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(54) **Handle for an electrically insulated ratcheting screwdriver and screwdriver with interchangeable axial shafts comprising such a handle**

Griff für einen elektrisch isolierten Ratschenschrauber und Schrauber mit austauschbarem axialen Schaft mit einem solchen Griff

Manche pour un tournevis à cliqué électriquement isolé et tournevis avec un tel manche avec tige échangeable

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Description

TECHNICAL FIELD OF THE INVENTION

[0001] The present invention lies within the technical field of hand-operated tools and particularly within that of electrically insulated screwdrivers with ratchet mechanisms.

BACKGROUND OF THE INVENTION

[0002] Ratcheting screwdrivers are well known in the art. They are useful to provide driving rotation of the handle and axial shaft in one direction for fastening or loosening an element such like a screw whilst allowing non-driven rotation of the handle into the opposite direction. On the other hand, there are known screwdrivers with interchangeable axial shafts comprising a handle with retaining means for holding a rearward portion of the axial shaft in an inner longitudinal hole in the handle.

[0003] A ratcheting screwdriver with exchangeable bits is disclosed, for example, in US-7287448-B2. The therein described screwdriver comprises a handle body having a first end, a second end and an inner axial blind hollow extending from the first end towards the second end of the handle body, and a first opening in the first end communicating with the axial hollow, and a sleeve member fixedly fitted within the axial blind hollow, The sleeve member comprises a first end portion with an insertion opening of an axial inner passage for accommodating the rearward portion of the axial shaft, a second end portion and an outer wall surface, and a ratchet mechanism comprising a toothed sleeve, at least one pawl member engaging the toothed sleeve and a switch member mounted at a first handle end portion. The ratcheting mechanism comprises a toothed sleeve, a first pawl member and a second pawl member positioned in a receiving section in an axial inner passage in the sleeve member, and connected to each other by a connecting spring for biasing the pawl members away from each other, and a cap-shaped switch member. The switch member is pivotable between a first end position, a second end position and an intermediate position and comprises actuator rods extending into the receiving portion at opposite sides. In the first end position, a second actuator rod pushes the second pawl member away from the outer wall surface of the toothed sleeve so that a toothed side of the second pawl member becomes disengaged from the toothed sleeve whilst the first pawl member becomes restrained between a lateral wall of the receiving portion and the outer surface of the toothed sleeve so that its toothed side engages with the toothed sleeve, so that the ratcheting mechanism allows clockwise driving rotation for driving a screw or other element, and counterclockwise free rotation in which the screw or other element is not driven. In the intermediate position of the switch member, the actuator rods are distanced from the pawl members so that the toothed sides of both of them engage with the toothed sleeve, so that driving rotation is allowed clockwise and counterclockwise. In the second end position, the first actuator rod pushes the first pawl member way from the outer wall surface of the toothed sleeve -6- so that the toothed side of the first pawl member becomes disengaged from the toothed sleeve whilst the second pawl member becomes restrained between the opposite lateral wall of the receiving portion and the outer surface of the toothed sleeve so that its toothed side engages with the toothed sleeve, so that, in said second portion, the ratcheting mechanism allows counterclockwise driving rotation for loosening a screw or other element, and clockwise free rotation in which the screw or other element is not moved.

[0004] When working at elements of electric equipment, electrical insulation of the screwdriver handle from the tip of the axial shaft is a must to protect the user from accidental electrical shocks.

DESCRIPTION OF THE INVENTION

[0005] The present invention is intended to overcome the above mentioned drawbacks of prior art by providing a handle for an electrically insulated ratcheting screwdriver and a screwdriver with interchangeable axial shafts comprising the handle.

[0006] The handle is capable of releasably holding an axial shaft having a tip and a rear end portion, a forward portion extending from the tip towards the rear end portion, a rearward portion extending from the rear end portion towards the tip and insertable into the handle, an anti-rotating portion of the rearward portion, and an annular notch between the antirotating portion and the rear end portion. This handle comprises a handle body made of a first electrically insulating material having a first end, a second end and an inner axial hollow extending from the first end towards the second end of the handle body, and a first opening in the first end communicating with the axial hollow, a sleeve member fixedly fitted within the axial hollow, the sleeve member comprising a first end portion with an insertion opening of an axial inner passage for accommodating the rearward portion of the axial shaft, a second end portion and an outer wall surface, and a ratchet mechanism comprising a toothed sleeve, at least one pawl member engaging the toothed sleeve and a switch member mounted to a first handle end portion, wherein

the handle comprises pushbutton-operated retaining means for releasably retaining the rearward portion within the axial passage of the sleeve member and releasing the rearward portion by actuating a pushbutton located a second handle end portion;

the outer wall surface of the sleeve member comprises at least one annular channel;

the handle body comprises radial throughholes communicating with the annular channel;

the handle body is at least radially wrapped by a jacket of elastomeric material injected over the handle body;

the jacket comprises an enveloping portion enveloping the handle body, a filling portion filling said annular channel, and connecting portions extending through said radial throughholes.

[0007] Preferably, the outer wall surface of the sleeve member comprises a plurality of annular channels, each filled with a filling portion of the elastomeric material of the jacket, each filling portion connected to the enveloping portion by connecting portions of the elastomeric material extending through a plurality of radial throughholes in the handle body.

[0008] The handle body may further comprise an outer surface with plurality of protrusions that at least penetrate into or, preferably, through adjacent portions of the elastomeric material of the enveloping portion of the jacket.

[0009] In accordance with a preferred embodiment of the invention,

the second end of the handle body comprises a second opening communicating with said inner axial hollow;

the second end portion of said axial inner passage of the sleeve member comprises with a second opening located axially opposite to said first end portion;

the retaining means comprise a claw member comprising a transversely positioned base member connected to elastically tiltable legs, for example at least two equidistant tiltable legs, extending into said inner passage, each tiltable leg comprising a free end with a thickening for releasably engaging said annular notch in said rearward portion when accommodated in said inner passage in a locked position;

the base member is fixed to the second end portion in a position where it is axially adjacent to the rear end portion when the rearward portion is in said locked position;

the tiltable legs are positioned radially in the axial inner passage such that they are able to move radially between a first position where said thickenings are radially closest to each other and a second position where said thickenings are radially distant from each other sufficiently to disengage from said annular notch of said rearward portion of the axial shaft;

a pusher rod member is axially guided in the axial hollow of the handle body, the pusher rod member comprising a pushbutton head portion located at least partially in the second opening of the handle body, and a pushing member axially opposite to the pushbutton head portion;

the pusher rod member is axially movable between a resting position where the pushing member does not act on the tiltable legs of the claw member, and an acting position, where the pushing member forces the tiltable legs into said second position;

the pusher rod member is held in the resting position by a spring member providing an axial resistance such that, to move the pusher rod member from the resting position towards the acting position, a pushing force greater than the axial resistance of the spring member must be exerted on the pushbutton head portion.

[0010] According to this first embodiment, the axial inner passage of the sleeve member comprises an intermediate stepped portion located between said first end portion and said second end portion, the intermediate portion having a smaller diameter than said end portions and axially dividing the axial inner passage into a first chamber comprising said receiving section and housing the toothed sleeve, and a second chamber housing the claw member. Each thickening may comprise a distal sliding ramp which is inwardly inclined towards said second end of the handle body, to contribute to allowing the rear end portion to separate the thickenings from each other when the rearward portion is inserted into the handle towards said locked position.

[0011] The switch member may be rotationally mounted to the first end of the sleeve member by means of a mounting arrangement. In a first embodiment of the mounting arrangement, it comprises at least two radial tabs emerging from opposed of an outer wall portion closely to the first end portion of the sleeve member and guided radially in respective horizontal guiding slots provided in an inner portion of a axial skirt of the switch member which surrounds said outer wall portion of the sleeve member. On the other hand, in a second embodiment of the mounting arrangement, it comprises respective pairs of radial tabs emerging from opposed portions of an outer wall closely to the first end portion of the sleeve member and guided radially in respective horizontal guiding slots provided in an inner surface of a skirt of the switch member which surrounds said outer wall portion of the sleeve member. In turn, in a third embodiment of the mounting arrangement, it comprises at least two radial tabs emerging equidistantly one to another at opposed portions of an outer wall closely to the first end portion of the sleeve element and radially guided in one single horizontal slot in an inner wall of the skirt of the switch member which surrounds said outer wall portion of the sleeve member.

[0012] In a first alternative of the above described preferred embodiment where the pushing member is a pushing end provided at the pusher rod, the tiltable legs are made of an elastic material, the base member of the claw member comprises a central hole which is axially aligned with said pusher rod member, and the pusher rod member is guided in the central hole at least when moving towards said acting position. Each thickening comprises a proximal sliding ramp inwardly inclined towards the first end of the handle body, to contribute to allowing separation of the thickenings from each other to disengage from said annular notch in the rearward portion, by a radial edge portion of the pushing member sliding on the proximal sliding ramps when the pusher rod member is pushed towards the first end of the handle body. Preferably, said pushing member is tubular and comprises an axial bore for inserting the rear end portion, such that the axial bore houses the rear end portion when the rearward portion is inserted in the handle, and the radial edge portion is a terminal edge of a perimetral wall surrounding the axial bore.

[0013] In a second alternative of the above described preferred embodiment where the pushing member com-

prises a plurality of pushing legs,
each tiltable leg comprises a first leg portion comprising said thickening and extending into the axial inner passage of the sleeve member towards said first end of the handle body, and a second leg portion extending towards said second end of the handle body, and a connecting leg portion located between the first and second leg portions,
the connecting leg portion is tiltably connected to a peripheral portion of the base member of the claw member;
each second leg portion is guided in a longitudinal recess in the axial hollow of the handle body;
the tiltable legs are connected to the peripheral portion of the base member such that, when the pusher rod member is moved towards said acting position, said peripheral inner edges force the thickened end portions of the tiltable legs to approach each other so that the tiltable legs pivot about the connecting leg portions to move the first leg portions from said first to said second position;
the connecting leg portions are elastically connected to the base member such that the tiltable legs elastically recover their first position.

[0014] According to this second alternative, each of the thickened end portions may comprise an inwardly inclined contact surface facing said inner peripheral edge of the pushing leg, and the spring member is radially surrounded by a plurality of fixing legs provided with respective fixing ends fixed to the axial inner passage of the sleeve element, and arranged axially between a seat provided at the pusher rod member and a transverse plate mounted in the second end opening of the sleeve element between the pushing legs.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015] Hereinafter, aspects and embodiments of the invention will be described on the grounds of hereto appended schematic drawings wherein

figure 1 is is a side view of an embodiment of the screwdriver in accordance with the invention;
figure 2 is a top plan view of the screwdriver shown in figure 1;
figure 3 is a bottom plan view of the screwdriver shown in figure 1;
figure 4 is a perspective view of the axial shaft of the screwdriver shown in figure 1;
figure 5 is an exploded view of a first embodiment of the components of the screwdriver shown in figure 1;
figure 6 is a perspective view of the handle body and the jacket of the handle of the screwdriver shown in figure 1;
figure 7 is a longitudinal sectional view of the jacket and handle body shown in figure 6;
figure 8 is a sectional view along line A-A marked in figure 1 according to a first embodiment of the screwdriver according to the invention;
figure 9 is an exploded view of the sleeve member, toothed sleeve pawls and switch member shown in figure 8;
figure 10 is a longitudinal section of the sleeve member, toothed sleeve and pawls shown in figure 9;
figure 11 is a cross sectional view along line B-B shown in figure 8;
figure 12 is a perspective view of the pusher rod member, spring member, claw member and sleeve member shown in figure 5;
figure 13 is a longitudinally sectioned view of the claw member shown in figure 12;
figure 14 is a cross sectional view along line C-C shown in figure 8;
figure 15 is longitudinally sectioned view of the handle body, pusher rod member, spring, claw member and sleeve member shown in figure 8;
figures 16A-16C are longitudinally sectioned views corresponding to figure 8 and showing how the axial shaft is inserted into the handle;
figure 17 is another sectional view along line A-A marked in figure 1 according to a second embodiment of the screwdriver according to the invention;
figure 18 is an exploded plan view of the pusher rod, sleeve and connecting members shown in figure 17;
figure 19 is a partial side perspective view of the pusher rod and sleeve members shown in figure 18;
figure 20 is another partial side perspective view of the pusher rod and sleeve members shown in figure 18.

[0016] In these figures, there are references identifying the following elements

1	handle
2	axial shaft
2a	tip
2b	rear end portion
2c	forward portion
2d	rearward portion
2e	anti-rotating portion
2f	annular notch
3	handle body
3a	first end
3b	second end
3c	inner axial hollow
3d	first opening
3e	radial throughholes
3f	protrusions
3g	second opening
3h	first hollow section
3i	second hollow section
3j	intermediate hollow section
3k	longitudinal guiding recess
3l	radial recess
3m	longitudinal recess
4	sleeve member
4a	first end portion
4b	insertion opening

4c	axial inner passage
4d	receiving section
4e	second end portion
4f	outer wall surface
4g, 4h	annular channel
4i	second opening
4j	intermediate stepped portion
4k	first chamber
4l	second chamber
4m	lateral walls
4n	end wall
4o	radial blind bore
4p	transverse plate
4q	radial tab
5	claw member
5a	base member
5b	central hole
6	toothed sleeve
6a	outer wall surface
6b	mounting portion
6c	longitudinal bore
7	longitudinal teeth
8, 8’	pawl member
8a, 8a’	toothed side
8b	rear side
8c	connecting spring
9	switch member
9a	head wall
9b	axial skirt
9c	mounting space
9d	central bore
9e	actuator rod
9f, 9f, 9f"	retaining grooves
9g	gripping recess
10	jacket of elastomeric material
10a	enveloping portion
10b	filling portion
10c	connecting portions
10d	adjacent portions
10e	window
11	tiltable leg
11a	thickening
11b	distal sliding ramp
11c	proximal sliding ramp
11d	first leg portion
11e	second leg portion
11f	connecting leg portion
11g	thickened end portion
11h	inclined contact surface
12	pusher rod member
12a	pushbutton head portion
12b	pushing end
12c	radial edge portion
12d	axial bore
12e	inner peripheral edge
12f	pushing leg
12g	fixing leg
12h	radial projection
12i	guiding rib
12j	peripheral flange
12k	seat
12l	radial arm
12m	fixing end
13	spring member
14	ball
15	spring
16	rubber disk

EMBODIMENTS OF THE INVENTION

[0017] Figures 1 to 4 are external views of an embodiment of an electrically insulated ratcheting screwdriver according to the present invention. As apparent, the screwdriver comprises a handle -1-capable of releasably holding an axial shaft -2- having a tip -2a- and a rear end portion -2b-, a forward portion -2c- extending from the tip -2a- towards the rear end portion -2b-, a rearward portion -2d- extending from the rear end portion -2b- towards the tip -2a- and insertable into the handle, The blade-2- further comprises an anti-rotating portion -2e- of the rearward portion -2d- , and an annular notch -2f-between the antirotating portion -2e- and the rear end portion -2b-.

