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(11) **EP 0 826 463 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention
of the grant of the patent:
12.07.2000 Bulletin 2000/28

(51) Int Cl.7: **B25B 13/50**, B25B 23/00

(21) Application number: **97306351.4**

(22) Date of filing: **20.08.1997**

(54) **Tool for screw threaded fasteners**

Werkzeug für mit Schraubgewinde versehene Befestigungsmittel

Outil pour fixations taraudées

(84) Designated Contracting States:
DE FR GB

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(30) Priority: **28.08.1996 GB 9617920**

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(43) Date of publication of application:
04.03.1998 Bulletin 1998/10

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Description

Field of the invention

[0001] The present invention relates to a tool for tightening and releasing screw threaded fasteners.

Background of the invention

[0002] European Patent Application 0722049 discloses a screw threaded fastener having a locking arrangement in which spring loaded pins engage complimentary formations of internally and externally threaded members. According to a preferred embodiment of this invention, the externally threaded member has an axial bore, the pins being mounted on a spring element and are engaged in apertures through the wall of the externally threaded member, from the internal diameter thereof.

[0003] In accordance with the above mentioned European Patent Application, an ABS sensor ring is used to secure the hub assembly of the wheel of a motor vehicle, on a tubular axle. The ABS sensor ring has a screw threaded central bore and a series of angularly spaced teeth around its outer periphery. In use an inductive probe is located radially outwardly of the teeth but in close proximity thereto, so that as the ring rotates, movement of the teeth will generate a signal which is a function of the speed of rotation.

[0004] Because of the proximity of the sensor and also in order to avoid damage to the teeth, it is not possible for a tool to engage the teeth to permit the sensor ring to be tightened or loosened. Projections are consequently provided on the outer face of the sensor ring for engagement by a tool, by which the sensor ring may be tightened or loosened.

[0005] In order to reduce manufacturing costs, it is desirable to minimise the axial extent of the projections. However, in this particular application, the sensor ring has to be tightened to a relatively high torque. As a consequence, when tightening or loosening the ring by application of a torque load spaced axially from the sensor ring, there is a problem of the tool twisting and disengaging from the projections.

[0006] EP-A-0176969 discloses a wrench according to the preamble of independent claim 1 having a spigot formation mounted coaxially, centrally of a socket formation. The spigot formation engages a recess in the head of a screw threaded member to centre the socket formation with respect to the head.

Summary of the invention

[0007] According to one aspect of the present invention, a tool for a screw threaded fastener having an externally threaded member, said externally threaded member having an axial bore extending at least part-way along the threaded portion thereof and radial bores

extending through the wall of the threaded portion, an internally threaded member, the internally threaded member having a series of projections extending axially from one radial face thereof, said projections being spaced angularly of one another and a locking pin engaging in one of the radial bores in the externally threaded member and being biased outwardly from the axial bore of the externally threaded member into engagement between a pair of consecutive projections on the internally threaded member, said tool comprising a socket member having an annular portion, the internal diameter of the annular portion defining an axially extending formation which cooperates with the axially extending projections on the internally threaded member and by which torque loads may be transmitted from the socket member to the internally threaded member, and a central spigot formation coaxially of the annular portion, characterised in that a radially extending recess is provided in an end face of the annular portion to accommodate the locking pin of the screw threaded fastener, the spigot formation being adapted for engagement in the bore of the internally threaded member, the end of the spigot formation being bifurcated, the bifurcation being aligned with the radially extending recess in the end face of the annular portion of the socket member.

[0008] With the above described tool, the internally threaded member may be tightened on the externally threaded member using the socket member, until the required torque is approached. The socket may then be removed and the locking pin inserted through the radial bore of the externally threaded member from within the axial bore, so that the locking pin is biased outwardly into engagement with the projections on the externally threaded member. The socket member may then be re-engaged with the projections on the internally threaded member, the bifurcation on the spigot formation serving to accommodate the locking pin and align the radially extending recess on the annular portion of the socket with the radial bore through which the locking pin is located. The internally threaded member may then be further tightened on the externally threaded member, until the locking pin engages between successive projections. Engagement of the spigot in the bore of the externally threaded member will stabilise the socket formation so that the tendency for the socket to twist out of engagement with the projections on the internally threaded member upon application of torque loads at a distance spaced axially from the internally threaded member, will be overcome. The axial extent of the projections may thus be minimised.

