume of said chamber that is occupied by the striking bodies 9 can vary as a function of the requirements of the specific applications.

[0025] In the particular embodiment shown, the box-like body 7 comprises an external cylindrical skirt 10 and a central sleeve 11 which are mutually coaxial and with the ends of which a pair of perforated lids 12 are associated by interposition of respective gaskets 13. The guiding stem 2 is inserted so as to pass through the axial hole of the sleeve 11. The box-like body 7 therefore is provided internally with an annular chamber 8, which is formed between the internal wall of the skirt 10, the external surface of the sleeve 11 and the mutually opposite faces of the lids 12. The chamber 8 therefore extends symmetrically around the direction of intervention D.

[0026] However, different shapes of the box-like body 7 and of the corresponding chamber 8 are not excluded.

[0027] In an alternative embodiment, the striking assembly 3 can have two or more box-like bodies 7 inside which respective pluralities of striking bodies 9 are accommodated and which are mutually integrally associated in sliding along the guiding stem 2.

[0028] In this manner it is possible to obtain a modular solution for adapting the total weight of the striking assembly 3 to the requirements of the specific application.

[0029] Preferably, the striking assembly 3 comprises a monolithic body 14 which is associated integrally in translation along the guiding stem 2 with the box-like body 7. The monolithic body 14 acts as a support for the box-like body 7 and contributes to determine the total weight of the striking assembly 3.

[0030] In the embodiment shown, the monolithic body 14 is constituted by a perforated disc through which the guiding stem 2 is inserted so as to pass through. The disc 14 is connected by means of screws 15 to the lid 12 of the box-like body 7 that is directed toward the second

end 5.

[0031] Furthermore, the striking assembly 3 is provided preferably with at least one element for grip on the part of an operator in order to facilitate the movement of the striking assembly 3 along the direction of intervention D. In the embodiment shown there are a first grip element and a second grip element, respectively 16 and 17, which have different shapes and are screwed on opposite sides of the disc 14.

[0032] In any case, it is not excluded that the striking assembly 3 might lack the monolithic body 14 and that the at least one grip element, if any, might be connected directly to the box-like body 7.

[0033] The tool 1 comprises a handle 18 which is associated with the second end 5 of the guiding stem 2, for example by means of a threaded connection.

[0034] The handle 18 is associated with a raised portion 19 which forms the stroke limiting abutment 6.

[0035] At the first end 4, the guiding stem 2 comprises at least one externally threaded portion 20, along which a threaded element 21, such as a nut or the like, is coupled for the axial retention of the striking assembly 3 and/or for any accessories for connection to the component being worked.

[0036] In use, the first end 4 can be connected directly to the component being worked, for example by screwing the guiding stem 2 to said component, or by means of the interposition of adapted accessories that are variously shaped in relation to the specific application.

[0037] Figure 3, for example, shows a first mode of use of the tool 1 for the extraction of an injector I which is jammed in the corresponding seat S on the head T of a vehicle engine. The tool 1 comprises an accessory for the connection of the guiding stem 2 to the injector I such as a clamp 22 which is coupled to the first end 4 of said stem.

[0038] Moreover, Figure 4 shows a second mode of use of the tool 1 for the extraction of a hub M of a wheel assembly R of a vehicle, in which the first end 4 of the guiding stem 2 is screwed directly onto said hub.

[0039] Finally, Figure 5 shows a third mode of use of the tool 1 for body shop work, in which there is an accessory such as a hook 23 for pulling a metal plate or a deformed component which is applied to the first end 4 of the guiding stem 2.

[0040] The operation of the present invention is as follows.

[0041] During the use of the tool 1 for the execution of an intervention, the first end 4 of the guiding stem 2 is connected temporarily to the component being worked, directly or by means of an adapted accessory, such as for example the clamp 22 or the hook 23.

[0042] If necessary, the operator keeps the tool 1 in position by supporting it at the handle 18, so that the direction of intervention D is positioned correctly.

[0043] At rest, the striking bodies 9 are arranged freely inside the chamber 8 due to the force of gravity.

[0044] With one or two hands, depending on the con-

ditions of use, the operator groups one or both of the grip elements 16 and 17 and imparts an acceleration to the striking assembly 3 in the direction away from the first end 4 until it strikes the stroke limiting abutment 6.

[0045] When the striking assembly 3 strikes the stroke limiting abutment 6, by means of the guiding stem 2 a pulling action is transferred to the component being worked along the direction of intervention, in the orientation from the first end to the second end of the guiding stem 2.