[0018] In the embodiments respectively shown respectively in figures 5-16 and 17, the handle -1- comprises a handle body -3- made of a first electrically insulating material having first end -3a-, a second end -3b- and an inner axial hollow -3c- extending from the first end -3a- towards the second end -3b- of the handle body -3-, and a first opening -3d- in the first end -3a- communicating with the axial hollow -3c-. The axial hollow -3c- comprises a first hollow section -3h-, second hollow section -3i- and an intermediate hollow section -3j-. The second opening -3g- has a larger diameter than the first hollow section -3h-, and the first and second hollow sections -3h, 3i- each have a larger diameter that the intermediate hollow section -3j-. The intermediate hollow section -3j- comprises longitudinal guiding recesses -3k-.

[0019] A sleeve member -4- is fixedly fitted within the second hollow section -3i- of the axial hollow -3c-. The sleeve member -4- comprises a first end portion -4a- with an insertion opening -4b- communicating with a receiving section -4d- of an axial inner passage -4c- for accommodating the rearward portion -2d-, a second end portion -4e- and an outer wall surface -4f-. The handle -1- further comprises retaining means for releasably retaining the rearward portion -2c- within the axial passage -4c- of the sleeve member -4- and a ratchet mechanism comprising a toothed sleeve -6- and at least one pawl member -8-.

[0020] The outer wall surface -4f- of the sleeve member -4- comprises two annular channels -4g, 4h-, whilst the handle body -3- comprises radial throughholes -3e-communicating with the annular channel -4g, 4h- and is radially wrapped by a jacket -10- of elastomeric material injected over the handle body -3-, each filled with a filling portion -10b- of the elastomeric material of the jacket -10-, each filling portion -10b-connected to the envelop-

ing portion -10a- by connecting portions -10c- of the elastomeric material extending through a plurality of radial throughholes -3e- in the handle body -3-. The outer surface of the handle body -3- has a plurality of protrusions -3f- that penetrate through adjacent portions -10d- of the elastomeric material of the enveloping portion -10a- of the jacket -10- and flush with the surface of the enveloping portion -10a- of the jacket -10-.

[0021] When injecting the jacket -10- over the handle body -3-, the elastomeric material penetrates through the throughholes -3e- into the annular channels -4g, 4h- so that, after cooling, the enveloping portion -10a- and the filling portions -10b- in the annular channels -4g, 4h- remain connected by the connecting portions -10c-extending through the throughholes -3e-, such that the sleeve member -4- is fixedly positioned in the handle body -3-.

[0022] The protrusions -3f- penetrating through the enveloping portion -10a- of the jacket -10- contribute to securing the jacket on the outer surface of the handle body -3-, especially to prevent slipping of the jacket -10- on said outer surface. As shown, some of the protrusions are simple knobs whilst others are shaped as arrows, numbers and letters and logos which are visible to the user.

[0023] The outer surface of the handle body -3- further comprises a recessed elongate plate portion -3h-, whilst the jacket -10 comprises a complementarily-shaped lateral window -10e- in the enveloping portion -10a- of the jacket -10-. The plate portion -3h-improves the gripping quality of the handle -1- and may additionally be used for putting thereon inscriptions such as, for example, a trademark or type name of the screwdriver, and/or symbols such as, for example, logos.

[0024] The ratcheting mechanism is of the type disclosed in US-7287448-B2 and comprises a toothed sleeve -6-, a first pawl members -8- and a second pawl member-8'- connected to each other by an elastic member i.e., a connecting spring -8c- for biasing the pawl members -8, 8'- away from each other, and a cap-shaped switch member -9-.

[0025] The toothed sleeve -6- is rotatably mounted in the inner passage -4c- of the sleeve member -4-, and comprises an outer wall surface -6a- a portion of which is provided with plurality of longitudinal teeth -7-. The teeth -7- radially protrude from the outer wall surface -6a-. The toothed sleeve -6- further comprises a mounting portion -6b- protruding beyond the insertion opening -4b- of the sleeve member -4c-, and a longitudinal bore -6c- shaped to fit with the anti-rotating portion -2e- of the rearward portion -2c-,

[0026] The pawl members -8, 8'- are mounted in a receiving section -4d- of the sleeve member -4-. The receiving section -4d- is comprised in said insertion opening -4b-, and comprises two converging lateral walls -4m- connected to an arched end wall -4n-. Each pawl member -8, 8'- comprises a toothed side -8a- for releasably engaging the longitudinal teeth -7- of the toothed sleeve -6-. The pawl members -8, 8'- are positioned in the receiving section -4d- between the end wall -4n- and the teeth -7- on the outer wall surface -6a- of the toothed sleeve -6-.

[0027] The switch member -9- is made of a another electrically insulating material and comprises a head wall -9a- and a peripheral axial skirt -9b- by which the switch member -9- is pivotally mounted to the first end portion -4a- of the sleeve member -4-. The head wall -9a- and the axial skirt -9b- enclose an inner mounting space -9c-. The head wall -9a- comprises a central bore -9d- for inserting the axial shaft -2-, and a first and a second axial actuator rod -9e, 9e'- located in positions where they protrude into the receiving section -4d- of the sleeve member -4- respectively between one lateral wall -4m- and the outer wall surface -6a- of the toothed sleeve -6- and where each actuator rod -9e, 9e'- faces one of the pawl members -8, 8'-.

[0028] The switch member -9- is pivotable between a first end position, a second end position (not shown in the figures) and an intermediate position shown in figure 11.

[0029] In the first end position, the second actuator rod -9e'- pushes the second pawl member -8'- away from the outer wall surface -6a- of the toothed sleeve -6- so that the toothed side -8a'- of the second pawl member -8'- becomes disengaged from the longitudinal teeth -7- whilst the first pawl member -8- becomes restrained between the lateral wall -4m- and the outer surface -6a- of the toothed sleeve -6- so that its toothed side -8a- engages with the longitudinal teeth -7- of the toothed sleeve -6-. Thus, in said first portion, the ratcheting mechanism allows clockwise driving rotation for driving a screw or other element, and counterclockwise free rotation in which the screw or other element is not driven.

[0030] In the intermediate position of the switch member -9- shown in figure 11, the actuator rods -9, 9'- are distanced from the pawl members -8. 8'- so that the toothed sides -8a, 8a'- of both of them engage with the teeth -7- of the toothed sleeve -6-, so that driving rotation is allowed clockwise and counterclockwise.

[0031] In the second end position, the first actuator rod -9e- pushes the first pawl member -8- away from the outer wall surface -6a- of the toothed sleeve -6- so that the toothed side -8a- of the first pawl member -8- becomes disengaged from the longitudinal teeth -7- whilst the second pawl member -8'- becomes restrained between the lateral wall -4m- and the outer surface -6a- of the toothed sleeve -6- , so that its toothed side -8a'- engages with the longitudinal teeth -7- of the toothed sleeve -6-. Thus, in said second position, the ratcheting mechanism allows counterclockwise driving rotation for loosening a screw or other element, and clockwise free rotation in which the screw or other element is not moved.

[0032] The switch member -9- is releasably held in the afore mentioned positions by positioning means comprising a first, second and a third axial retaining groove -9f, 9f, 9f"- in the inner surface of the skirt -9b- of the switch member -9-, a radial blind bore -4o- in the outer wall sur-

face -4f- of the sleeve member -4-, and a ball -14- and a spring -15- positioned in the axial bore -4o- such that the spring -15- exerts a pushing force.

[0033] The blind bore -4o- is located such that when the switch member -9- is pivoted, a portion of the ball -14- is pressed by the spring -15- into one of the retaining grooves -9f, 9f, 9f'-. When pivoting the switch member -9- from one to another of said positions, the ball -14- is pressed against the pushing force of the spring 15- into the blind bore -4o- until it faces another of the retaining recesses -9f, 9f, 9f'- into which a portion of the ball -14- is then pressed by action of the spring -15-.

[0034] The switch member -9- is not enveloped by the jacket -10-, and the outer surface of its axial skirt -9b- is provided with longitudinal gripping recesses -9g- to enhance pivoting of the switch member -9-.

[0035] In all of the embodiments shown in the figures, the second end of the handle body -3- comprises a second opening -3g- communicating with said inner axial hollow -3c-, and the second end portion -4e- of said axial inner passage -4c- of the sleeve member -4- comprises with a second opening -4i- located axially opposite to said first end portion -4-, whereas the retaining means comprise a claw member -5- comprising a transversely positioned base member -5a- connected elastically to a plurality of tiltable legs -11- extending into said inner passage -4c-, each tiltable leg -11-comprising a free end with a thickening -11a- for releasably engaging said annular notch -2f- in said rearward portion -2e- of the axial shaft -2- when accommodated in said inner passage -4c- in a locked position. The base member -5a- is fixed to the second end portion -4e- in a position where it is axially adjacent to the rear end portion -2b- of the axial shaft -2- when the rearward portion -2d- of the axial shaft -2- is in said locked position. The tiltable legs -11- are positioned radially in the axial inner passage -4c- such that they are able to move radially between a first position where said thickenings -11a- are radially closest to each other and a second position where said thickenings -11a- are radially distant from each other sufficiently to disengage from said annular notch -2f- of said rearward portion -2d- of the axial shaft -2-. Each thickening -11a- comprises a distal sliding ramp -11b- which is inwardly inclined towards said second end -3b- of the handle body -4-, to contribute to allowing the rear end portion -2b- to separate the thickenings -11 a- from each other when the rearward portion -2d- of the axial shaft -2- is inserted into the handle -1- towards said locked position, as shown in figures 16A-16C.

[0036] A pusher rod member-12- of an insulating material is axially guided in the axial hollow -3c- of the handle body -3-. The pusher rod member -12- comprises a pushbutton head portion -12a- located in the second opening -3g- of the handle body -3-, and a pushing member in the form of a pushing end -12b- axially opposite to the pushbutton head portion -12a-. The pushbutton head portion -12a- comprises two radial projections -12h- that slidablly fit within corresponding radial recesses -3l- provided in the inner surface of the second opening -3g- of the handle body -3-. The radial recesses -3l- communicate with the first hollow section -3h- of the inner axial hollow -3c- of the handle body -3-. The pushbutton head portion -12a- is thus slidably retained in the second opening -3g- of the handle body -3-.

[0037] The pusher rod member -12- is axially movable, guided by longitudinal guiding ribs -12i- slidably fitting in the guiding recesses -3k- in the intermediate hollow section -3j-, between a resting position where the pushing end -12b- does not act on the tiltable legs -11- of the claw member -5-, and an acting position, where the pushing end -12b- forces the tiltable legs -11- into said second position. The pusher rod member -12- is held in the resting position by a spring member -13- providing an axial resistance such that, to move the pusher rod member -12- from the resting position towards the acting position, a pushing force greater than the axial resistance of the spring member -13- must be exerted on the pushbutton head portion -12a-. The spring member -13- surrounds the pusher rod member -12- and is positioned within the first hollow section -3h- of the handle body -3- abutting against a peripheral flange -12j- of the pusher rod member -12- located adjacently to the pushbutton head portion -12a-.

[0038] The axial inner passage -4c- of the sleeve member -4- comprises an intermediate stepped portion -4j - located between said first end portion -4a- and said second end portion -4e-, the intermediate portion -4j- having a smaller diameter than said end portions -4a, 4i- and axially dividing the axial inner passage -4c- into a first chamber -4k- comprising said receiving section -4d- and housing the toothed sleeve -6-, and a second chamber -41- housing the claw member -5-.

[0039] In the first embodiment shown in figures 5, 8, 12-14, 15 and 16A-16C, the base member -5a- of the claw member -5- comprises a central hole -5b- which is axially aligned with said pusher rod member -12-, and the tiltable legs -11- are made of an elastic material. Each thickening -11a- comprises a proximal sliding ramp -11c- inwardly inclined towards the first end -3a- of the handle body -3-, to contribute to allowing separation of the thickenings -11- from each other to disengage from said annular notch -2f- in the rearward portion -2d-, by a radial edge portion -12c, 12e- of the pushing end -12b- sliding on the proximal sliding ramps -11c- when the pusher rod member -12- is pushed towards the first end -3a- of the handle body -3-. The pusher rod member -12- is guided in the central hole -5b- when moving towards said acting position, and its pushing end -12b- is tubular and comprises an axial bore -12d- for inserting the rear end portion -2b- of the axial shaft -2-, such that the axial bore -12d- houses the rear end portion -2b- when the rearward portion -2d- of the axial shaft -2- is inserted in the handle. The radial edge portion is a terminal edge -12c- of a perimetral wall surrounding the axial bore -12d-.

[0040] In the second embodiment shown in figures 17 to 20, the claw member comprises two tiltable legs -11-,

and each tiltable leg -11- comprises a first leg portion -11 d- comprising said thickening -11a- and extending through the axial inner passage -4c- of the sleeve member -4- towards the first end -3a- of the handle body -3-, and a second leg portion -11e- extending towards the second end -3b- of the handle body -3-, and a connecting leg portion -11f- located between the first and second leg portions -11d, 11e-. The connecting leg portion -11f- is tiltably connected to a peripheral portion of the base member -5a- of the claw member -5-. An insulating rubber disk -16- is located between the rear end portion -2b- of the axial shaft -2- and the base member -5a- of the claw member -5-. In this embodiment, the pusher rod member comprises respective pushing legs -11f- which act on the respective tiltable legs -11-.

[0041] Each second leg portion -11e- comprises a thickened end portion -11g-arranged in correspondence with a cut -4r- which extends from the second end portion -4e- towards the first end portion -4b- of the sleeve member -4- and which faces an inner peripheral edge -12e- of one of the pushing legs -12f-. Each pushing leg -12f- is guided within the axial inner hollow -3c- of the handle body -3- and joint to the pusher rod member -12-. In turn, each of the thickened end portions -11g- comprises an inwardly inclined contact surface -11 h- facing said inner peripheral edge -12e- of the pushing leg -12f-.