[0009] According to a preferred embodiment of the invention, the bifurcation on the spigot formation diverges outwardly in order to assist in alignment with the locking pin. The socket member may be associated in fixed or detachable relationship to means for applying torque loads, in conventional manner.

Brief description of the drawings

[0010] The invention will now be described further, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view of an ABS sensor ring secured on a tubular axle; and

Figure 2 is a perspective view of a tool in accordance with the present invention.

Detailed description of the drawings

[0011] As illustrated in Figure 1, an ABS sensor ring 10 is secured on a tubular axle 11, a screw thread on the internal diameter 12 of the sensor ring 10 engaging a corresponding screw thread 13 on the external diameter of the tubular axle 11.

[0012] A series of diametrically opposed bores 14 extend radially through the wall of the tubular axle 11.

[0013] A series of axially extending angularly spaced projections 15 are provided on the outer radial end face 16 of the sensor ring 10.

[0014] A locking pin assembly 20 comprises a pair of locking pins 21 disposed one at each end of a U-shaped spring element 22. The locking pins 21 are engaged in a pair of the diametrically opposed bores 14 by compression of the spring element 22 and inserting the pins 21 into the bores 14 from within the bore 23 of the tubular axle 11, so that pins 21 are biased outwardly and engaged between adjacent projections 15 on the sensor ring 10. The sensor ring 10 is thereby prevented from rotating with respect to the tubular axle 11, by means of the locking pins 21. The sensor ring 10 is tightened against the inner race of a wheel bearing assembly (not shown) to locate a wheel hub on the axle 11.

[0015] As illustrated in Figure 2, a tool 25 for tightening and loosening the ABS sensor ring 10 comprises a socket member 26. The socket member 26 comprises a drive socket 27 by which means, for example a lever or pneumatic brace may be drivingly connected to the socket member 26, in conventional manner. At the other end of the socket member 26, an annular portion 28 defines axially extending formations 29 corresponding to the projections 15 on the sensor ring 10. The socket member 26 may thus be located on the end face 16 of sensor ring 10, so that the axially extending formations 29 on the socket member 26 engage the projections 15 on the sensor ring 10 so as to transmit torque loads from the socket member 26 to the sensor ring 10.

[0016] Diametrically opposed recesses 30 are provided in the free end of the annular portion 28, to provide a clearance for the locking pins 21.

[0017] A tubular spigot formation 31 extends coaxially of the annular portion 28 of socket member 26, for engagement in the axial bore 23 of tubular axle 11. The spigot formation 31 may be tapered towards its outer end, to facilitate location in the bore 23 of tubular axle 11.

[0018] The free end of the spigot formation 31 is bifurcated, the bifurcation 33 diverging outwardly. The bifurcation 33 is aligned diametrically with the recesses 30 in the annular portion 28.

[0019] In order to tighten or loosen the ABS sensor ring 10 on the tubular axle 11 when the locking pin assembly 20 is removed, the socket member 26 is located over the end face 16 of the sensor ring 10, so that the spigot formation 31 engages in the bore of the tubular axle 11 and the formations 29 on the internal diameter of the annular portion 28 engage the projections 15 on the sensor ring 10. Torque loads may then be applied to the socket member 26 to tighten or loosen the sensor ring 10. Engagement of the spigot formation 31 in the bore 23 of tubular axle 11 will keep the socket member 26 square on the end face 16 of the sensor ring 10, so that high torque loads may be applied without the risk of the socket member 26 twisting out of engagement with the projections 15 on the sensor ring 10, even though the point of application of the torque load to the socket member 26 may be spaced axially some distance from the sensor ring 10.