[0046] In this step, the striking bodies 9, due to the force of inertia, are still arranged at the lid 12 that is opposite with respect to the one associated with the disc 14. Only a few instants after impact, the striking bodies 9 tend to move toward the lid 12 associated with the disc 14, which in turn is arranged in abutment against the stroke limiting abutment 6, applying a further pulling action to the component being worked.

[0047] In this way, although the intensity of the pulling action transferred to the component being worked at the time of impact is lower than that which can be obtained with a conventional impact tool of equal weight, a useful action of the blow that is extended over time is achieved, reducing considerably, if not avoiding, the rebound effect described above.

[0048] In practice it has been found that the described invention achieves the proposed aim and objects, and in particular the fact is stressed that the tool according to the invention allows to contain, if not avoid, the rebound effect that penalizes the effectiveness of the intervention performed, causes inconvenience to the assigned workers and entails risks of damage to the components being worked.

[0049] Furthermore, the tool according to the invention is flexible in use for the execution of various kinds of work on mechanical components, in particular within the field of work generally performed in car repair shops and body shops.

[0050] The invention thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

[0051] All the details may furthermore be replaced with other technically equivalent elements.

[0052] 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.

[0053] The disclosures in German Utility Model Application No. 20 2018 105 187.3 from which this application claims priority are incorporated herein by reference.

[0054] 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. An impact tool (1) comprising a guiding stem (2) along which a striking assembly (3) is associated slidingly, the guiding stem (2) being provided with a first end (4) designed to be associated temporarily with a component being worked and with a second end (5), arranged opposite to the first end, at which there is a stroke limiting abutment (6) of the striking assembly (3), **characterized in that** said striking assembly (3) comprises at least one substantially box-like body (7) which forms inside it a chamber (8) inside which at least one striking body (9) is accommodated movably so as to occupy only partially its internal volume.
2. The tool (1) according to claim 1, **characterized in that** said striking assembly (3) comprises a plurality of said striking bodies (9) which are accommodated so that they can move inside said chamber (8) so as to occupy only partially its internal volume.
3. The tool (1) according to claim 2, **characterized in that** said striking bodies (9) are free to move with respect to each other.
4. The tool (1) according to claim 2 or 3, **characterized in that** each one of said striking bodies (9) is constituted by a respective ball, granule or the like.
5. The tool (1) according to claim 1, **characterized in that** said striking assembly (3) comprises a monolithic body (14) which is associated so as to be integral with said box-like body (7) in translation along said guiding stem (2).
6. The tool (1) according to one or more of the preceding claims, **characterized in that** said striking assembly (3) comprises at least one element (16, 17) for grip on the part of an operator.
7. The tool (1) according to claim 1, **characterized in that** it comprises a handle (18) which is associated with the second end (5) of said guiding stem (2).
8. The tool (1) according to claim 1, **characterized in that** said guiding stem (2) has at least one threaded portion (20) at said first end (4).
9. The tool (1) according to claim 1 or 8, **characterized in that** the first end (4) of said guiding stem (2) is adapted to be connected directly to the component being worked.
10. The tool (1) according to claim 1 or 8, **characterized in that** it comprises an accessory (22, 23) for connection to the component being worked which is associated with the first end (4) of said guiding stem (2).