[0042] The spring member -13- is radially surrounded by a plurality of axial fixing legs -12g- provided at respective fixing ends -12m- fixed to the axial inner passage -4c- of the sleeve member -4-, and fixed axially between a seat -12k- provided at the pusher rod member -12- and a transverse plate -4o- mounted in the second end opening -4i-of the sleeve member between the pushing legs -12f-.

[0043] The tiltable legs -11- are connected to the peripheral portion of the base member -5a- such that, when the pusher rod member -12- is moved towards said acting position, said peripheral inner edge -12e- forces the thickened end portions -11g- to approach each other and to slide on said inner wall surface so that the tiltable legs -11- pivot about the connecting leg portions -11f- to move the first leg portions -11d- from said first to said second position. For this purpose, the connecting leg portions -11f- are elastically connected to the base member -5a- such that the tiltable legs -11- elastically recover their first position.

Claims

1. A handle for an electrically insulated ratcheting screwdriver, capable of releasably holding an axial shaft (2) having a tip (2a) and a rear end portion (2b), a forward portion (2c) extending from the tip (2a) towards the rear end portion (2b), a rearward portion (2d) extending from the rear end portion (2b) towards the tip (2a) and insertable into the handle (1), an antirotating portion (2e) of the rearward portion (2d), and an annular notch (2f) between the antirotating portion (2e) and the rear end portion (2b), the handle (1) comprising

a handle body (3) made of a first electrically insulating material having a first end (3a), a second end (3b) and an inner axial hollow (3c) extending from the first end (3a) towards the second end (3b) of the handle body (3), and a first opening (3d) in the first end (3a) communicating with the axial hollow (3c);

a sleeve member (4) fixedly fitted within the axial hollow (3c), the sleeve member (4) comprising a first end portion (4a) with an insertion opening (4b) of an axial inner passage (4c) for accommodating the rearward portion (2d) of the axial shaft, a second end portion (4e) and an outer wall surface (4f);

a ratchet mechanism comprising a toothed sleeve (6), at least one pawl member (8) and a switch member (9) mounted to a first handle end portion;

characterized in that

the handle (1) comprises pushbutton-operated retaining means for releasably retaining the rearward portion (2c) within the axial passage (4c) of the sleeve member (4) and releasing the rearward portion (2c) of the axial shaft (2) by actuating a pushbutton located a second handle end portion;

the outer wall surface (4f) of the sleeve member (4) comprises at least one annular channel (4g, 4h);

the handle body (3) comprises radial throughholes (3e) communicating with the annular channel (4g, 4h);

the handle body (3) is at least radially wrapped by a jacket (10) of elastomeric material injected over the handle body (3);

the jacket (10) comprises an enveloping portion (10a) enveloping the handle body (3), a filling portion (10b) filling said annular channel (4g, 4h), and connecting portions (10c) extending through said radial throughholes (3e).

2. A handle according to claim 1, **characterized in that** the outer wall surface (4f) of the sleeve member (4) comprises a plurality of annular channels (4g, 4h), each filled with a filling portion (10b) of the elastomeric material of the jacket (10), each filling portion (10b) connected to the enveloping portion (10a) by connecting portions (10c) of the elastomeric material extending through a plurality of radial throughholes (3e) in the handle body (3).

3. A handle, according to claim 2, **characterized in that** the handle body (3) comprises an outer surface with plurality of protrusions (3f) that at least penetrate into adjacent portions of the elastomeric material of the enveloping portion (10a) of the jacket (10).

4. A handle, according to claim 3, **characterized in that** at least some of the protrusions (3f) penetrate through said adjacent portions of the elastomeric

material of the enveloping portion (10a) of the jacket (10).

5. A handle according to any of claims 1 to 4, **characterized in that**
the second end of the handle body (3) comprises a second opening (3g) communicating with said inner axial hollow (3c);
the second end portion (4e) of the sleeve member (4) comprises with a second opening (4i) located axially opposite to said first end portion (4);
the retaining means comprise a claw member (5) comprising a transversely positioned base member (5a) connected to at least two elastically tiltable legs (11) being angularly equidistant one to another and extending through said inner passage (4c), each tiltable leg (11) comprising a free end with a thickening (11 a) for releasably engaging said annular notch (2f) in said rearward portion (2e) when accommodated in said inner passage (4c) in a locked position;
the base member (5a) is fixed to the second end portion (4e) in a position where it is axially adjacent to the rear end portion (2b) of the axial shaft (2) when said rearward portion (2d) is in said locked position;
the tiltable legs (11) are positioned radially in the axial inner passage (4c) such that they are able to move radially between a first position where said thickenings (11 a) are radially closest to each other and a second position where said thickenings (11a) are radially distant from each other sufficiently to disengage from said annular notch (2f) of said rearward portion (2d) of the axial shaft (2);
a pusher rod member(12) is axially guided in the axial hollow (3c) of the handle body (3), the pusher rod member (12) comprising a pushbutton head portion (12a) located at least partially in the second opening (3g) of the handle body (3), and a pushing member (12b, 12f) axially opposite to the pushbutton head portion (12a);
the pusher rod member (12) is axially movable between a resting position where the pushing member (12b, 12f) does not act on the tiltable legs (11) of the claw member (5), and an acting position, where the pushing member (12b, 12f) forces the tiltable legs (11) into said second position;
the pusher rod member (12) is held in the resting position by a spring member (13) providing an axial resistance such that, to move the pusher rod member (12) from the resting position towards the acting position, a pushing force greater than the axial resistance of the spring member (13) must be exerted on the pushbutton head portion (12a).

6. A handle, according to claim 5, **characterized in that** the axial inner passage (4c) of the sleeve member (4) comprises an intermediate stepped portion (4j) located between said first end portion (4a) and said second end portion (4e), the intermediate portion (4j) having a smaller diameter than said end portions (4a, 4i) and axially dividing the axial inner passage (4c) into a first chamber (4k) comprising said receiving section (4d) and housing the toothed sleeve (6), and a second chamber (4l) housing the claw member (5).

7. A handle according to claim 5 or 6, **characterized in that** each thickening (11a) comprises a distal sliding ramp (11b) which is inwardly inclined towards said second end (3b) of the handle body (4), to contribute to allowing the rear end portion (2b) to separate the thickenings (11a) from each other when the rearward portion (2d) is inserted into the handle (1) towards said locked position.

8. A handle, according to any of claims 5, 6 or 7, **characterized in** the switch member (9) is rotationally mounted to the first end (4a) of the sleeve member (4) by means of a mounting arrangement selected from
at least two radial tabs (4q) emerging from opposed portions of an outer wall portion closely to the first end of the sleeve member (4) and guided radially in respective horizontal guiding slots (9h) provided in an inner wall of a skirt (9b) of the switch member (9) which surrounds said outer wall portion of the sleeve member (4);
respective pairs of radial tabs (4q) emerging form opposed portions of an outer wall portion closely to said first end (4a) of the sleeve member (4) and guided radially in respective horizontal guiding slots (9h) provided in an inner surface of a skirt (9b) of the switch member (9) which surround said outer wall portion of the sleeve member (4);
at least two radial tabs (4q) emerging equidistantly one from another at opposed portion of an outer wall portion closely to the first end of the sleeve member (4) and guided radially in one single horizontal guiding slot (9h) in an inner wall of the skirt (9) of the switch member (9) which surrounds said outer wall portion of the sleeve member (4).

9. A handle according to any of claims 5 to 8, **characterized in that**
the tiltable legs (11) are made of an elastic material;
the base member (5a) of the claw member (5) comprises a central hole (5b) which is axially aligned with said pusher rod member (12);
the pusher rod member (12) is guided in the central hole (5b) at least when moving towards said acting position;
the pushing member is a pushing end (12b) provided at the pusher rod member (12);
each thickening (11a) comprises a proximal sliding ramp (11c) inwardly inclined towards the first end (3a) of the handle body (3), to contribute to allowing separation of the thickenings (11) from each other

to disengage from said annular notch (2f) in the rearward portion (2d) of the axial shaft (2), by a radial edge portion (12c, 12e) of the pushing end (12b) sliding on the proximal sliding ramps (11c) when the pusher rod member (12) is pushed towards the first end (3a) of the handle body (3).

10. A handle according to claim 9, **characterized in that** said pushing end (12b) is tubular and comprises an axial bore (12d) for inserting the rear end portion (2b), such that the axial bore (12d) houses the rear end portion when the rearward portion (2d) is inserted in the handle;
the radial edge portion is a terminal edge (12c) of a perimetral wall surrounding the axial bore (12d).

11. A handle according to claims 5 to 8, **characterized in that**
each tiltable leg (11) comprises a first leg portion (11d) comprising said thickening (11a) and extending into the axial inner passage (4c) of the sleeve member (4) towards said first end (3a) of the handle body (3), and a second leg portion (11e) extending towards said second end (3b) of the handle body (3), and a connecting leg portion (11f) located between the first and second leg portions (11d, 11e);
the connecting leg portion (11f) is tiltably connected to a peripheral portion of the base member (5a) of the claw member (5);
the pushing member comprises a plurality of pushing legs (12f);
each second leg portion (11e) comprises a thickened end portion (11g) facing an inner peripheral edge (12e) of the pushing legs (12f);
each pushing leg (12f) is guided in a longitudinal recess (3m) within the inner axial hollow (3c) of the handle body (3);
the tiltable legs (11) are connected to the peripheral portion of the base member (5a) such that, when the pusher rod member (12) is moved towards said acting position, said peripheral inner edges (12e) force the thickened end portions (11g) of the tiltable legs (11) to approach each other so that the tiltable legs (11) pivot about the connecting leg portions (11f) to move the first leg portions (11d) from said first to said second position;
the connecting leg portions (11f) are elastically connected to the base member (5a) such that the tiltable legs (11) elastically recover their first position.

12. A handle according to claim 11, **characterized in that in that** each of the thickened end portions (11g) comprises an inwardly inclined contact surface (11h) facing said inner peripheral edge (12e) of one of the pushing legs (12f).

13. A handle according to claim 11 or 12, **characterized in that** each pushing leg (12f) is connected to the pusher rod member (12) by means of a radial arm (12l) which emerges peripherally from the pusher rod member (12).

14. A handle according to claim 11, 12 or 13, **characterized in that** the spring element (13) is radially surrounded at least partially by a plurality of axial fixing legs (12g) provided with respective fixing ends (12m) fixed on the axial inner passage (4c) of the sleeve member (12) and a transverse plate (4o) mounted in the second end opening (4l) of the sleeve member (4) between the pushing legs (12f).

15. A screwdriver with interchangeable axial shafts, **characterized in that** it comprises the handle as defined in any of the preceding claims.

Patentansprüche

1. Handgriff für einen elektrisch isolierten Ratschenschraubendreher, welcher dazu in der Lage ist, einen axialen Schaft (2) mit einer Spitze (2a) und einem hinteren Endbereich (2b), mit einem sich von der Spitze (2a) in Richtung zu dem hinteren Endbereich (2b) hin erstreckenden vorderen Bereich (2c), mit einem sich von dem hinteren Endbereich (2b) in Richtung zu der Spitze (2a) hin erstreckenden und in den Handgriff (1) einführbaren hinteren Bereich (2d), mit einem Antirotationsbereich (2e) des hinteren Bereichs (2d) und mit einer Ringnut (2f) zwischen dem Antirotationsbereich (2e) und dem hinteren Endbereich (2b) lösbar zu halten, wobei der Handgriff (1) umfasst:

einen Handgriffkörper (3), hergestellt aus einem ersten elektrisch isolierenden Material, mit einem ersten Ende (3a), einem zweiten Ende (3b) und einem inneren axialen Hohlraum (3c), welcher sich von dem ersten Ende (3a) in Richtung zu dem zweiten Ende (3b) des Handgriffkörpers (3) hin erstreckt, und mit einer ersten Öffnung (3d) in dem ersten Ende (3a), welche mit dem axialen Hohlraum (3c) kommuniziert;
ein Hülsenglied (4), welches innerhalb des axialen Hohlraums (3c) fest eingepasst ist, wobei das Hülsenglied (4) einen ersten Endbereich (4a) mit einer Einführungsöffnung (4b) eines axialen inneren Durchlasses (4c) zum Aufnehmen des hinteren Bereichs (2d) des axialen Schafts, einen zweiten Endbereich (4e) und eine äußere Wandoberfläche (4f) umfasst;
einen Ratschenmechanismus, umfassend eine gezahnte Hülse (6), mindestens ein Rastglied (8) und ein Schaltglied (9), welches an einem ersten Handgriffendbereich montiert ist;
dadurch gekennzeichnet, dass
der Handgriff (1) druckknopfbetätigte Haltemit-

tel umfasst zum lösbaren Halten des hinteren Bereichs (2c) innerhalb des axialen Durchlasses (4c) des Hülsenglieds (4) und zum Freigeben des hinteren Bereichs (2c) des axialen Schafts (2) durch Betätigen eines Druckknopfs, welcher einem zweiten Handgriffendbereich angeordnet ist;
die äußere Wandoberfläche (4f) des Hülsenglieds (4) mindestens einen Ringkanal (4g, 4h) umfasst;
der Handgriffkörper (3) radiale Durchgangslöcher (3e) umfasst, welche mit dem Ringkanal (4g, 4h) kommunizieren;
der Handgriffkörper (3) mindestens radial bewickelt ist mit einem Mantel (10) aus einem elastomeren Material, mit dem der Handgriffkörper (3) überspritzt ist;
der Mantel (10) einen Hüllbereich (10a), welcher den Handgriffkörper (3) umhüllt, einen Füllbereich (10b), welcher den Ringkanal (4g, 4h) füllt, und Verbindungsbereiche (10c), welche sich durch die radialen Durchgangslöcher (3e) hindurch erstrecken, umfasst.

2. Handgriff nach Anspruch 1, **dadurch gekennzeichnet, dass** die äußere Wandoberfläche (4f) des Hülsenglieds (4) eine Mehrzahl von Ringkanälen (4g, 4h) umfasst, von denen jeder mit einem Füllbereich (10b) des elastomeren Materials des Mantels (10) gefüllt ist, wobei jeder Füllbereich (10b) mit dem Hüllbereich (10a) über Verbindungsbereiche (10c) des elastomeren Materials, welche sich durch eine Mehrzahl von radialen Durchgangslöchern (3e) in dem Handgriffkörper (3) hindurch erstrecken, verbunden ist.

3. Handgriff nach Anspruch 2, **dadurch gekennzeichnet, dass** der Handgriffkörper (3) eine äußere Oberfläche mit einer Mehrzahl von Vorsprüngen (3f) umfasst, welche in benachbarte Bereiche des elastomeren Materials des Hüllbereichs (10a) des Mantels (10) mindestens eindringen.

