

(19) **DANMARK**

(10) **DK/EP 3292958 T3**



(12)

Oversættelse af europæisk patentskrift

Patent- og
Varemærkestyrelsen

-
- (51) Int.Cl.: **B 25 B 27/18 (2006.01)** **B 25 B 23/10 (2006.01)**
- (45) Oversættelsen bekendtgjort den: **2020-03-02**
- (80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2019-11-20**
- (86) Europæisk ansøgning nr.: **16315008.9**
- (86) Europæisk indleveringsdag: **2016-09-09**
- (87) Den europæiske ansøgnings publiceringsdag: **2018-03-14**
- (84) Designerede stater: **AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**
- (73) Patenthaver: **Hubitools S.A., Rue de la Station, 13, 1300 Wavre, Belgien**
- (72) Opfinder: **Dudot, Yannick, 225, rue de Henriville, 57450 Cappel, Frankrig**
- (74) Fuldmægtig i Danmark: **Plougmann Vingtoft A/S, Strandvejen 70, 2900 Hellerup, Danmark**
- (54) Benævnelse: **FREMGANGSMÅDE TIL UDTRÆKNING AF EN SKRUE SAMT UDTRÆKKER TIL UDØVELSE AF FREMGANGSMÅDEN**
- (56) Fremdragne publikationer:
DE-A1-102011 050 671
DE-A1-102012 104 298
US-A- 1 798 944
US-A- 1 875 484
US-A- 6 098 499
US-A1- 2003 059 267
US-A1- 2006 191 379

Description

[0001] The invention is in the field of processes and tooling for automotive mechanics and relates in particular to the processes and tools for the dismantling of vehicle wheels, for example of motor vehicles.

[0002] It is known to fix the wheel of a vehicle on its hub by means of multiple screws, one of which is a safety or an anti-theft screw. These safety screws, also known as "tamper-proof screws", have various forms. Thus, as is known, these are safety screws with a head that does not correspond to the marks of standard wrenches making it necessary to use a specific tool comprising a wrench having a shape adapted to the head of the safety screw in order to be able to loosen it.

[0003] This specific tool is usually present in the vehicle. However, it is possible that this tool may get lost or damaged preventing the vehicle user from changing his wheel in the event of a puncture. The user will then have to call a professional mechanic who will either have the right tool or will have to find a solution to remove this safety screw. It is also possible that the specific mark on the screw head may be damaged and therefore unusable, or that the tool has broken on the screw head and remains partly fixed to the latter such that the specific mark is no longer accessible.

[0004] One of the solutions implemented by the mechanics to nevertheless loosen the screw, and thus change the wheel, is to weld another hexagon head screw (standardised) on the safety screw head in order to rotationally couple it with the said screw. The thus formed assembly has a head that can be manipulated with standard tools for loosening the safety screw.

[0005] Unfortunately, this technique has several disadvantages including heat damage to the paints and varnishes of the rims or the risk of breaking the safety screw head in case of shear head screw.

[0006] Finally, this technique is unsuitable for cases in which the safety screw head is designed to rotate freely (countersunk) in the absence of a tool comprising the appropriate means for gripping said head as in the example of the safety device described in document EP2228176.

[0007] There are processes and tools for extracting broken screws as described for example in document EP0451256 or document US2006/0191379. Such extractors are in the form of a threaded rod with left-hand reverse threading and generally of conical shape. They are inserted into a bore made in the screw for extracting it. Unfortunately, these solutions are not suitable for the disassembly of safety screws and particularly the safety screws used in vehicle wheels because of the fragility of their threading or their insufficient contact surface, which prevents the user from applying sufficient torque to loosen said screws. The safety screws on the vehicle wheels can have a tightening torque of 160 Nm or more.

[0008] Other tools are described in documents US6098499, DE102012104298 and US1798944. However, these tools too are not suited to the disassembly of safety screws and especially the safety screws used in vehicle wheels due to the fragility of their threading or their insufficient contact surface, which prevents one from applying sufficient torque to loosen said screws. Safety screws on vehicle wheels can have a tightening torque of 160 Nm or more.

[0009] The tool described in document US6098499, when used, risks deviating from its position and damaging the broken screw as well as the surrounding components.

[0010] There is therefore a need for a process and tools for extracting safety screws that are adaptable to different kinds of safety screws and that can also be used in cases where the screw is broken or damaged or when the screw has a shear head or is designed to rotate freely. There is also a need for an extraction process and for tools that make it possible to extract a broken safety screw and that will not damage the components surrounding said screw. There is a need for a process and tools for extracting safety screws that are suitable for disassembling vehicle wheels and that can therefore be used with screws having high tightening torque.

[0011] The purpose of the invention is to address at least one of the disadvantages presented by the prior art by proposing a process and tools for disassembling vehicle wheels, which are universally acceptable in that they are capable of being used on safety screws of different models or which are broken.