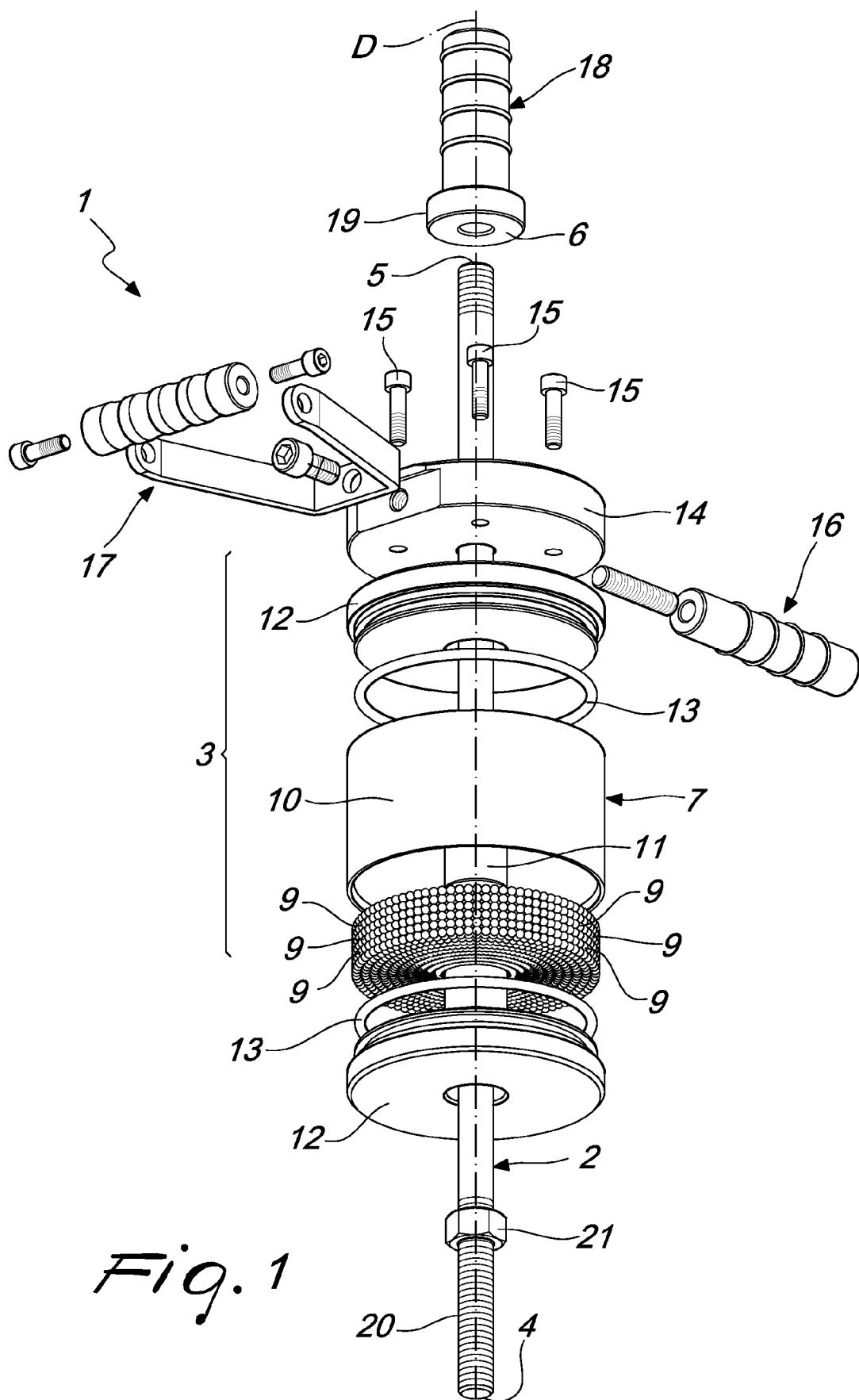