4. Handgriff nach Anspruch 3, **dadurch gekennzeichnet, dass** mindestens einige der Vorsprünge (3f) die benachbarten Bereiche des elastomeren Materials des Hüllbereichs (10a) des Mantels (10) durchdringen.

5. Handgriff nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, dass**
das zweite Ende des Handgriffkörpers (3) eine zweite Öffnung (3g) umfasst, welche mit dem inneren axialen Hohlraum (3c) kommuniziert;
der zweite Endbereich (4e) des Hülsenglieds (4) eine zweite Öffnung (4i) umfasst, welche axial gegenüberliegend zu dem ersten Endbereich (4) angeordnet ist;
die Haltemittel ein Klauenglied (5) umfassen, welches ein quer positioniertes Basisglied (5a) umfasst, das mit mindestens zwei elastisch neigbaren Schenkeln (11) verbunden ist, welche in gleichen Winkelabständen zueinander angeordnet sind und sich durch den inneren Durchlass (4c) hindurch erstrecken, wobei jeder neigbare Schenkel (11) ein freies Ende mit einer Verdickung (11a) aufweist zum lösbaren Ineingrifftreten mit der Ringnut (2f) in dem hinteren Bereich (2e), wenn dieser in dem inneren Durchlass (4c) in einer verriegelten Position aufgenommen ist;
das Basisglied (5a) an dem zweiten Endbereich (4e) in einer Position fixiert ist, in der es axial benachbart zu dem hinteren Endbereich (2b) des axialen Schafts (2) angeordnet ist, wenn sich der hintere Bereich (2d) in der verriegelten Position befindet;
die neigbaren Schenkel (11) in dem axialen inneren Durchlass (4c) radial positioniert sind, derart, dass sie in der Lage sind, eine Radialbewegung auszuführen zwischen einer ersten Position, in der die Verdickungen (11a) radial am dichtesten beieinander liegen, und einer zweiten Position, in der die Verdickungen (11a) ausreichend radial voneinander beabstandet sind, um außer Eingriff mit der Ringnut (2f) des hinteren Bereichs (2d) des axialen Schafts (2) zu gelangen;
ein Drückerstangenglied (12) in dem axialen Hohlraum (3c) des Handgriffkörpers (3) axial geführt ist, wobei das Drückerstangenglied (12) einen Druckknopf-Kopfbereich (12a), welcher mindestens teilweise in der zweiten Öffnung (3g) des Handgriffkörpers (3) angeordnet ist, und ein Drückglied (12b, 12f) axial gegenüberliegend zu dem Druckknopf-Kopfbereich (12a) umfasst;
das Drückerstangenglied (12) axial beweglich ist zwischen einer Ruheposition, in der das Drückglied (12b, 12f) nicht auf die neigbaren Schenkel (11) des Klauenglieds (5) wirkt, und einer Wirkposition, in der das Drückglied (12b, 12f) die neigbaren Schenkel (11) in die zweite Position zwingt;
das Drückerstangenglied (12) durch ein Federglied (13) in der Ruheposition gehalten wird, wobei dieses einen axialen Widerstand bereitstellt, derart, dass, um das Drückerstangenglied (12) aus der Ruheposition in Richtung zu der Wirkposition hin zu bewegen, eine Drückkraft auf den Druckknopf-Kopfbereich (12a) ausgeübt werden muss, die größer ist als der axiale Widerstand des Federglieds (13).

6. Handgriff nach Anspruch 5, **dadurch gekennzeichnet, dass** der axiale innere Durchlass (4c) des Hülsenglieds (4) einen abgestuften Zwischenbereich (4j) aufweist, welcher zwischen dem ersten Endbereich (4a) und dem zweiten Endbereich (4e) angeordnet ist, wobei der Zwischenbereich (4j) einen kleineren Durchmesser aufweist als die Endbereiche (4a, 4i) und den axialen inneren Durchlass (4c) axial

unterteilt in eine erste Kammer (4k), welche den Aufnahmeabschnitt (4d) umfasst und die gezahnte Hülse (6) aufnimmt, und eine zweite Kammer (4l), welche das Klauenglied (5) aufnimmt.

7. Handgriff nach Anspruch 5 oder 6, **dadurch gekennzeichnet, dass** jede Verdickung (11a) eine distale Gleitrampe (11b) umfasst, welche nach innen in Richtung zu dem zweiten Ende (3b) des Handgriffkörpers (4) hin geneigt ist, um dazu beizutragen, dass dem hinteren Endbereich (2b) ermöglicht wird, die Verdickungen (11a) voneinander zu trennen, wenn der hintere Bereich (2d) in den Handgriff (1) in Richtung zu der verriegelten Position hin eingeführt wird.

8. Handgriff nach einem der Ansprüche 5, 6 oder 7, **dadurch gekennzeichnet, dass** das Schaltglied (9) an dem ersten Ende (4a) des Hülsenglieds (4) mittels einer Lagerungsanordnung drehend gelagert ist, wobei Letztere ausgewählt ist aus
mindestens zwei radialen Nasen (4q), welche von gegenüberliegenden Bereichen eines äußeren Wandbereichs nahe dem ersten Ende des Hülsenglieds (4) hervortreten und in jeweiligen horizontalen Führungsschlitzen (9h) radial geführt sind, die in einer inneren Wand einer Schürze (9b) des Schaltglieds (9) bereitgestellt sind, welche den äußeren Wandbereich des Hülsenglieds (4) umgibt;
entsprechenden Paaren von radialen Nasen (4q), welche von gegenüberliegenden Bereichen eines äußeren Wandbereichs nahe dem ersten Ende des Hülsenglieds (4) hervortreten und in jeweiligen horizontalen Führungsschlitzen (9h) radial geführt sind, die in einer inneren Oberfläche einer Schürze (9b) des Schaltglieds (9) bereitgestellt sind, welche den äußeren Wandbereich des Hülsenglieds (4) umgeben;
mindestens zwei radialen Nasen (4q), welche gleichabständig voneinander an gegenüberliegenden Bereich eines äußeren Wandbereichs nahe dem ersten Ende des Hülsenglieds (4) hervortreten und in einem einzigen horizontalen Führungsschlitz (9h) radial geführt sind, der in einer inneren Wand der Schürze (9b) des Schaltglieds (9) bereitgestellt ist, welche den äußeren Wandbereich des Hülsenglieds (4) umgibt.

9. Handgriff nach einem der Ansprüche 5 bis 8, **dadurch gekennzeichnet, dass**
die neigbaren Schenkel (11) aus einem elastischen Material hergestellt sind;
das Basisglied (5a) des Klauenglieds (5) ein Zentralloch (5b) umfasst, welches zu dem Drückerstangenglied (12) axial ausgerichtet ist;
das Drückerstangenglied (12) mindestens dann in dem Zentralloch (5b) geführt ist, wenn es sich in Richtung zu der Wirkposition hin bewegt;
das Drückglied ein Drück-Ende (12b) ist, welches an dem Drückerstangenglied (12) bereitgestellt ist;
jede Verdickung (11a) eine proximale Gleitrampe (11c) umfasst, welche nach innen in Richtung zu dem ersten Ende (3a) des Handgriffkörpers (3) hin geneigt ist, um dazu beizutragen, die Trennung der Verdickungen (11a) voneinander zu ermöglichen, so dass sie außer Eingriff mit der Ringnut (2f) in dem hinteren Bereich (2d) des axialen Schafts (2) gelangen, dadurch, dass ein radialer Randbereich (12c, 12e) des Drück-Endes (12b) auf den proximalen Gleitrampen (11c) gleitet, wenn das Drückerstangenglied (12) in Richtung zu dem ersten Ende (3a) des Handgriffkörpers (3) hin gedrückt wird.

10. Handgriff nach Anspruch 9, **dadurch gekennzeichnet, dass**
das Drück-Ende (12b) röhrenförmig ist und eine axiale Bohrung (12d) umfasst zum Einführen des hinteren Endbereichs (2b), derart, dass bei Einführung des hinteren Bereichs (2d) in den Handgriff die axiale Bohrung (12d) den hinteren Endbereich aufnimmt;
der radiale Randbereich ein abschließender Rand (12c) einer Umfangswand ist, welche die axiale Bohrung (12d) umgibt.

11. Handgriff nach den Ansprüchen 5 bis 8, **dadurch gekennzeichnet, dass**
jeder neigbare Schenkel (11) umfasst: einen ersten Schenkelbereich (11d), welcher die Verdickung (11a) umfasst und sich in den axialen inneren Durchlass (4c) des Hülsenglieds (4) in Richtung zu dem ersten Ende (3a) des Handgriffkörpers (3) hin erstreckt, und einen zweiten Schenkelbereich (11e), welcher sich in Richtung zu dem zweiten Ende (3b) des Handgriffkörpers (3) hin erstreckt, und einen Verbindungsschenkelbereich (11f), welcher zwischen dem ersten und dem zweiten Schenkelbereich (11d, 11e) angeordnet ist;
der Verbindungsschenkelbereich (11f) mit einem peripheren Bereich des Basisglieds (5a) des Klauenglieds (5) neigbar verbunden ist;
das Drückglied eine Mehrzahl von Drück-Schenkeln (12f) umfasst; jeder zweite Schenkelbereich (11e) einen verdickten Endbereich (11g) umfasst, welcher einem inneren peripheren Rand (12e) der Drück-Schenkel (12f) zugewandt ist;
jeder Drück-Schenkel (12f) in einer längs verlaufenden Ausnehmung (3m) innerhalb des inneren axialen Hohlraums (3c) des Handgriffkörpers (3) geführt ist;
die neigbaren Schenkel (11) mit dem peripheren Bereich des Basisglieds (5a) verbunden sind, derart, dass bei Bewegung des Drückerstangenglieds (12) in Richtung zu der Wirkposition hin die peripheren inneren Ränder (12e) die verdickten Endbereiche (11g) der neigbaren Schenkel (11) dazu zwingen, sich einander anzunähern, so dass die neigbaren

Schenkel (11) um die Verbindungsschenkelbereiche (11f) schwenken, um die ersten Schenkelbereiche (11d) von der ersten in die zweite Position zu bewegen;
die Verbindungsschenkelbereiche (11f) mit dem Basisglied (5a) elastisch verbunden sind, derart, dass die neigbaren Schenkel (11) ihre erste Position elastisch wiedergewinnen.

12. Handgriff nach Anspruch 11, **dadurch gekennzeichnet, dass** jeder der verdickten Endbereiche (11g) eine nach innen geneigte Kontaktoberfläche (11h) aufweist, welche dem inneren peripheren Rand (12e) eines der Drück-Schenkel (12f) zugewandt ist.

13. Handgriff nach Anspruch 11 oder 12, **dadurch gekennzeichnet, dass** jeder Drück-Schenkel (12f) mit dem Drückerstangenglied (12) mittels eines radialen Arms (12l) verbunden ist, welcher von dem Drückerstangenglied (12) aus peripher hervortritt.

14. Handgriff nach Anspruch 11, 12 oder 13, **dadurch gekennzeichnet, dass** das Federelement (13) mindestens teilweise von einer Mehrzahl von axialen Fixierschenkeln (12g) radial umgeben ist, welche mit entsprechenden Fixierenden (12m) versehen sind, die an dem axialen inneren Durchlass (4c) des Hülsenglieds (12) und an einer transversalen Platte (4o), welche in der zweiten Endöffnung (4) des Hülsenglieds (4) zwischen den Drück-Schenkeln (12f) montiert ist, fixiert sind.

15. Schraubendreher mit auswechselbaren axialen Schäften, **dadurch gekennzeichnet, dass** er den Handgriff nach einem der voranstehenden Ansprüche umfasst.

Revendications

1. Manche pour un tournevis à cliquet isolé électriquement, capable de maintenir de façon libérable une tige axiale (2) ayant une pointe (2a) et une partie d'extrémité arrière (2b), une partie avant (2c) s'étendant de la pointe (2a) vers la partie d'extrémité arrière (2b), une partie arrière (2d) s'étendant de la partie d'extrémité arrière (2b) vers la pointe (2a) et insérable dans le manche (1), et une partie anti-rotation (2e) de la partie arrière (2d), et une encoche annulaire (2f) entre la partie anti-rotation (2e) et la partie d'extrémité arrière (2b), le manche (1) comprenant
un corps de manche (3) constitué d'un premier matériau électriquement isolant ayant une première extrémité (3a), une seconde extrémité (3b) et un creux axial interne (3c) s'étendant de la première extrémité (3a) vers la seconde extrémité (3b) du corps de manche (3), et une première ouverture (3d) dans la première extrémité (3a) en communication avec le creux axial (3c) ;
un élément formant manchon (4) fixé solidement à l'intérieur du creux axial (3c), l'élément formant manchon (4) comprenant une première partie d'extrémité (4a) avec une ouverture d'insertion (4b) d'un passage interne axial (4c) pour loger la partie arrière (2d) de la tige axiale, une seconde partie d'extrémité (4e) et une surface de paroi externe (4f) ;
un mécanisme d'encliquetage comprenant un manchon denté (6), au moins un élément formant cliquet (8) et un élément formant interrupteur (9) monté sur une première partie d'extrémité du manche ;
caractérisé en ce que
le manche (1) comprend des moyens de maintien actionnés par bouton-poussoir destinés à maintenir de manière libérable la partie arrière (2c) à l'intérieur du passage axial (4c) de l'élément formant manchon (4) et à libérer la partie arrière (2c) de la tige axiale (2) par actionnement d'un bouton-poussoir situé sur une seconde partie d'extrémité du manche ;
la surface de paroi externe (4f) de l'élément formant manchon (4) comprend au moins un canal annulaire (4g, 4h) ;
le corps de manche (3) est au moins radialement recouvert par une gaine (10) de matériau élastomère injectée sur le corps de manche (3) ;
la gaine (10) comprend une partie enveloppante (10a) enveloppant le corps de manche (3), une partie de remplissage (10b) remplissant ledit canal annulaire (4g, 4h) et des parties de liaison (10c) s'étendant à travers lesdits trous traversants radiaux (3e).

2. Manche selon la revendication 1, **caractérisé en ce que** la surface de paroi externe (4f) de l'élément formant manchon (4) comprend une pluralité de canaux annulaires (4g, 4h), chacun étant rempli avec une partie de remplissage (10b) du matériau élastomère de la gaine (10), chaque partie de remplissage (10b) étant reliée à la partie enveloppante (10a) par des parties de liaison (10c) du matériau élastomère s'étendant à travers une pluralité de trous traversants radiaux (3e) dans le corps de manche (3).