[0012] To this end, and according to a first aspect, the object of the invention is a method for extracting a safety screw or a broken screw, the said screw comprising a rod, the method being noteworthy in that it comprises the following steps:

a) drilling a bore in the screw longitudinally using a drill with a diameter less than the diameter of the screw rod;

b) fitting an extractor in the said bore, the extractor comprising a serrated rod whose teeth are in the form of longitudinal ribs and a head fixed to one of the ends of said rod, the fitting being obtained by inserting

the rod of the extractor in said bore and by hitting on the head of said extractor by means of a percussion tool, so as to rotationally connect the extractor and the screw;

- 5 c) extraction of the screw by loosening it using a wrench adapted to the head of the extractor, the method being characterised in that the step (b) of fitting comprises the use of a striking pin positioned between the extractor and the percussion tool and an end of which has a mark in a shape that interlocks with that on the head of the extractor.

[0014] According to particular embodiments, the process can comprise one or the other of the following features, taken in isolation or in all possible combinations:

- 10 - The step (a) of drilling the bore includes the use of a drill comprising a tungsten carbide tip.
 - The step (a) of drilling the bore is preceded by a step of setting up a centring device on the screw for positioning and guiding the drill.
 - The extractor comprises a sleeve arranged at the base of its head and having a larger diameter than that of its rod and smaller than that of its head so as to form a shoulder with the rod and the step (b) of fitting
 15 comprises the fitting of the rod of the extractor in the screw until the said shoulder abuts against the screw.
 - The step (c) of extraction of the screw is followed by the step (d) of unhooking the extractor from the screw in which it was fitted by using an extraction mandrel.

- 20 **[0015]** As is understood from reading the definition given above, the invention consists of replacing the safety screw head or the broken head with the head of an extractor that can be manipulated using standard tools. To do this, the invention will rotationally connect the extractor with the screw to be loosened by forcefully pressing it into a bore made in said screw. The presence of the head and possibly of a sleeve on the extractor forming a shoulder limits the insertion of the extractor in the screw by bringing the screw head into abutment on the head of the extractor or on the shoulder formed by the sleeve. This limitation of the insertion of the extractor rod
 25 makes it possible to confine the extractor rod inside the screw and prevents contact with the wheel hub while allowing a rod of substantial length to be pressed in said screw.

[0016] According to a second aspect, the object of the invention is a set of tools for implementing the method as described above, which is noteworthy in that it comprises:

- 30 - at least an extractor comprising a serrated rod whose teeth are in the form of longitudinal ribs, and a head fixed to one of the ends of said rod,
 - at least a drill of a diameter similar to the diameter of the rod of the extractor, for drilling a bore in the screw,
 - at least a percussion tool set up to hit the head of the said extractor,
 - at least a wrench configured to fit the head of the extractor,
 35 - one or more centring devices for the positioning and guiding of the drills during the drilling operations, and
 - a striking pin for the fitting of the extractor in a bore that has been drilled in the screw, the said striking pin having a mark at one of its ends in a shape that interlocks with the head of the extractor.

[0017] Preferably, the use of a striking pin allows keeping the extractor in place so that it can be interlocked.

- 40 **[0018]** The set of tools may also include an extraction mandrel for removing the extractor from the screw in which it is interlocked.

[0019] Preferably, the extractor comprises a sleeve arranged at the base of the head, the sleeve having a diameter greater than that of the rod and less than that of the head so as to form a shoulder with the rod. Preferably, the extractor head is hexagonal. More preferably, the extractor is made of steel.

- 45 **[0020]** The extractor according to the invention is noteworthy in that it makes interlocking possible to have a straight interlocking with a large contact surface with the screw to be loosened, making it possible to apply a release torque of up to 160 Nm or more for loosening the screw. The pressing of the extractor until the abutment of the head or the shoulder formed by the sleeve makes it possible on the one hand to control the length of insertion of the rod and thus force it to not exceed of the screw rod. On the other hand, the abutment makes it
 50 possible to prevent clashes when the extractor is manipulated which would impair its retention in the screw, the head or the sleeve being placed in support against the screw.

[0021] According to particular embodiments, the assembly according to the invention can comprise one or the other of the following characteristics, taken in isolation or in all possible combinations:

- 55 - The assembly comprises at least one drill and at least one of the drills has a tungsten carbide tip.

- The assembly comprises at least one centring device for positioning and guiding a drill, and at least one of the centring devices is in the form of a truncated cone traversed on both sides, in its longitudinal direction, by a central conduit, the said conduit having a larger diameter than that of the drill and/or of the extractor rod.
- 5 - The assembly comprises at least one centring device for positioning and guiding a drill, and in that at least one of the centring devices is in the form of a hollow casing with a cylindrical or frustoconical body traversed by a central conduit of a larger diameter than that of the drill and/or of the extractor rod; the said central conduit being in contact with an internal cavity opening onto one of the ends of the body, the mouth of the internal cavity being dimensioned to cover the screw head; the centring device preferably having a protrusion at its end opposite to that overlooking the internal cavity, which has the shape of the head of the extractor, the said protrusion being traversed by the said conduit.
- 10 - The assembly comprises at least one centring device, and at least one of the centring devices is in the form of a cylindrical body, and having a mark on at least one of its ends in a shape that interlocks with a head of a hexagonal screw and traversed along its length by a central conduit, the said conduit having a larger diameter than that of the drill and/or of the extractor rod. Preferably, the cylindrical body has two diametrically opposite flat sides. Even more preferably, the centring device has a mark that fits with the head of a hexagonal screw at both of its ends, the said marks having different dimensions.
- 15 - At least one of the centring devices is made of plastic material, preferably polyoxymethylene (POM).
- 20 - The assembly comprises an extraction mandrel, the said extraction mandrel having a fork at one of its ends, which comprises two teeth of increasing thickness between their tip and their base and preferably parallel to one another, and the spacing between the teeth of the extraction mandrel is smaller than the diameter of the head of the extractor.