Fig. 1

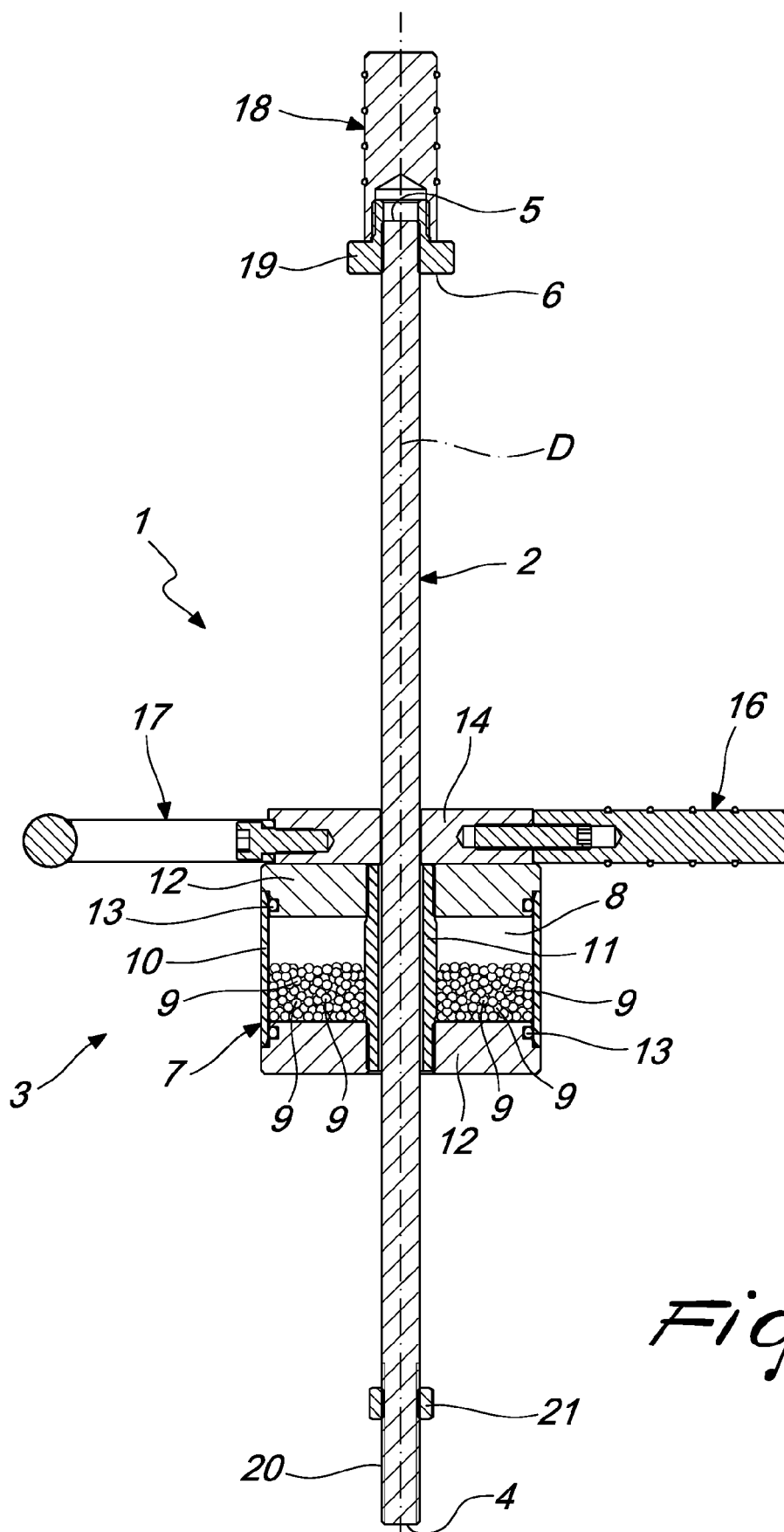