3. Manche, selon la revendication 2, **caractérisé en ce que** le corps de manche (3) comprend une surface externe avec une pluralité de saillies (3f) qui pénètrent au moins dans des parties adjacentes du matériau élastomère de la partie enveloppante (10a) de la gaine (10).

4. Manche selon la revendication 3, **caractérisé en ce qu'**au moins certaines des saillies (3f) pénètrent à travers lesdites parties adjacentes du matériau élastomère de la partie enveloppante (10a) de la gaine (10).

5. Manche selon l'une quelconque des revendications

1 à 4, **caractérisé en ce que**
la seconde extrémité du corps de manche (3) comprend une seconde ouverture (3g) communiquant avec ledit creux axial interne (3c) ;
la seconde partie d'extrémité (4e) de l'élément formant manchon (4) comprend une seconde ouverture (4i) se trouvant axialement opposée à ladite première partie d'extrémité (4) ;
les moyens de maintien comprennent un élément formant griffe (5) comprenant un élément formant base positionné transversalement (5a) relié à au moins deux pattes élastiquement inclinables (11) angulairement équidistantes l'une de l'autre et s'étendant à travers ledit passage interne (4c), chaque patte inclinable (11) comprenant une extrémité libre avec un épaississement (11a) pour la mise en prise libérable de ladite encoche annulaire (2f) dans ladite partie arrière (2e) lorsqu'elle est logée dans ledit passage interne (4c) dans une position verrouillée ;
l'élément formant base (5a) est fixé à la seconde partie d'extrémité (4e) dans une position où il est adjacent à la partie d'extrémité arrière (2b) de la tige axiale (2) lorsque ladite partie arrière (2d) est dans ladite position verrouillée ;
les pattes inclinables (11) sont positionnées radialement dans le passage interne axial (4c) de telle sorte qu'elles soient aptes à se déplacer radialement entre une première position où lesdits épaississements (11a) sont radialement les plus proches l'un de l'autre et une seconde position où lesdits épaississements (11a) sont radialement distants l'un de l'autre suffisamment pour se dégager de ladite encoche annulaire (2f) de ladite partie arrière (2d) de la tige axiale (2) ;
un élément formant tige poussoir (12) est guidé axialement dans le creux axial (3c) du corps de manche (3), l'élément formant tige poussoir (12) comprenant une partie de tête de bouton-poussoir (12a) se trouvant au moins partiellement dans la seconde ouverture (3g) du corps de manche (3), et un élément de poussée (12b, 12f) axialement opposé à la partie de tête de bouton-poussoir (12a) ;
l'élément formant tige poussoir (12) est mobile axialement entre une position de repos où l'élément de poussée (12b, 12f) n'agit pas sur les pattes inclinables (11) de l'élément formant griffe (5), et une position active, où l'élément de poussée (12b, 12f) amène de force les pattes inclinables (11) dans ladite seconde position ;
l'élément formant tige poussoir (12) est maintenu dans la position de repos par un élément formant ressort (13) fournissant une résistance axiale de telle sorte que, pour déplacer l'élément formant tige poussoir (12) de la position de repos vers la position active, une force de poussée supérieure à la résistance axiale de l'élément formant ressort (13) doit être exercée sur la partie de tête de bouton-poussoir (12a).

6. Manche selon la revendication 5, **caractérisé en ce que** le passage interne axial (4c) de l'élément formant manchon (4) comprend une partie étagée intermédiaire (4j) située entre ladite première partie d'extrémité (4a) et ladite seconde partie d'extrémité (4e), la partie intermédiaire (4j) ayant un diamètre plus petit que lesdites parties d'extrémité (4a, 4i) et divisant axialement le passage interne axial (4c) en une première chambre (4k) comprenant ladite section de réception (4d) et logeant le manchon denté (6), et une seconde chambre (41) logeant l'élément formant griffe (5).

7. Manche selon la revendication 5 ou 6, **caractérisé en ce que** chaque épaississement (11a) comprend une glissière distale (11b) qui est inclinée vers l'intérieur vers ladite seconde extrémité (3b) du corps de manche (4), pour contribuer à permettre à la partie d'extrémité arrière (2b) de séparer les épaississements (11a) l'un de l'autre lorsque la partie arrière (2d) est insérée dans le manche (1) vers ladite position verrouillée.

8. Manche selon l'une quelconque des revendications 5, 6 ou 7, **caractérisé en ce que** l'élément formant interrupteur (9) est monté de sorte à pouvoir tourner sur la première extrémité (4a) de l'élément formant manchon (4) au moyen d'un agencement de montage choisi parmi
au moins deux languettes radiales (4q) émergeant de parties opposées d'une partie de paroi externe près de la première extrémité de l'élément formant manchon (4) et guidées radialement dans des fentes de guidage horizontal respectives (9h) fournies dans une paroi interne d'une jupe (9b) de l'élément formant interrupteur (9) qui entoure ladite partie de paroi externe de l'élément formant manchon (4) ;
des paires respectives de languettes radiales (4q) émergeant de parties opposées d'une partie de paroi externe près de ladite première extrémité (4a) de l'élément formant manchon (4) et guidées radialement dans des fentes de guidage horizontal respectives (9h) fournies dans une surface interne d'une jupe (9b) de l'élément formant interrupteur (9) qui entoure ladite partie de paroi externe de l'élément formant manchon (4) ;
au moins deux languettes radiales (4q) émergeant de façon équidistante l'une de l'autre au niveau d'une partie opposée d'une partie de paroi externe près de la première extrémité de l'élément formant manchon (4) et guidée radialement dans une seule fente de guidage horizontal (9h) dans une paroi interne de la jupe (9) de l'élément formant interrupteur (9) qui entoure ladite partie de paroi externe de l'élément formant manchon (4).

9. Manche selon l'une quelconque des revendications 5 à 8, **caractérisé en ce que**

les pattes inclinables (11) sont constituées d'un matériau élastique ;
l'élément formant base (5a) de l'élément formant griffe (5) comprend un trou central (5b) qui est aligné axialement sur ledit élément formant tige poussoir (12) ;
l'élément formant tige poussoir (12) est guidé dans le trou central (5b) au moins lorsqu'il se déplace vers ladite position active ;
l'élément de poussée est une extrémité de poussée (12b) fournie au niveau de l'élément formant tige poussoir (12) ;
chaque épaississement (11a) comprend une glissière proximale (11c) inclinée vers l'intérieur vers la première extrémité (3a) du corps de manche (3), pour contribuer à permettre la séparation des épaississements (11) l'un de l'autre pour qu'ils se dégagent de ladite encoche annulaire (2f) dans la partie arrière (2d) de la tige axiale (2), par le coulissement d'une partie de bord radial (12c, 12e) de l'extrémité de poussée (12b) sur les glissières proximales (11c) lorsque l'élément formant tige poussoir (12) est poussé vers la première extrémité (3a) du corps de manche (3).

10. Manche selon la revendication 9, **caractérisé en ce que**
ladite extrémité de poussée (12b) est tubulaire et comprend un alésage axial (12d) pour insérer la partie d'extrémité arrière (2b), de telle sorte que l'alésage axial (12d) loge la partie d'extrémité arrière lorsque la partie arrière (2d) est insérée dans le manche ;
la partie de bord radial est un bord terminal (12c) d'une paroi périmétrique entourant l'alésage axial (12d).

11. Manche selon les revendications 5 à 8, **caractérisé en ce que**
chaque patte inclinable (11) comprend une première partie de patte (11d) comprenant ledit épaississement (11a) et s'étendant dans le passage interne axial (4c) de l'élément formant manchon (4) vers ladite première extrémité (3a) du corps de manche (3), et une seconde partie de patte (11e) s'étendant vers ladite seconde extrémité (3b) du corps de manche (3), et une partie de patte de liaison (11f) situé entre lesdites première et seconde parties de patte (11d, 11e) ;
la partie de patte de liaison (11f) est reliée de sorte à pouvoir s'incliner à une partie périphérique de l'élément formant base (5a) de l'élément formant griffe (5) ;
l'élément de poussée comprend une pluralité de pattes de poussée (12f) ;
chaque seconde partie de patte (11e) comprend une partie d'extrémité épaissie (11g) faisant face à un bord périphérique interne (12e) des pattes de poussée (12f) ;
chaque patte de poussée (12f) est guidée dans un évidement longitudinal (3m) à l'intérieur du creux axial interne (3c) du corps de manche (3) ;
les pattes inclinables (11) sont reliées à la partie périphérique de l'élément formant base (5a) de telle sorte que, lorsque l'élément formant tige poussoir (12) est déplacé vers ladite position active, lesdits bords internes périphériques (12e) amènent de force les parties d'extrémité épaissies (11g) des pattes inclinables (111) à se rapprocher l'une de l'autre afin que les pattes inclinables (11) pivotent autour des parties de patte de liaison (11f) pour déplacer les premières parties de patte (11d) de ladite première à ladite seconde position ;
les parties de patte de liaison (11f) sont reliées élastiquement à l'élément formant base (5a) de telle sorte que les pattes inclinables (11) retrouvent élastiquement leur première position.

12. Manche selon la revendication 11, **caractérisé en ce que** chacune des parties d'extrémité épaissies (11g) comprend une surface de contact inclinée vers l'intérieur (11h) faisant face audit bord périphérique interne (12e) de l'une des pattes de poussée (12f).

13. Manche selon la revendication 11 ou 12, **caractérisé en ce que** chaque patte de poussée (12f) est reliée à l'élément formant tige poussoir (12) au moyen d'un bras radial (121) qui émerge périphériquement de l'élément formant tige poussoir (12).

14. Manche selon la revendication 11, 12 ou 13, **caractérisé en ce que** l'élément formant ressort (13) est radialement entouré au moins partiellement par une pluralité de pattes de fixation axiales (12g) dotées d'extrémités de fixation respectives (12m) fixées sur le passage interne axial (4c) de l'élément formant manchon (12) et une plaque transversale (4o) montée dans la seconde ouverture d'extrémité (41) de l'élément formant manchon (4) entre les pattes de poussée (12f).

15. Tournevis avec tiges axiales interchangeables, **caractérisé en ce qu'**il comprend le manche tel que défini dans l'une quelconque des revendications précédentes.