25 **[0022]** According to a third aspect, the invention relates to the use of an assembly as defined above for the extraction of a safety screw or a broken screw on a vehicle wheel.

[0023] The invention will be well understood and other aspects and advantages will become clear from the following description, given by way of example with reference to the appended drawings on which:

- Figure 1 shows an extractor according to the invention.
- 30 - Figure 2 is a sectional view showing the drilling of a safety screw using a drill and a centring device according to the invention.
- Figures 3 to 5 illustrate different centring devices according to the invention.
- Figure 6 shows the interlocking step of the extractor according to the invention.
- Figure 7 shows the extraction mandrel according to the invention.
- 35 - Figure 8 shows the detachment step of the extractor from the screw in which it is fitted.

[0024] In the description below, the term "comprise" is synonymous with "include" and is not restrictive in that it allows the presence of other elements in the device or the vehicle to which it relates. It is understood that the term "comprise" includes the words "consist of".

40 **[0025]** In the present specification, the process according to the invention will be described in parallel with the tools according to the invention for the implementation of said process.

[0026] Reference will first be made to figure 1, which shows an extractor 1 used for implementing the method of extracting a screw such as a safety screw or a broken screw. The extractor 1 according to the invention comprises a serrated rod 3 whose teeth, in the form of projecting ribs 5, extend longitudinally along the length of the rod 3, such that a transverse section of the rod shows a star-shaped pattern. The extractor 1 also has a head 7 which is preferably hexagonal so that it can be manipulated using standard wrenches. The extractor 1 is preferably made of steel. The head 7 and the rod 3 are fixed to each another irreversibly such that when the rod 3 is pushed into the screw, the head can act as an abutment to limit the insertion of the extractor, and a support to avoid clashes during manipulation as seen below.

45 **[0027]** According to a preferred embodiment of the invention, the extractor 1 comprises a sleeve 9 placed at the base of the head 7 and having a diameter greater than that of the rod 3 and less than that of the head 7 such that it forms a shoulder 11 with the rod 3.

[0028] The process according to the invention comprises the steps according to claim 1.

50 **[0029]** The step a) of drilling a bore is shown in figure 2 in the context of the extraction of a safety screw 13 called "sunken" in that it is placed at the bottom of a cavity presented by the rim 15 of the wheel. This step therefore consists of drilling a bore 17 longitudinally in the screw 13 to be loosened using a drill 19 with a diameter less than the diameter of the rod 21 of the screw 13. In the figure, the safety screw is shown with a

round head 23. The drilling operation is in progress, and the bore has not yet reached the screw rod. Nevertheless, in the process according to the invention, the rod of the screw is hollowed out along all or part of its length. For example, the length of the bore made in the screw is greater than 10 mm, for example between 10 and 20 mm depending on the screw models considered. This bore length will make it possible to position an extractor whose rod has a corresponding length and which thus offers a large contact surface. This large contact surface will allow the application of sufficient torque to loosen the screw.

[0030] The drilling is carried out using a drill 19. Preferably, the step (a) of drilling the bore is performed using a drill comprising a tungsten carbide tip. Such a drill may, for example, be obtained by splitting the tip of a traditional steel drill to insert a tungsten carbide insert therein. The use of such a drill facilitates the drilling of the safety screws when they are made of hardened steel.

[0031] According to the invention, the diameter of the drill is equal to the diameter of the extractor rod so that the rod can be fitted and retained in the bore hollowed out in the screw. It will be understood that the bore must be in the centre with respect to the screw head 23 since it then extends into the rod 21 of this screw. According to a preferred embodiment of the invention, and as shown in figure 2, the step (a) of drilling the bore is carried out using a centring device 25 for positioning and guiding the drill.

[0032] Depending on the type of screws to be loosened, the centring device may be in different shapes. In the case illustrated in figure 2 where the screw is a "sunken" screw as it is positioned at the bottom of a cavity presented by the rim, the centring device "with sunken screws" 25 will preferably be in the form of a truncated cone pierced by a central conduit longitudinally passing through it on both sides. Such a centring device is shown in figure 3. The conduit 27 has a diameter greater than that of the drill and is intended for the positioning and the guiding of this drill.