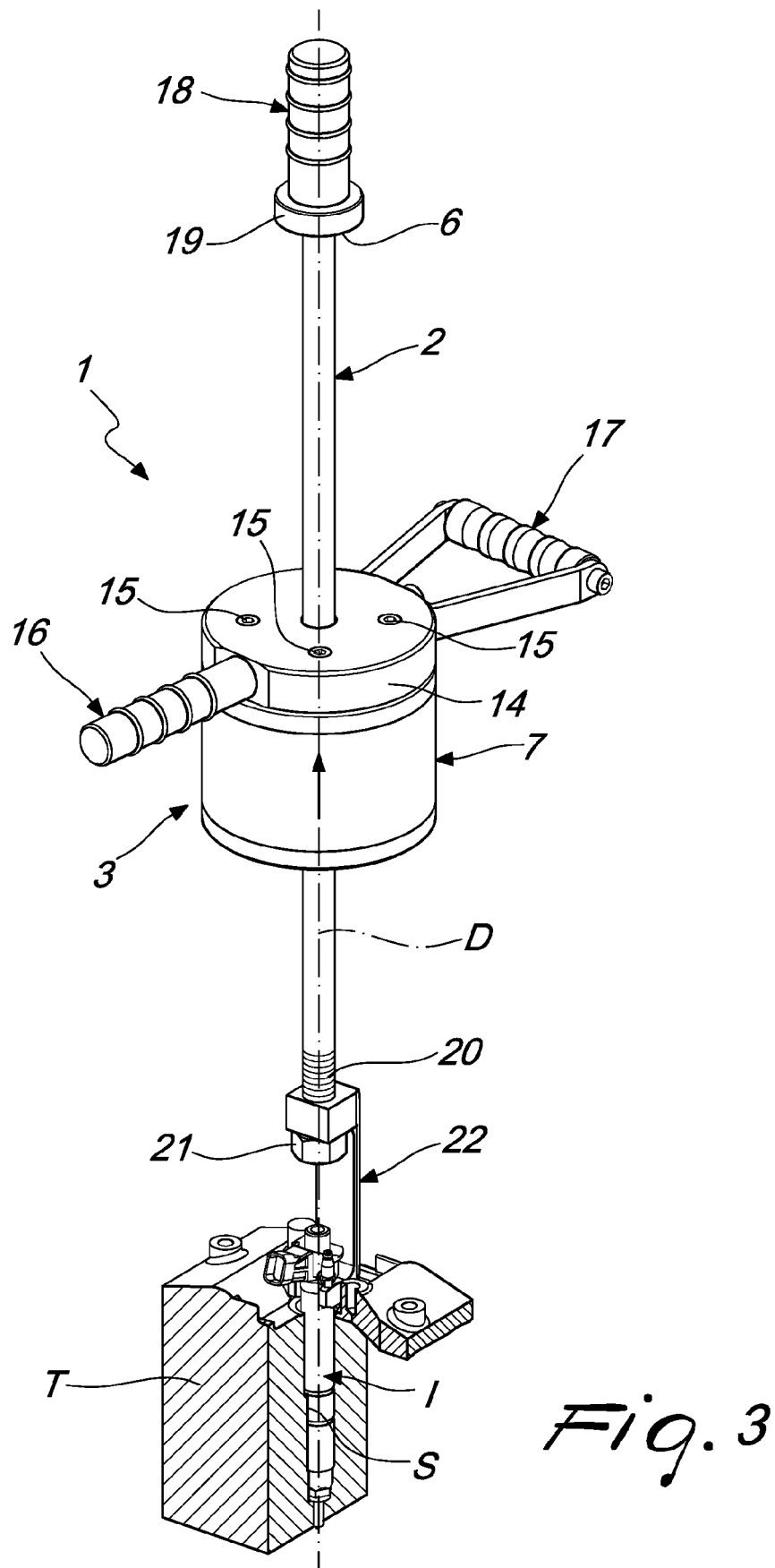