[0020] When assembling the sensor ring 10 on the axle 11, the sensor ring 10 is tightened to the required torque by means of a socket member 26. The socket member 26 is then removed from the end face 16 of the sensor ring 10 and the locking pin assembly 20 is inserted into the bore 23 of axle 11, so that the locking pins 21 engage through a pair of diametrically opposed radial bores 14 which are most closely aligned to gaps between adjacent projections 15 on the sensor ring 10.

[0021] The socket member 26 is then re-engaged with the end face 16 of sensor ring 10, the locking pin assembly 20 within the bore 23 of axle 11 being located in the bifurcation 33 of spigot formation 31. The bifurcation 33 will then guide the socket member 26 onto the face 16 of sensor ring 10, so that the recesses 30 are aligned with the locking pins 21. The sensor ring 10 may then be further tightened until the locking pins 21 are aligned with gaps between adjacent projections 15 and under the influence of the spring element 22 will spring into the gaps to lock the sensor ring.

[0022] While the present invention is particularly suited for the fastening of ABS sensor rings as described above, the tool in accordance with the present invention may be used with any screw threaded fasteners in which a locking pin assembly is located in an axial bore of the externally threaded member.

Claims

1. A tool for a screw threaded fastener having an externally threaded member, said externally threaded member (11) having an axial bore (23) extending at least part-way along the threaded portion (13) thereof and radial bores (14) extending through the wall of the threaded portion (13), an internally

threaded member (10), the internally threaded member (10) having a series of projections (15) extending axially from one radial face thereof, said projections (15) being spaced angularly of one another and a locking pin (21) engaging in one of the radial bores (14) in the externally threaded member (11) and being biased outwardly from the axial bore (23) of the externally threaded member (11) into engagement between a pair of adjacent projections (15) on the internally threaded member (10), said tool (26) comprising a socket member (27) having an annular portion (28), the internal diameter of the annular portion defining axially extending formations (29) which cooperate with the axially extending projections (15) on the internally threaded member (10) and by which torque loads may be transmitted from the socket member (27) to the internally threaded member (10) and a central spigot formation (31) coaxially of the annular portion (28), characterised in that a radially extending recess (30) is provided in an end face of the annular portion (28) to accommodate the locking pin (21) of the screw fastener, the spigot formation (31) being adapted for engagement in the bore (23) of the internally threaded member (11), the end of the spigot formation (31) being bifurcated, the bifurcation (33) being aligned with the radially extending recess (30) in the end face of the annular portion (28) of the socket member (26).

2. A tool according to Claim 1 characterised in that the bifurcation (33) in the central spigot formation (31) diverges outwardly.
3. A tool according to Claim 1 or 2 characterised in that a pair of recesses (30) are provided in the annular portion of the socket member, the recesses being aligned diametrically with the bifurcation (33).
4. A tool according to any one of the preceding claims, characterised in that an end portion of the spigot formation tapers outwardly, from its free end.

Patentansprüche

1. Werkzeug für ein Befestigungselement mit Schraubengewinde mit einem Außengewindeteil, wobei besagtes Außengewindeteil (11) eine axiale Bohrung (23) aufweist, die sich wenigstens teilweise über den Gewindeabschnitt (13) desselben erstreckt, sowie radiale Bohrungen (14), die sich durch die Wand des Gewindeabschnittes (13) erstrecken, und ein Innengewindeteil (10), wobei das Innengewindeteil (10) eine Reihe von axial von einer Radialseite desselben abstehenden Vorsprüngen (15) aufweist, wobei besagte Vorsprünge (15) im Winkel von einander beabstandet sind, und ei-