[0033] Figure 4 shows another embodiment of a centring device 29 according to the invention for centring and guiding the drill in the case of "protruding" screws, in that they appear in relief on the rim. The centring device 29 "with protruding screws" will then be in the form of a hollow sleeve, with a cylindrical or truncated cone body 31 and a central conduit 35 passing through it in contact with an internal cavity 33 opening out at one of the ends of the body 31. Preferably, the internal cavity 33 has an internal conical shape such that its diameter decreases along its length from its mouth. This configuration will allow the centring device to cover the screw head and to be retained on the latter. The central conduit 35 with a diameter greater than that of the drill rod (and therefore that of the extractor rod) is used for positioning and guiding said drill. Preferably, the centring device 29 has, at the end opposite the one opening on the internal cavity 33, a protrusion 37 reproducing the shape of the extractor head, the said conduit 35 passing through the said protrusion 37. This protrusion 37 allows the user to use a striking pin to position and depress the centring device 29 on the screw head.

[0034] In cases where the head of the screw is mounted to rotate freely (countersunk), it will be advantageous for a person skilled in the art to use a marked centring device 39 as shown in figure 5. This marked centring device is in the form of a cylindrical socket 41 and has on at least one of its ends a mark 43 of a shape adapted to a hexagonal screw head. The body 41 has a central conduit 45 longitudinally passing through it on both sides. The conduit 45 has a diameter greater than that of the drill rod (and therefore that of the extractor rod) and is used for positioning and guiding said drill. The mark 43 will retain the head in position and prevent it from rotating under the force of the drill during the drilling operation. Preferably, the body 31 has two diametrically opposite flat sides 47 to facilitate gripping and retention in position of the centring device. More preferably, the centring device has a mark adapted to a hexagonal screw head at each of its ends, said marks having different dimensions.

[0035] According to a preferred embodiment of the invention, at least one of the centring devices is made of plastic material, for example polyoxymethylene (POM), to limit the risk of damaging the paint and varnish of the rims. Nevertheless, it is also possible to make them using metallic materials.

[0036] Once the bore has been made, the extractor can be put in place according to the invention. To do this, the extractor rod is pressed into said bore during a step b) of fitting illustrated in figure 6. The fitting is carried out by longitudinal sliding along the bore and this sliding is generated by hitting on the extractor head using a percussion tool, for example a hammer. The fitting of the extractor into the screw will rotationally connect the extractor and the screw.

[0037] The fitting step (b) is carried out by placing a striking pin 51 between the extractor 1 and the hammer 49. The striking pin 51 according to the invention comprises an end having a mark 53 adapted to that of the head 7 of the extractor 1. The use of such a striking pin makes it possible to hold the extractor in position for its fitting.

[0038] Preferably, the extractor 1 is fitted until the base of its head comes into abutment against the head 27 of the screw or when the extractor has a sleeve 9, against the shoulder 11 formed by the sleeve 9 with the rod 3. This limitation of the insertion of the extractor 1 makes it possible to ensure that the extractor rod 3 remains in

the rod 21 of the screw 13. If the extractor rod protrudes from the end of the screw rod, it would attach to the wheel hub which would make the loosening of the screw more difficult.

5 **[0039]** Once the extractor is in position, the screw is extracted by loosening it during an extraction step c) (not shown) using a wrench adapted to the extractor head. The straightness of the fitting combined with the extended contact surface makes it possible to obtain a release torque of at least 160 Nm, necessary for releasing the safety screws from the vehicle wheels.

10 **[0040]** According to a preferred embodiment of the invention, the extraction step (c) of the screw is followed by a step (d) of detaching the extractor from the screw in which it was fitted, preferably using an extraction mandrel 55 as shown in figure 7. The separation of the screw 13 and the extractor 1 makes it possible to reuse said extractor 1 for the extraction of another screw 13. The detachment operation can be carried out when the extractors 1 have a sleeve 9 defining a space between the head 23 of the screw 13 and the head 7 of the extractor 1.

15 **[0041]** Preferably, the extraction mandrel 55 has a fork 57 at one of its ends comprising two parallel teeth 59 of increasing thickness between their tip 61 and their base 63. The spacing between the teeth 59 of the extraction mandrel 55 is chosen to be greater than the diameter of the sleeve 9 and less than the diameter of the extractor head 7. In cases where the extraction mandrel is used with an extractor without a sleeve, the spacing between the teeth of the extraction mandrel must be greater than the diameter of the rod of said extractor.

20 **[0042]** Step d) is illustrated in figure 8. As can be seen, the screw 13 is held by the jaws 65 of a vice. The extraction mandrel 55 is positioned to place the sleeve of extractor 1 between its teeth 59. The sleeve is then pressed between the teeth 59 of the fork by percussion. Since the teeth 59 have an increasing height that is greater than the height of the sleeve at the base of said teeth, the insertion of the extractor 1 will raise the extractor 1 in order to remove it partially from the screw 13.