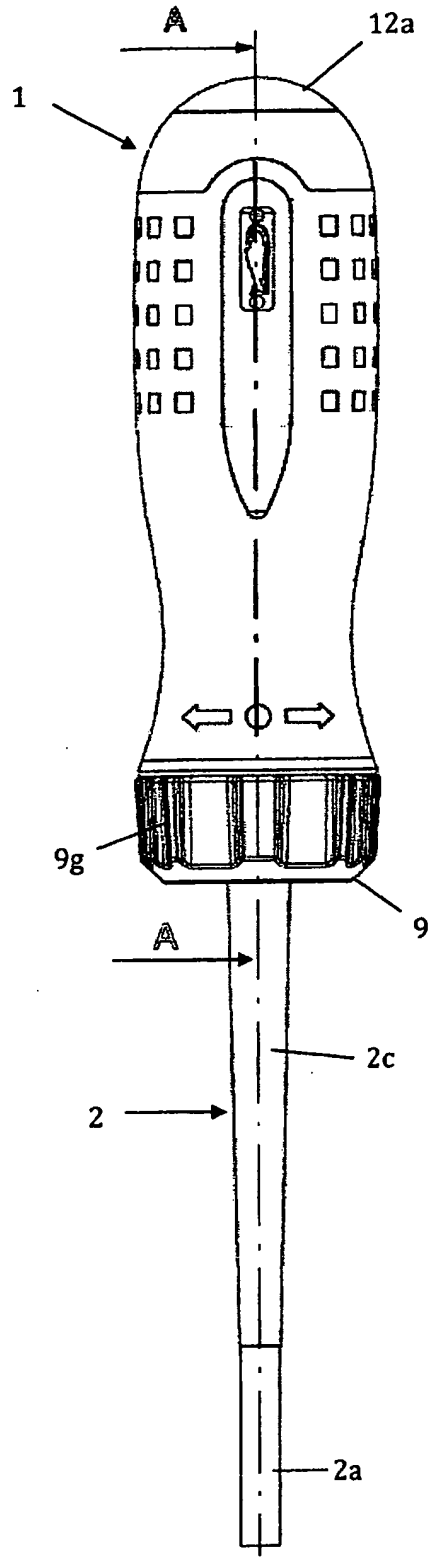


Fig. 1

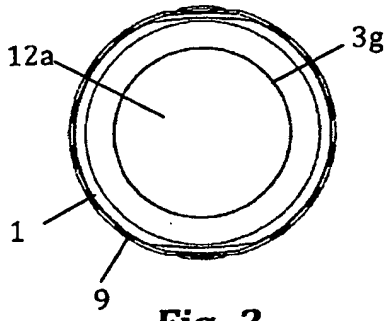


Fig. 2

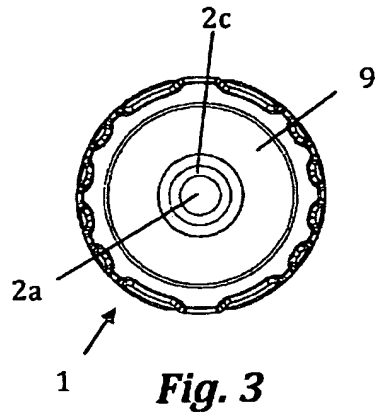


Fig. 3

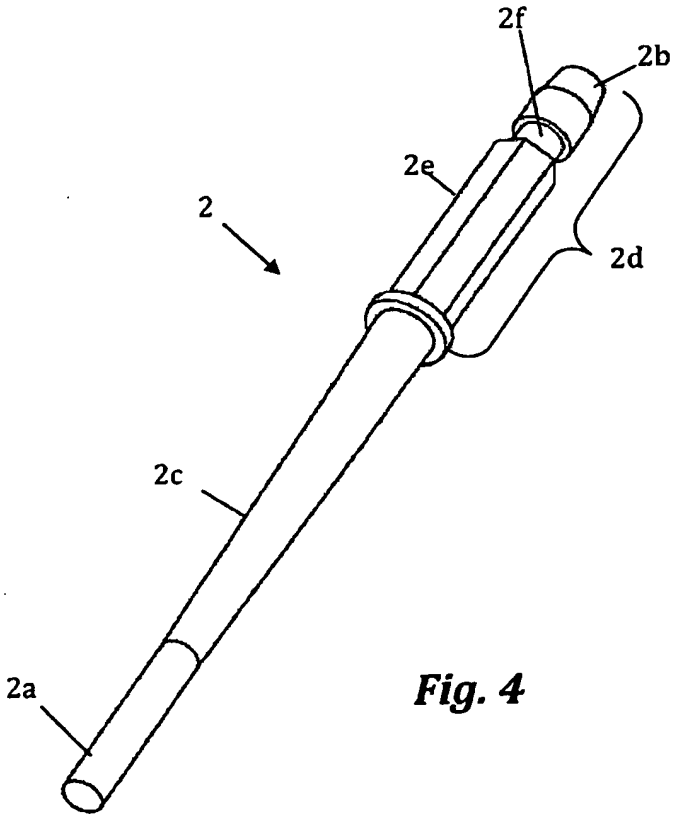
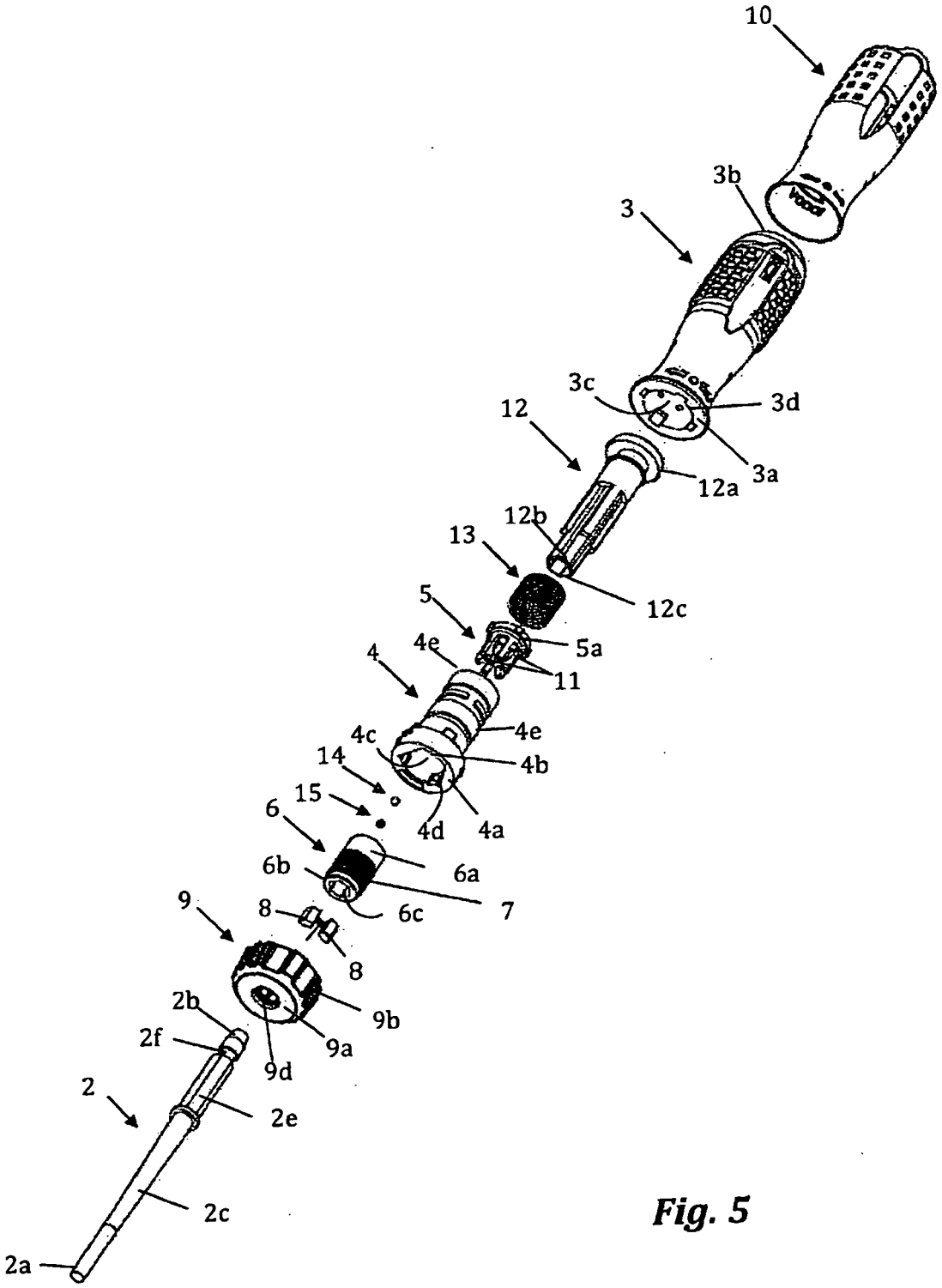


Fig. 4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3d
12
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12c
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5a
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14
4b
15
4d
4a
6
6a
6b
7
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8
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2f
9d
2
2e
2c
2a

Fig. 5

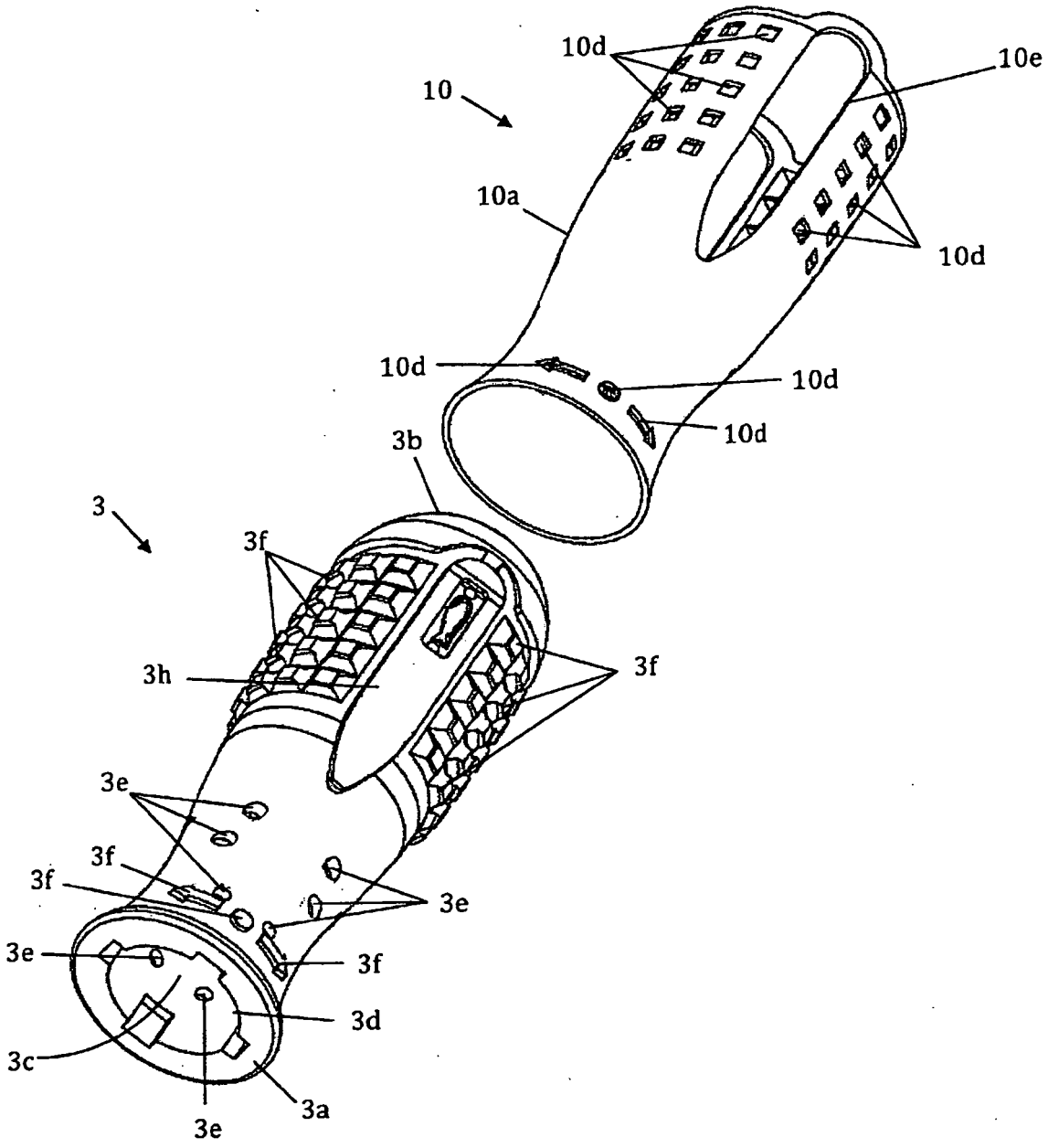
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Fig. 6

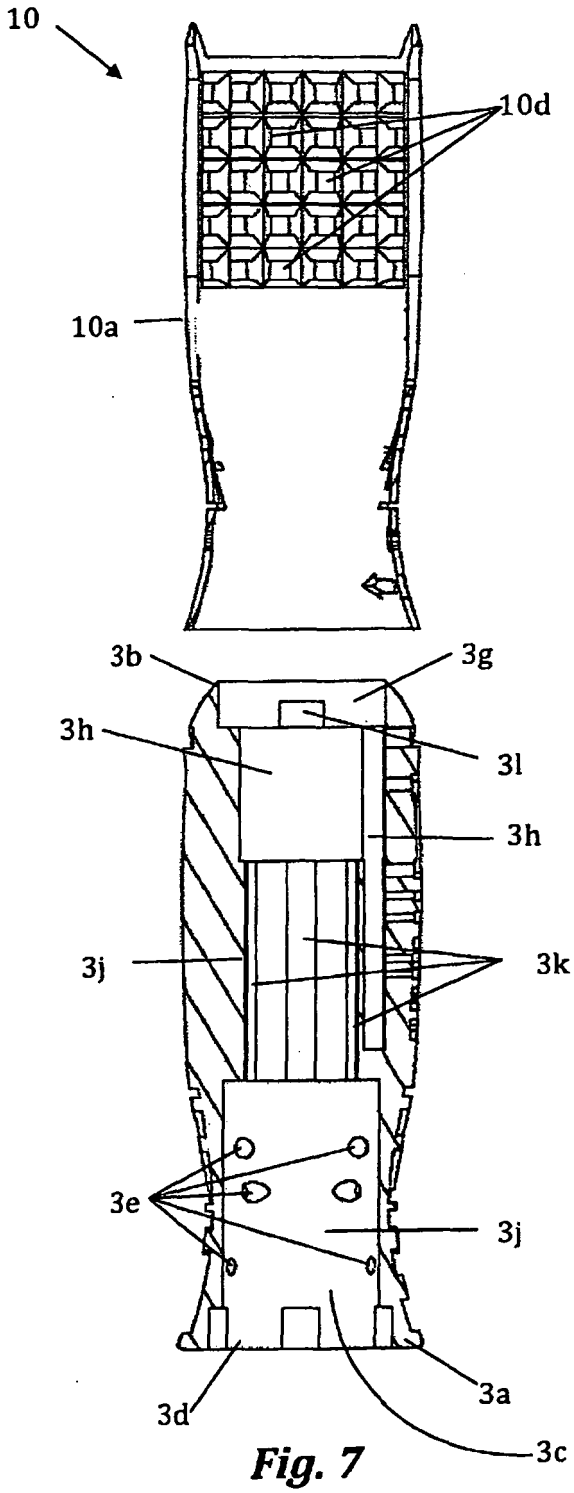
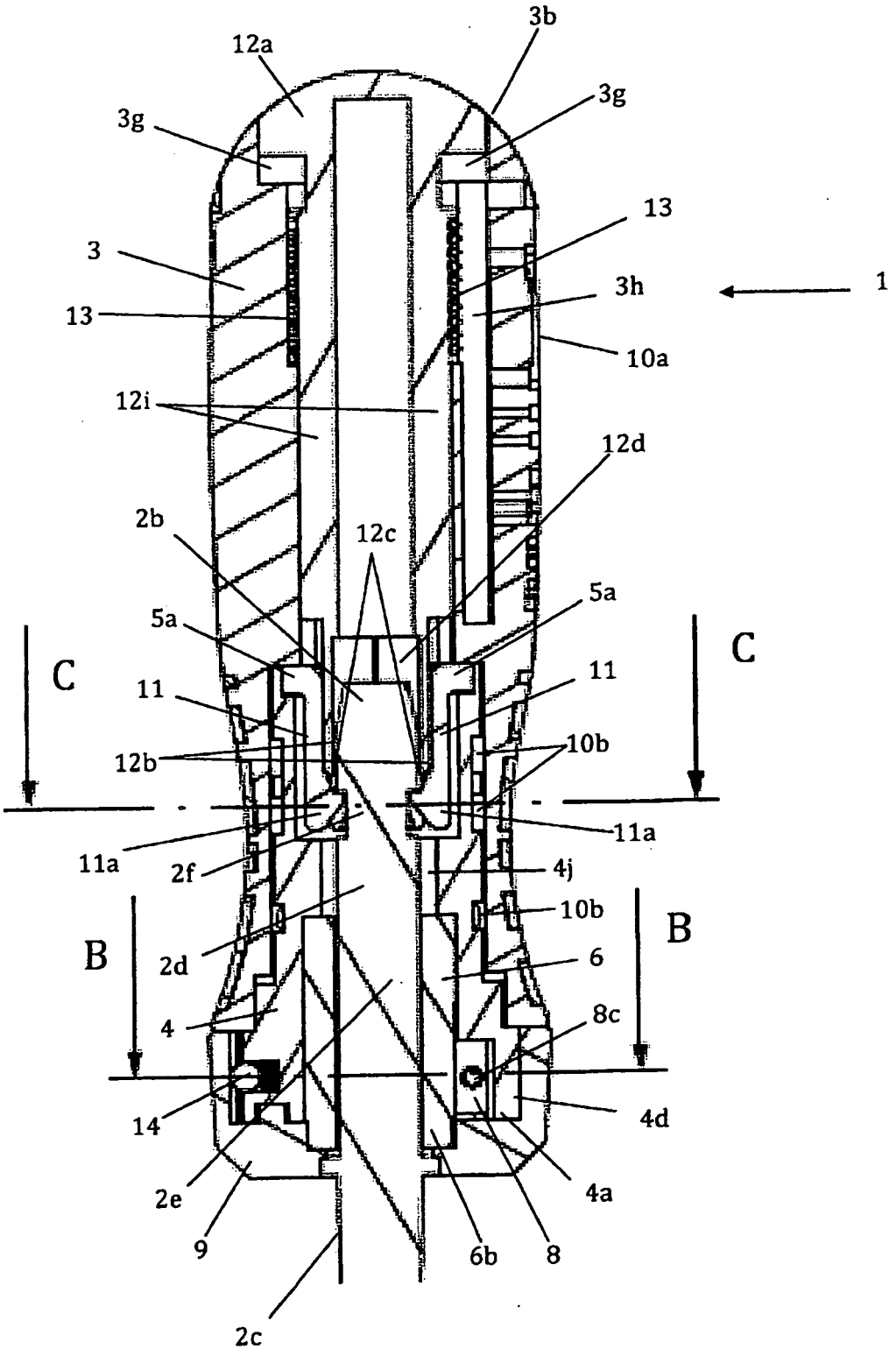