nen Sperrstift (21), welcher in eine der Radialbohrungen (14) in dem Außengewindeteil (11) eingreift und von der Axialbohrung (23) des Außengewindeteils (11) nach außen vorgespannt ist, so daß er in Eingriff zwischen zwei nebeneinander liegende Vorsprünge (15) des Innengewindeteils (10) gedrückt wird, wobei besagtes Werkzeug (26) ein Glockenelement (27) mit einem ringförmigen Abschnitt (28) aufweist, wobei der Innendurchmesser des ringförmigen Abschnittes sich axial erstreckende Anformungen (29) aufweist, die mit den sich axial erstreckenden Vorsprüngen (15) am Innengewindeteil (10) zusammenwirken, und über welche Drehmoment von dem Glockenteil (27) auf das Innengewindeteil (10) übertragen werden kann, und eine zentrale, zu dem ringförmigen Abschnitt (28) koaxiale Klauenausbildung (31), dadurch gekennzeichnet, daß eine sich radial erstreckende Ausnehmung (30) in einer Stirnfläche des ringförmigen Abschnittes (28) vorgesehen ist, welche den Sperrstift (21) des Befestigungselementes mit Schraubengewinde aufnimmt, wobei die Klauenausbildung (31) so ausgelegt ist, daß sie in die Bohrung (23) im Innengewindeteil (11) eingeführt werden kann, wobei das Ende der Klauenausbildung (31) gabelförmig ausgebildet ist, wobei die Gabelung (33) mit der sich radial erstreckenden Ausnehmung (30) in der Stirnfläche des ringförmigen Abschnittes (28) des Glockenteils (26) fluchtend ausgerichtet ist.

2. Werkzeug nach Anspruch 1, dadurch gekennzeichnet, daß die Gabelung (33) in der Klauenausbildung (31) nach außen auseinanderläuft.
3. Werkzeug nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß zwei Ausnehmungen (30) in dem ringförmigen Teil des Glockenteils vorgesehen sind, wobei die Ausnehmungen diametral mit der Gabelung (33) fluchten.
4. Werkzeug nach einem beliebigen der vorangehenden Ansprüche, dadurch gekennzeichnet, daß ein Endabschnitt der Klauenausbildung von seinem freien Ende aus konisch nach außen verläuft.

Revendications

1. Outil destiné à une fixation filetée à vis comportant un élément fileté à l'extérieur, ledit élément fileté à l'extérieur (11) comportant un alésage axial (23) s'étendant au moins en partie le long de la partie filetée (13) de celui-ci et des alésages radiaux (14) s'étendant au travers de la paroi de la partie filetée (13), un élément fileté à l'intérieur (10), l'élément fileté à l'intérieur (10) comportant une série de saillies (15) s'étendant axialement depuis une face radiale

de celui-ci, lesdites saillies (15) étant espacées angulairement les unes des autres et une broche de verrouillage (21) pénétrant dans l'un des alésages radiaux (14) dans l'élément fileté à l'extérieur (11) et étant sollicitée vers l'extérieur depuis l'alésage axial (23) de l'élément fileté à l'extérieur (11) jusqu'en prise entre une paire de saillies adjacentes (15) sur l'élément fileté à l'intérieur (10), ledit outil (26) comprenant un élément de douille (27) comportant une partie annulaire (28), le diamètre intérieur de la partie annulaire définissant des structures s'étendant axialement (29) qui coopèrent avec les saillies s'étendant axialement (15) sur l'élément fileté à l'intérieur (10) et grâce à quoi des charges de couple peuvent être transmises depuis l'élément de douille (27) à l'élément fileté à l'intérieur (10), et une structure de tenon centrale (31) coaxiale à la partie annulaire (28), caractérisé en ce qu'un évidement s'étendant radialement (30) est ménagé dans une face d'extrémité de la partie annulaire (28) afin de recevoir la broche de verrouillage (21) de la fixation à vis, la structure de tenon (31) étant conçue pour s'engager dans l'alésage (23) de l'élément fileté à l'intérieur (11), l'extrémité de la structure de tenon (31) étant à fourche, la fourche (33) étant alignée avec l'évidement s'étendant radialement (30) dans la face d'extrémité de la partie annulaire (28) de l'élément de douille (26).

2. Outil selon la revendication 1, caractérisé en ce que la fourche (33) dans la structure de tenon centrale (31) diverge vers l'extérieur.
3. Outil selon la revendication 1 ou 2, caractérisé en ce qu'une paire d'évidements (30) est prévue dans la partie annulaire de l'élément de douille, les évidements étant alignés diamétralement avec la fourche (33).
4. Outil selon l'une quelconque des revendications précédentes, caractérisé en ce qu'une partie d'extrémité de la structure de tenon s'évase vers l'extérieur, depuis son extrémité libre.