Patentkrav

1. Fremgangsmåde til udtrækning af en sikkerhedsskrue eller en brækket skrue, idet skruen (13) omfatter et skaft (21) og eventuelt et hoved (23), hvilken

5 fremgangsmåde omfatter følgende trin:

a) boring af et hul (17) i skruen (13) i dennes længderetning ved hjælp af et bor (19) med mindre diameter end diameteren af skruens (13) skaft (21);

10 b) indsætning af en udtrækker (1) i hullet (17), idet udtrækkeren (1) omfatter et fortandet skaft (3), hvis fortanding har form af langsgående ribber (5) og et på en af skaftets (3) ender fastgjort hoved (7), idet indsætningen opnås ved indsætning af udtrækkerens (1) skaft (3) i hullet (17) og ved slag på udtrækkerens (1) hoved (7) ved hjælp af et slagværktøj (49), således at udtrækkeren (1) og skruen (13) forbindes i
15 rotation;

c) udtrækning af skruen (13) ved løsning af denne ved hjælp af en nøgle, der samvirker med udtrækkerens hoved (7);

idet fremgangsmåden er **kendetegnet ved, at** trin (b) til indsætning omfatter anvendelse af en slagdorn (51), som er anbragt mellem udtrækkeren (1) og
20 slagværktøjet (49), og hvis ene ende har en fordybning (53) af en form, der griber ind i udtrækkerens (1) hoved (7).

2. Fremgangsmåde ifølge krav 1, **kendetegnet ved, at** trin (a) til boring af hullet (17) omfatter:

25 - anvendelse af et bor (19), der omfatter en spids af wolframcarbid, og/eller
- foregås af et trin til påsætning af et centreringsapparat (25, 29, 39) på skruen (13) til placering og styring af boret (19).

30 **3.** Fremgangsmåde ifølge et af kravene 1 eller 2, **kendetegnet ved, at** udtrækkeren (1) omfatter en studs (9), som er anbragt på hovedets (7) basis og har en diameter, der er større end skaftets (3) og mindre end hovedets (7), således at der dannes en skulder (11) med skaftet (3), og **at** trin (b) til indsætning omfatter indsætning af udtrækkerens (1) skaft (3) i skruen (13), indtil

skulderen (11) er placeret i anslag mod skruen (13).

4. Fremgangsmåde ifølge et af kravene 1 til 3, **kendetegnet ved, at** trin (c) til udtrækning af skruen (13) efterfølges af et trin (d) til aftagning af udtrækkeren (1) af skruen (13), i hvilken den er blevet indsat, ved anvendelse af en aftagningsdorn (55).

5. Værktøjssamling til udøvelse af fremgangsmåden ifølge et af kravene 1 til 4, omfattende:

- 10 - mindst en udtrækker (1) omfattende et fortandet skaft (3), hvis fortanding (5) har form af langsgående ribber (5), og et hoved (7) fastgjort til en af skaftets (3) ender;
- mindst et bor (19) med lignende diameter som diameteren af udtrækkerens (1) skaft (3) til boring af et hul (17) i skruen (13);
- 15 - mindst et slagværktøj (49) udformet til slå på udtrækkerens (1) hoved (7);
- mindst en nøgle udformet til at samvirke med udtrækkerens (1) hoved (7);

kendetegnet ved, at værktøjssamlingen desuden omfatter:

- 20 - en slagdorn (51) til indsætning af udtrækkeren (1) i et hul (17), der er boret i skruen (13), idet slagdornen (51) i en af sine ender har en fordybning (53) med en form, der samvirker med udtrækkerens (1) hoved (7);
- et eller flere centreringsapparater (25, 29, 39) til placering og styring af
- 25 borene (19) under boringsoperationerne.

6. Værktøjssamling ifølge krav 5, **kendetegnet ved, at** udtrækkeren (1) desuden omfatter en studs (9) anbragt ved hovedets (7) basis, idet studsen har en diameter, der er større end skaftets (3) og mindre end hovedets (7), således at
- 30 den danner en skulder (11) med skaftet (3); og/eller **at** udtrækkerens hoved (7) er sekskantet.

7. Samling ifølge krav 5 eller 6 omfattende mindst et bor (19) med en lignende diameter som diameteren af udtrækkerens (1) skaft (3) til boring af et hul (17) i
- 35 skruen (13), hvilken samling er **kendetegnet ved, at** mindst et af borene (19)

har en spids af wolframcarbid.

8. Værktøjssamling ifølge et af kravene 5 til 7 omfattende mindst et centreringsapparat (25) til placering og styring af et bor, hvilken samling er

- 5 **kendetegnet ved, at** mindst et af centreringsapparaterne (25) har form af en keglestub, som fra den ene til den anden ende i sin længderetning gennemskæres af en central kanal (27), idet kanalen (27) har en større diameter end borets (19).

9. Værktøjssamling ifølge et af kravene 5 til 8 omfattende mindst et

- 10 centreringsapparat (29) til placering og styring af et bor, hvilken samling er **kendetegnet ved, at** mindst et af centreringsapparaterne (29) har form af en hul bøsning med cylindrisk eller keglestubformet legeme, som gennemskæres af en central kanal (35) med større diameter end borets (19); idet den centrale kanal (35) står i forbindelse med et indre hulrum (33), der udmunder på en af
- 15 legemets (31) ender, idet det indre hulrums munding er dimensioneret til at sættes på skruens hoved, idet centreringsapparatet (29) fortrinsvis på sin ende, der er modsat den, der åbner sig mod det indre hulrum (33), har et fremspring (37), der gengiver formen af udtrækkerens (1) hoved (7), idet fremspringet (37) gennemskæres af kanalen (35).