Fig. 7


3b
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12d
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12c
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11
11
12b
10b
11a
11a
2f
4j
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2c

Fig. 8
A-A

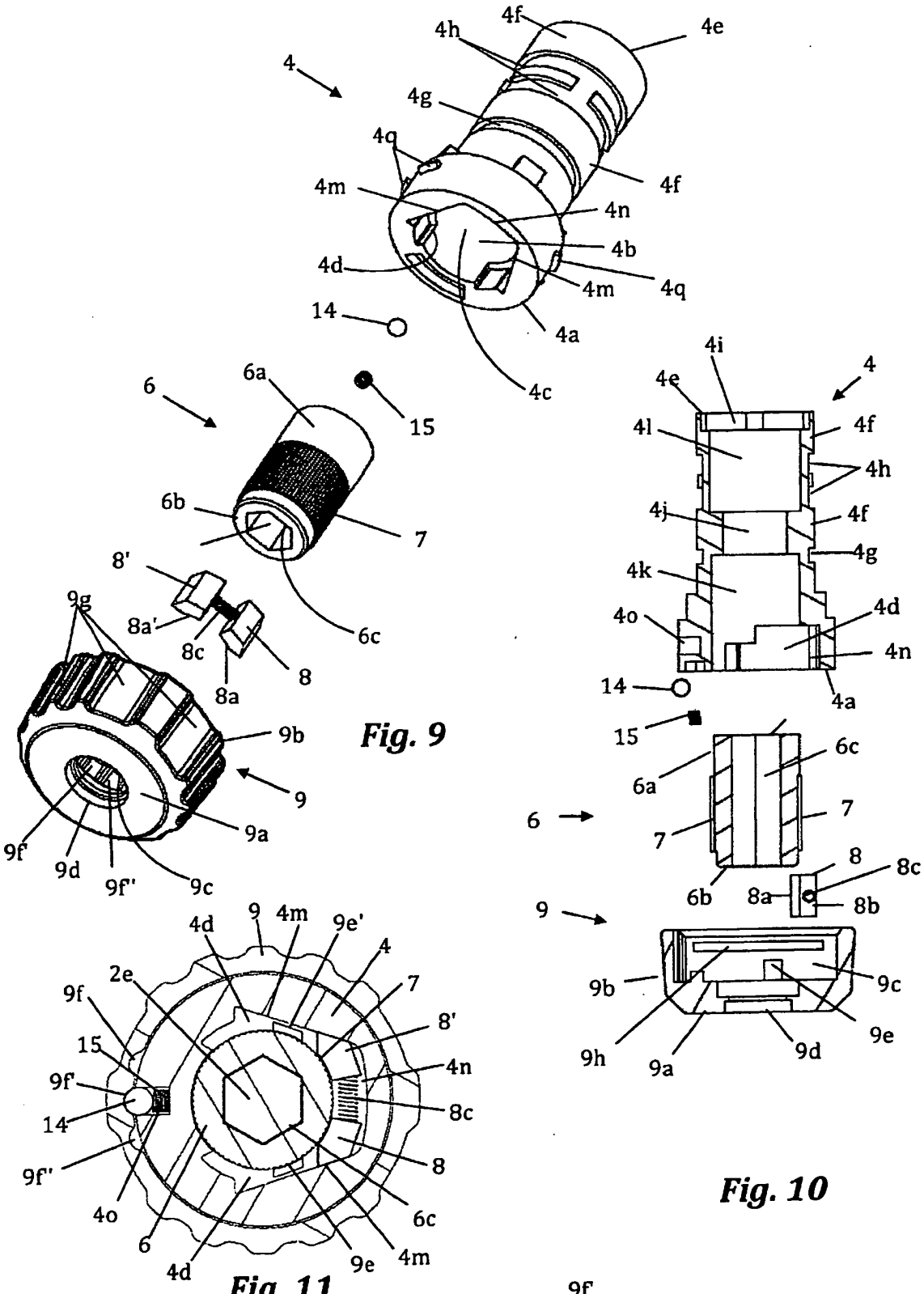

Fig. 9

Fig. 10

Fig. 11
(B-B)

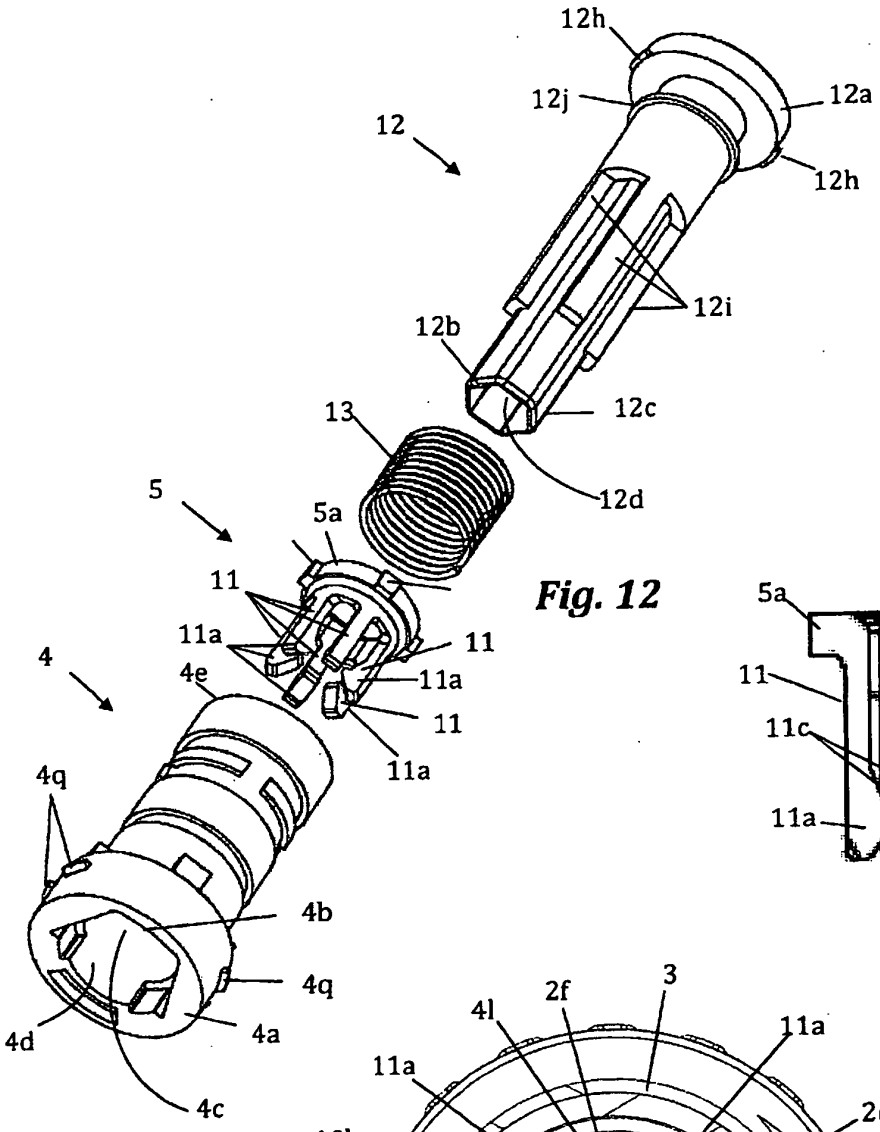

Fig. 12

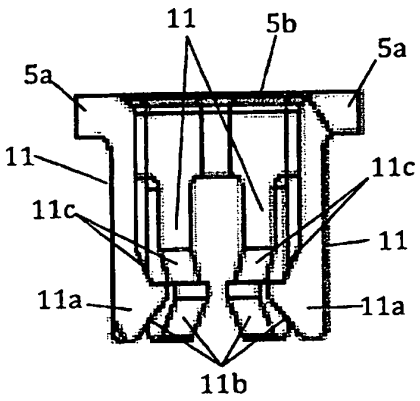

Fig. 13

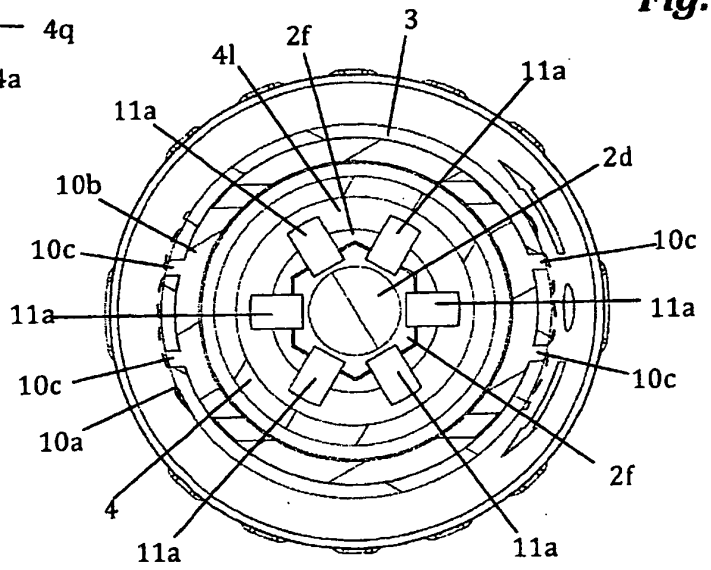

Fig. 14
(C-C)

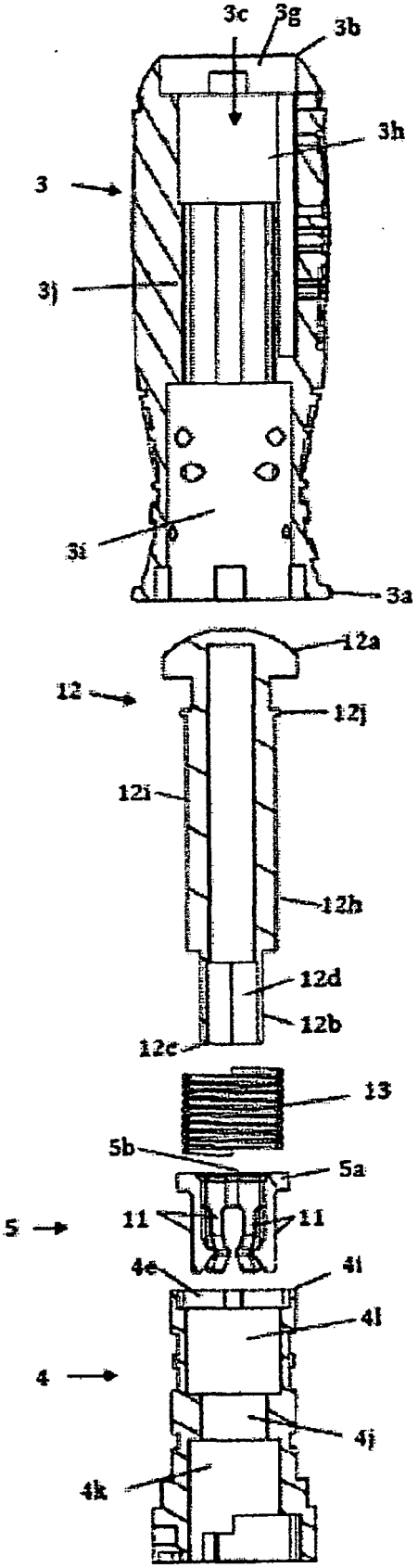
3c
3g
3b
3h
3
3j
3i
3a
12a
12
12j
12i
12h
12d
12b
12c
13
5b
5a
5
11
11
4e
4i
4l
4
4j
4k