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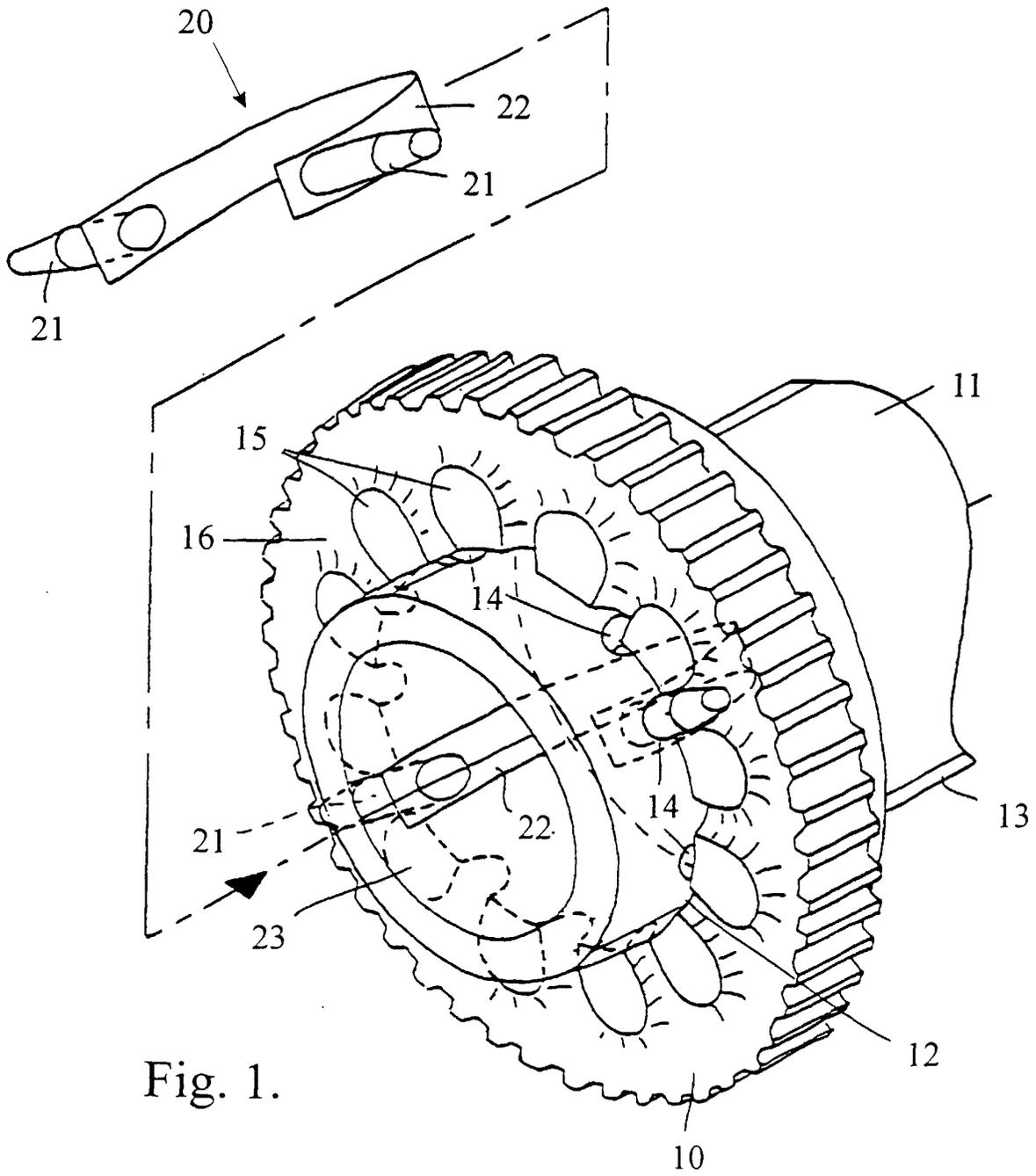


Fig. 1.