20

10. Værktøjssamling ifølge et af kravene 5 til 9 omfattende mindst et centreringsapparat (39) til placering og styring af et bor, hvilken samling er **kendetegnet ved, at** mindst et af centreringsapparaterne (39) har form af et cylindrisk legeme (41) og i mindst en af sine ender har en fordybning (43) af en

- 25 form, der griber ind i et sekskantet hoved på skruen, som i sin længde gennemskæres af en central kanal (45), idet kanalen (45) har en større diameter end borets (19), og det cylindriske legeme fortrinsvis har to diametralt modsatte plader.

- 30 **11.** Værktøjssamling ifølge et af kravene 7 til 10 **kendetegnet ved, at** mindst et af centreringsapparaterne (25, 29, 39) er af plastmateriale, fortrinsvis af polyoxymethylen (POM).

12. Værktøjssamling ifølge et af kravene 5 til 11 omfattende en udtrækningsdorn

- 35 (55) til aftagning af udtrækkeren (1) af skruen (13), i hvilken den er indsat,

hvilken samling er **kendetegnet ved, at** udtrækningsdornen (55) i en af sine ender har en gaffel (57), som omfatter to fortrinsvis indbyrdes parallelle tænder (59) med tiltagende tykkelse mellem deres spids (61) og deres basis (63), og **at** afstanden mellem aftagningsdornens (55) tænder (59) er mindre end diameteren 5 af udtrækkerens (1) hoved (7).

13. Anvendelse af et værktøjssamling ifølge et af kravene 5 til 12 til udtrækning af en sikkerhedsskrue eller en brækket skrue på et hjul på et køretøj.