Fig. 15

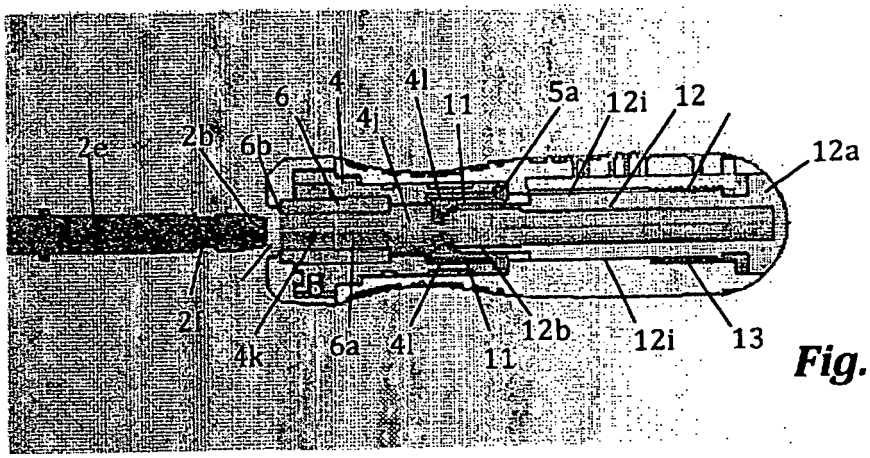

Fig. 16A

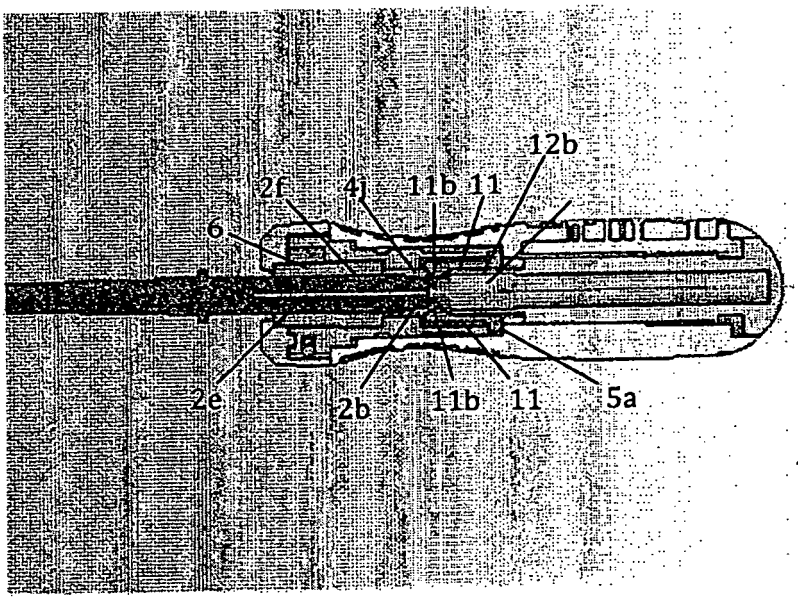

Fig. 16B

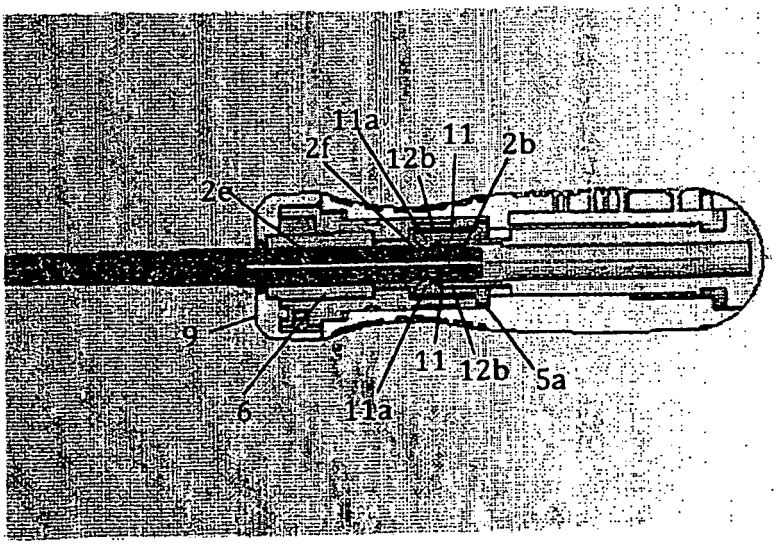

Fig. 16C

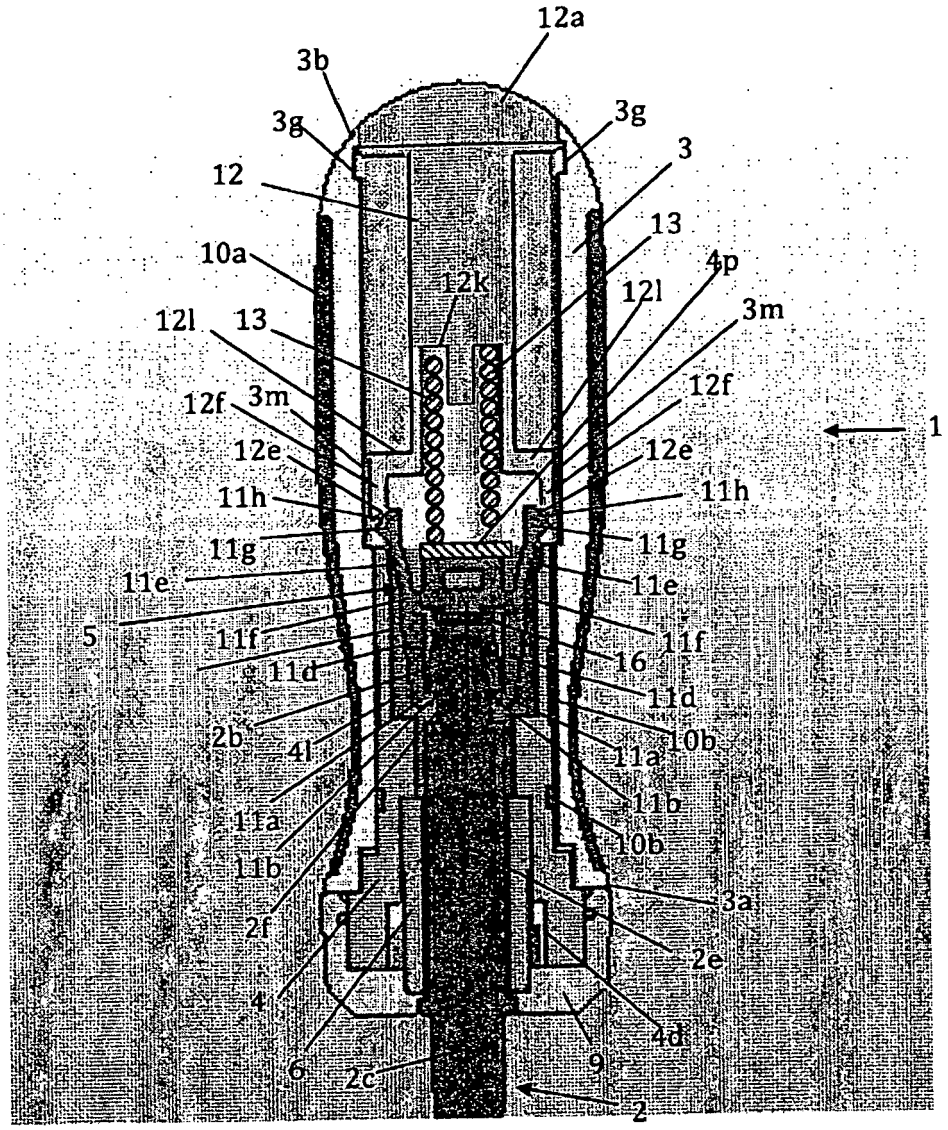
12a
3b
3g
3g
12
3
13
10a
12k
4p
12l
12l
13
3m
12f
3m
12f
1
12e
12e
11h
11h
11g
11g
11e
11e
5
11f
11f
16
11d
11d
2b
4l
10b
11a
11a
11b
11b
10b
2f
3a
2e
4
4d
6
2c
9
2

Fig. 17
(A-A)

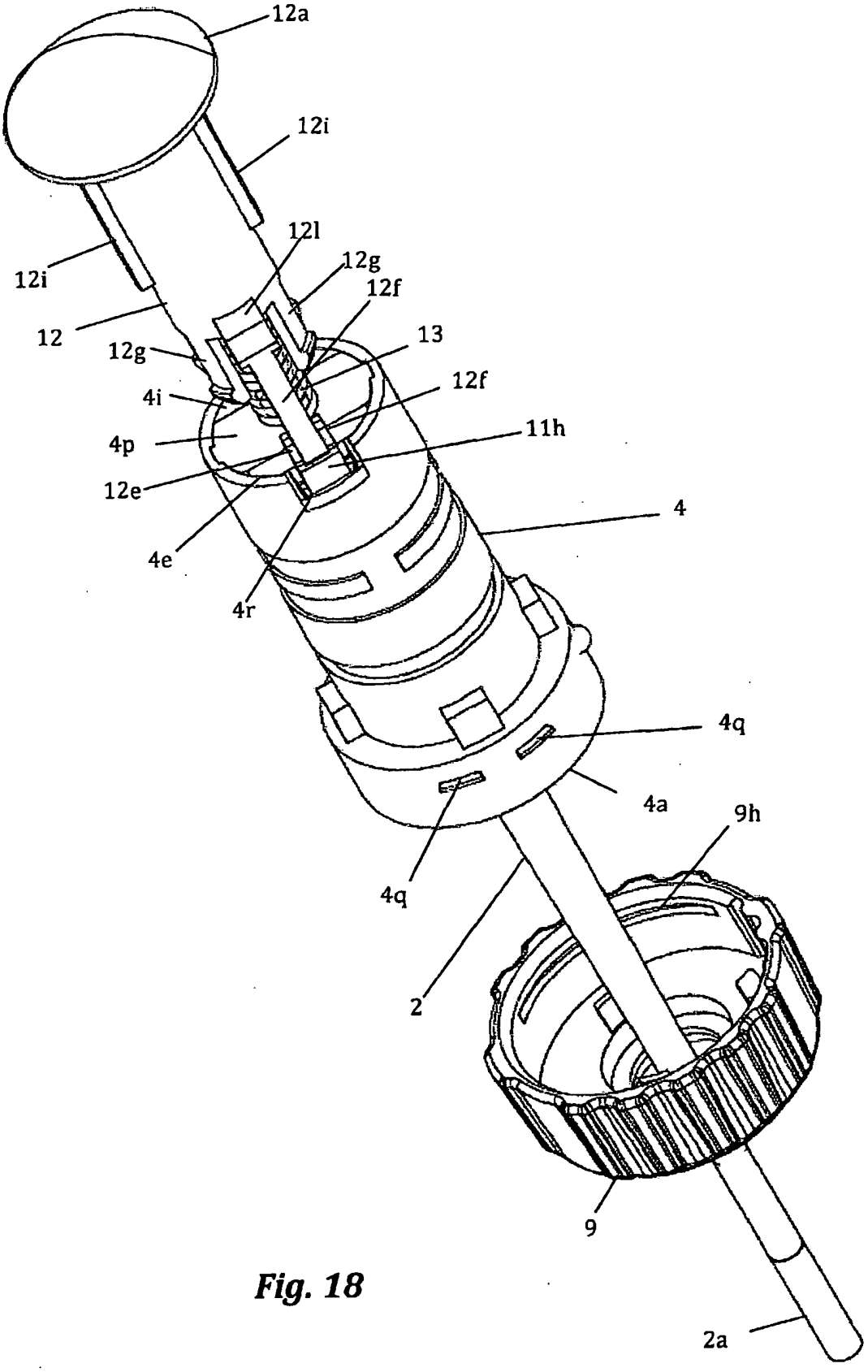
12a
12i
12l
12g
12f
12i
12
12g
13
12f
4i
11h
4p
12e
4
4e
4r
4q
4a
9h
4q
2
9
2a

Fig. 18

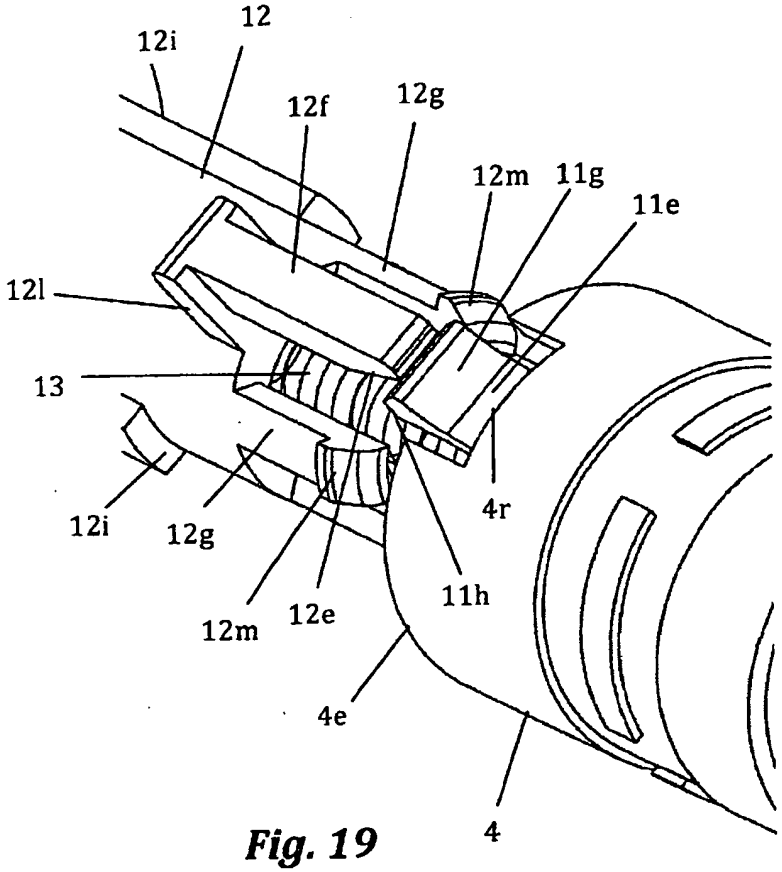
12
12i
12f
12g
12m
11g
11e
12l
13
12i
12g
4r
12m
12e
11h
4e
4

Fig. 19

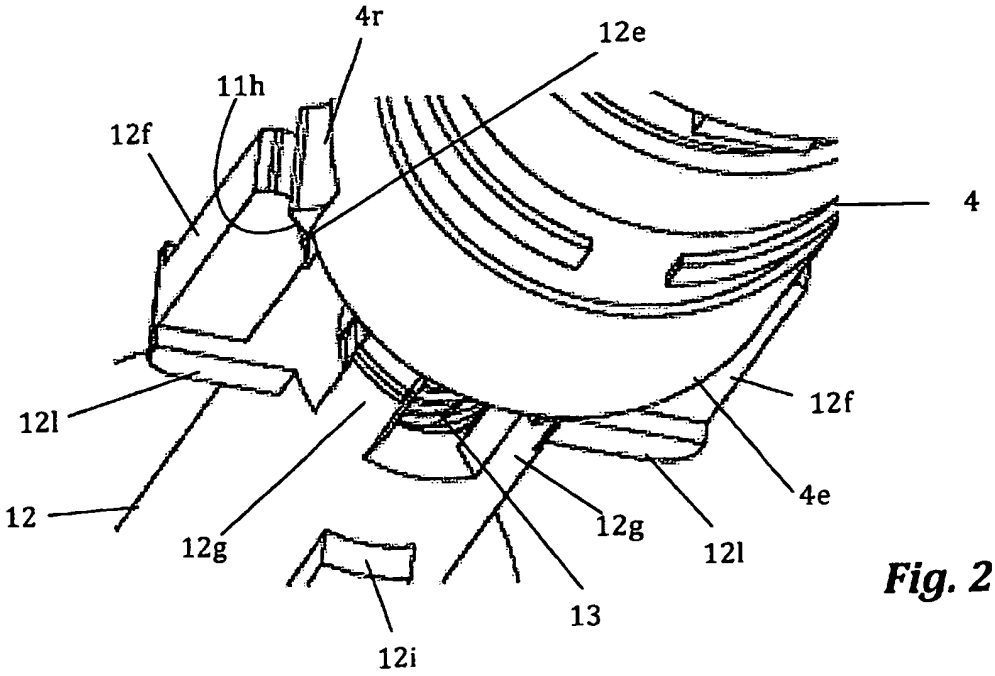
4r
12e
11h
12f
4
12l
12f
12
4e
12g
12g
12l
13
12i

Fig. 20

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 7287448 B2 **[0003] [0024]**