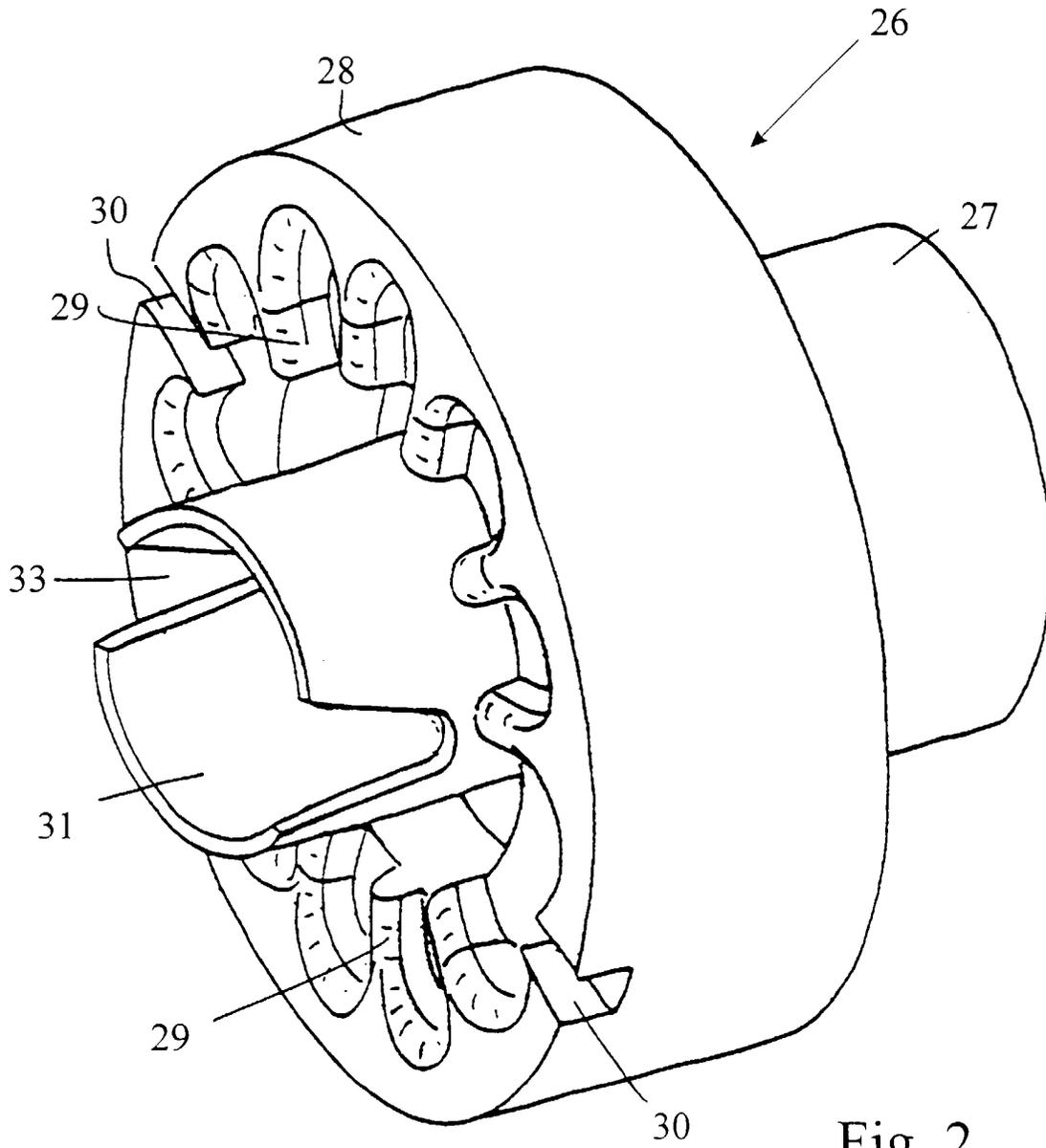


Fig. 2.