1/4

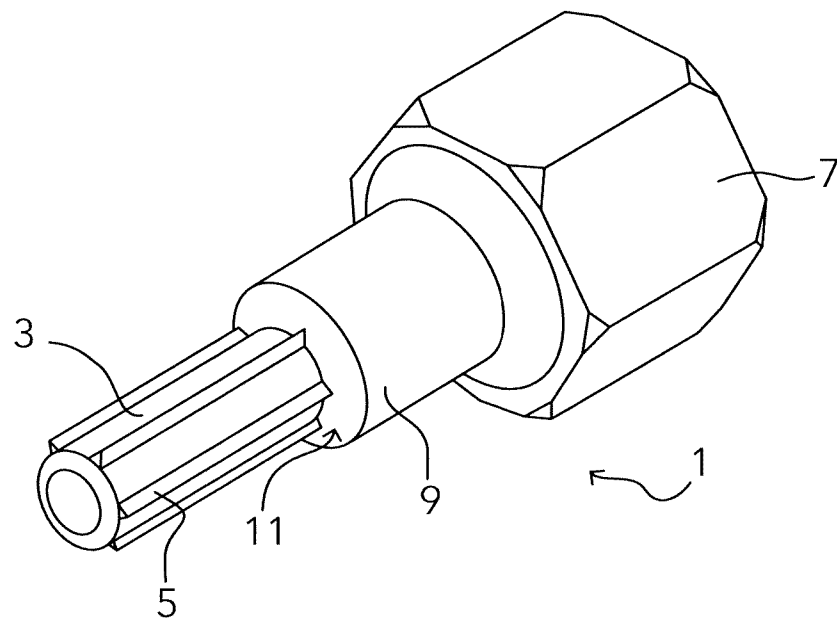


Fig. 1

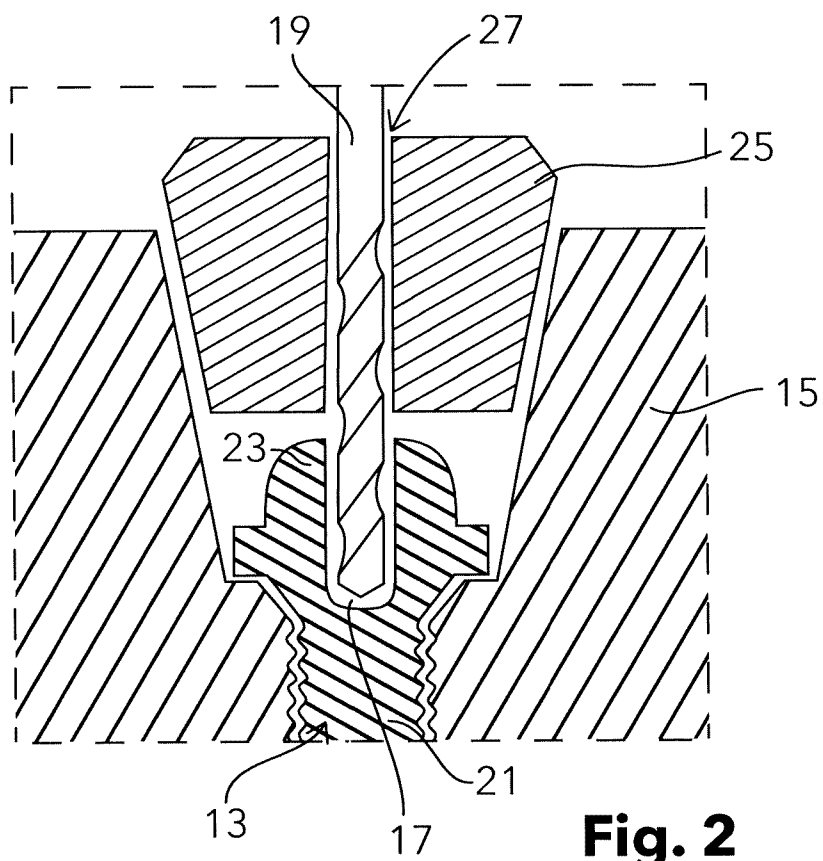


Fig. 2

2/4

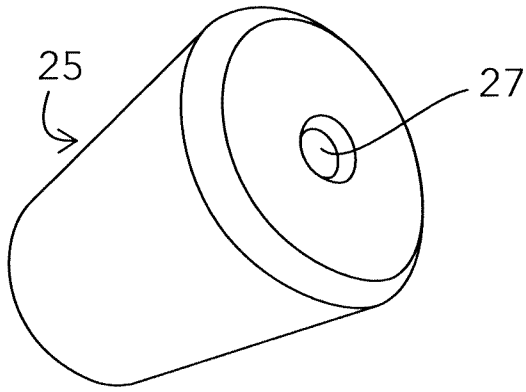


Fig. 3

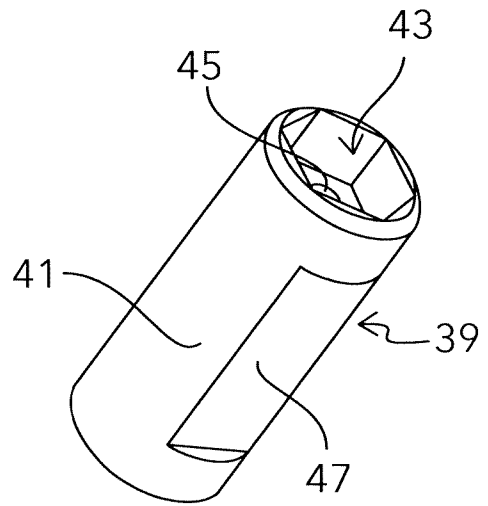


Fig. 5

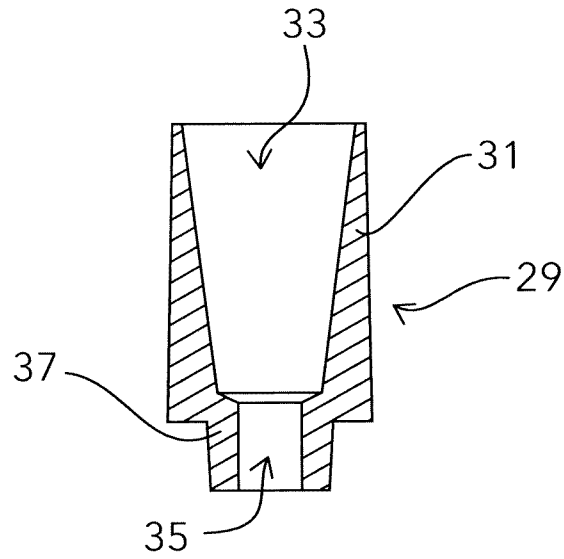
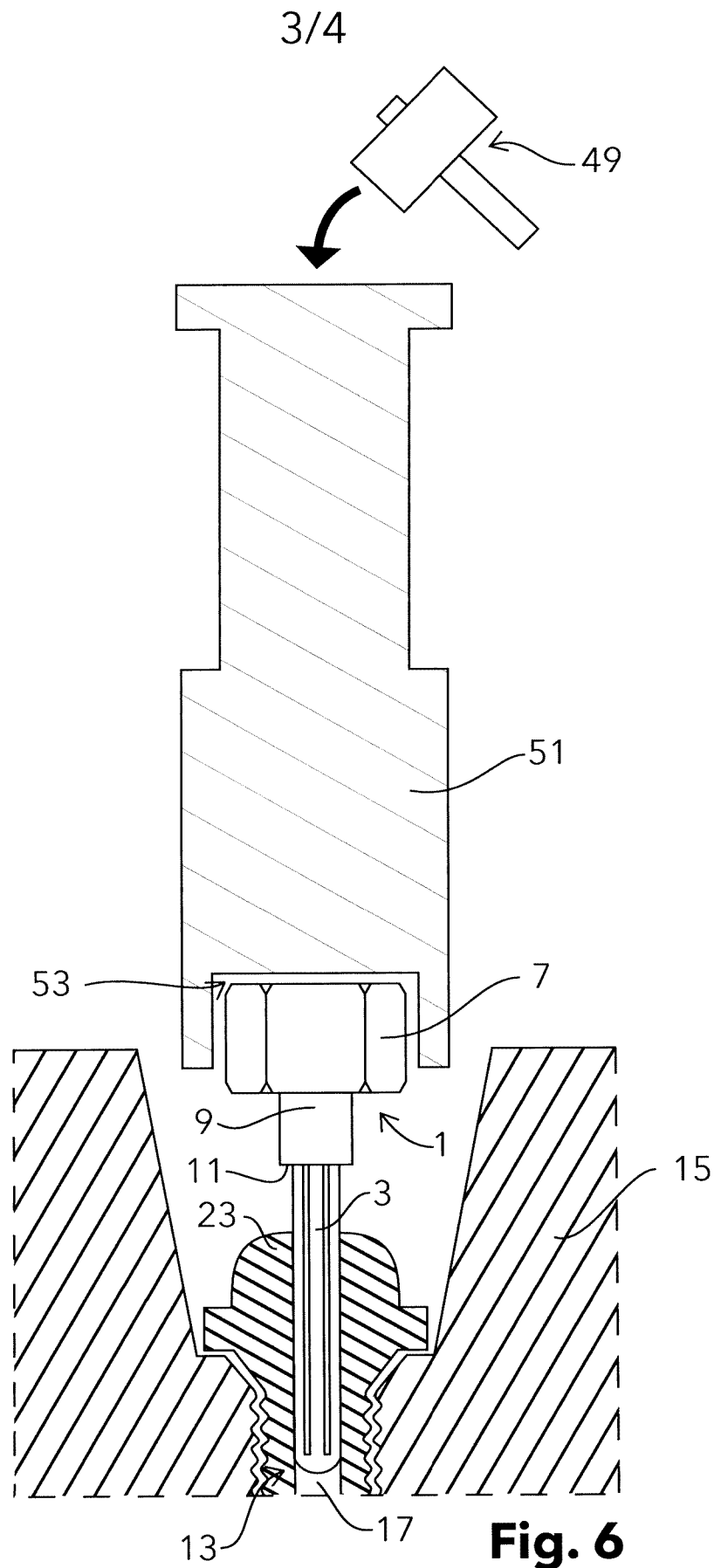