Fig. 2



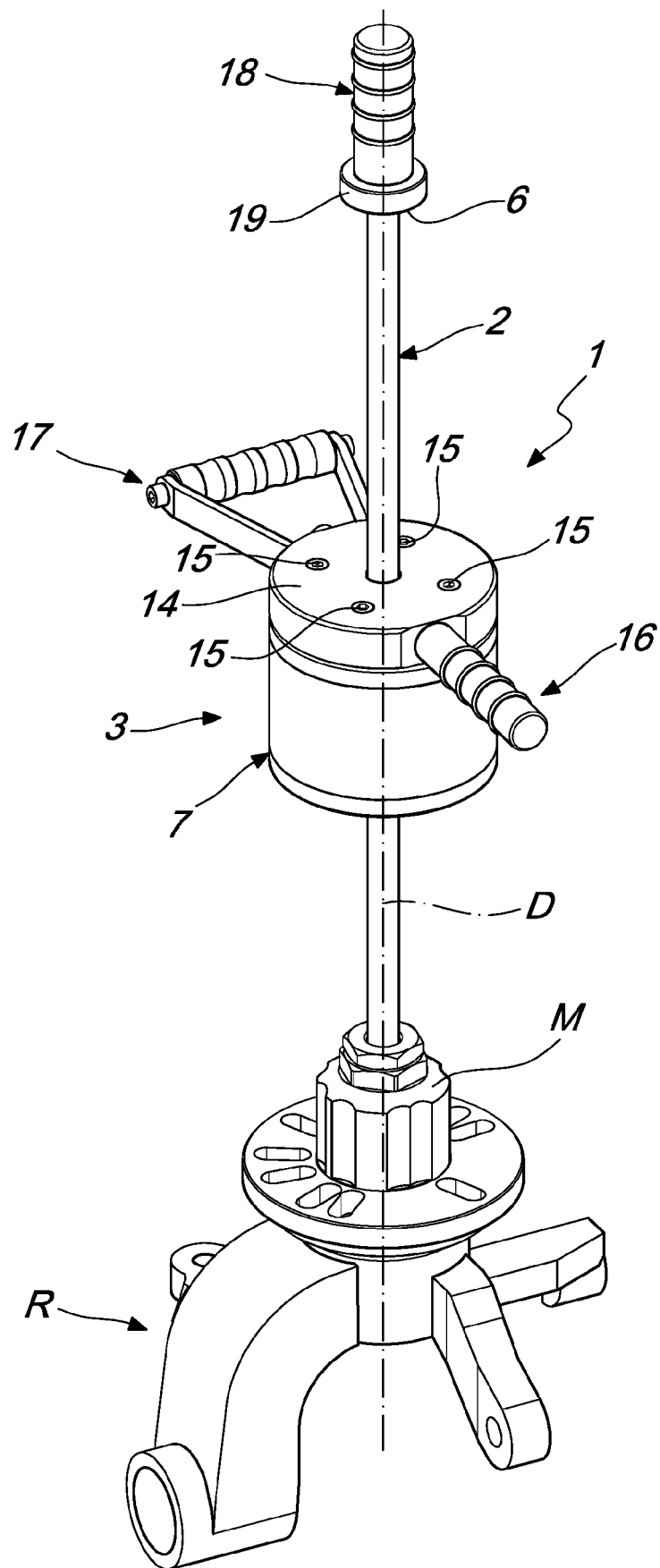


Fig. 4

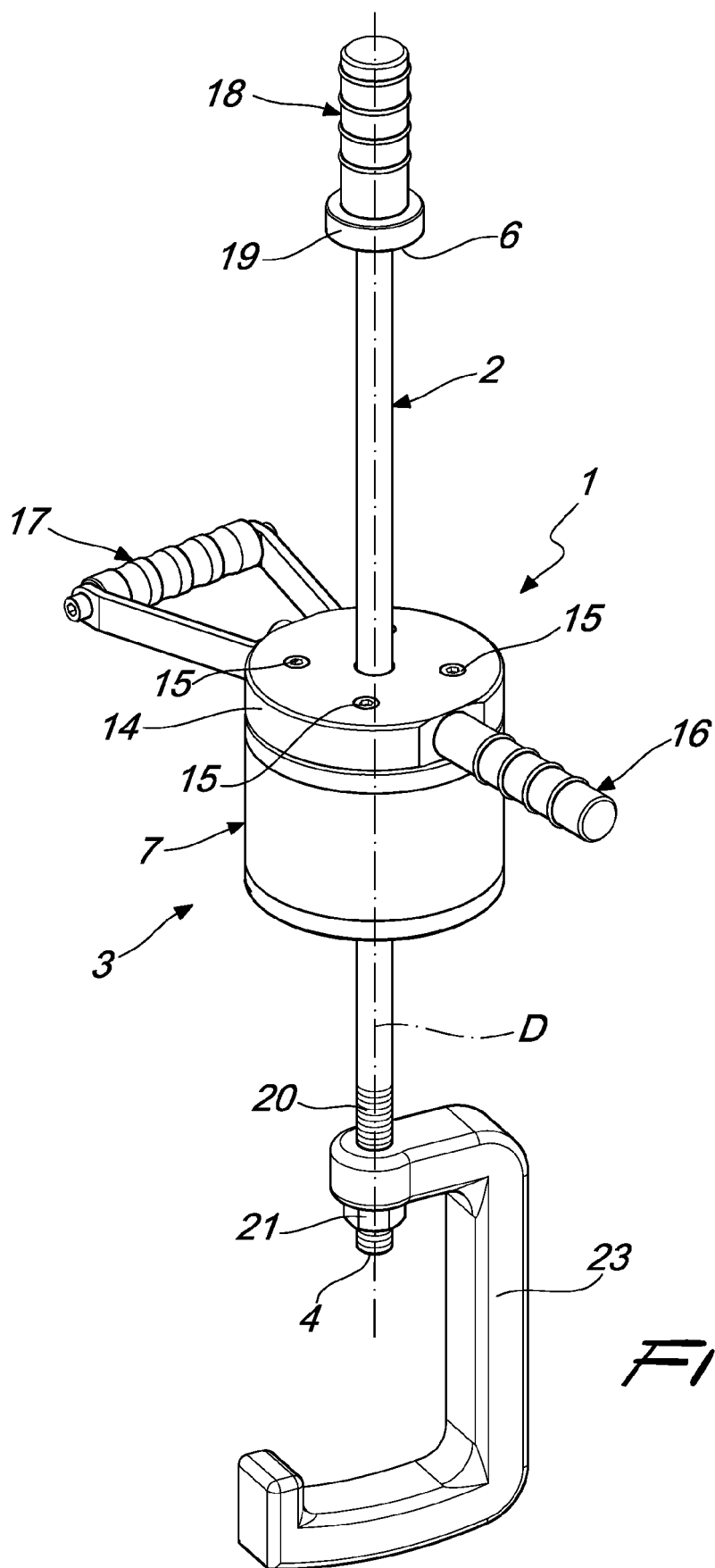


Fig. 5



EUROPEAN SEARCH REPORT

Application Number
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 21 January 2020	Examiner Coja, Michael
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REFERENCES CITED IN THE DESCRIPTION

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