Fig. 4



4/4

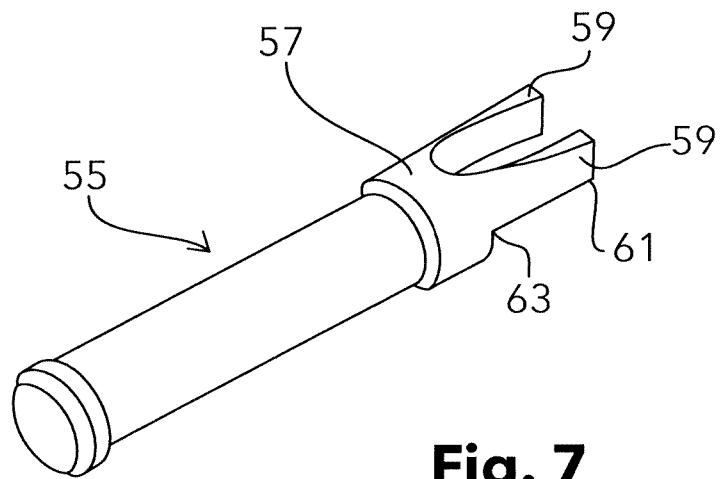


Fig. 7

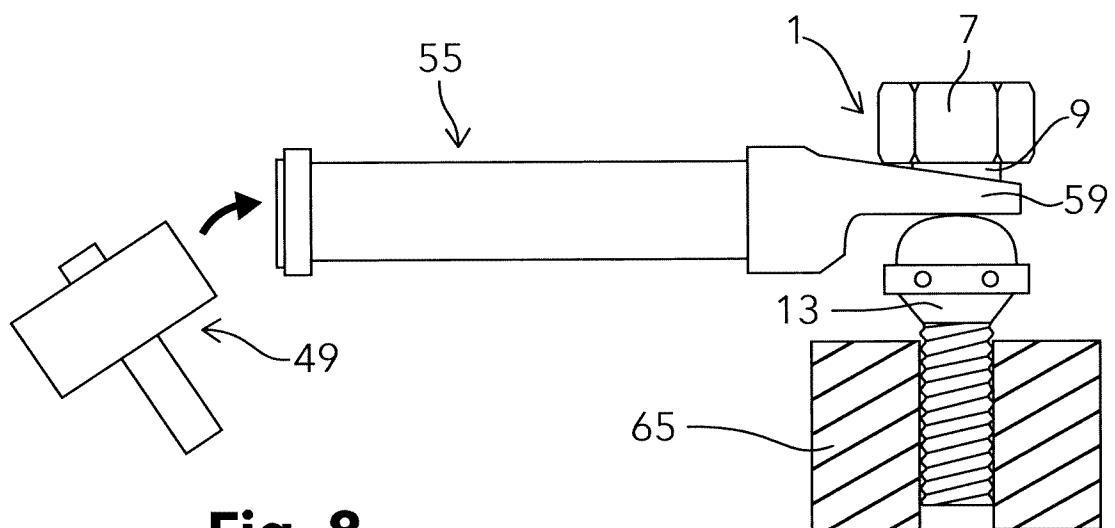


Fig. 8