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(54) **MANUAL TOOL**

(57) A tool comprises: a handle (1), a splined shaft (6) disposed axially inside the handle (1), a tip (7) connected to the splined shaft (6) and protruding frontally from the handle, a first freewheel (C1) and a second freewheel (C2) mounted on the splined shaft (6), a selector (8), actuation means (A) of the selector (8), a tube (5) slidably mounted in the handle, a back spring (M1) and a front spring (M2).

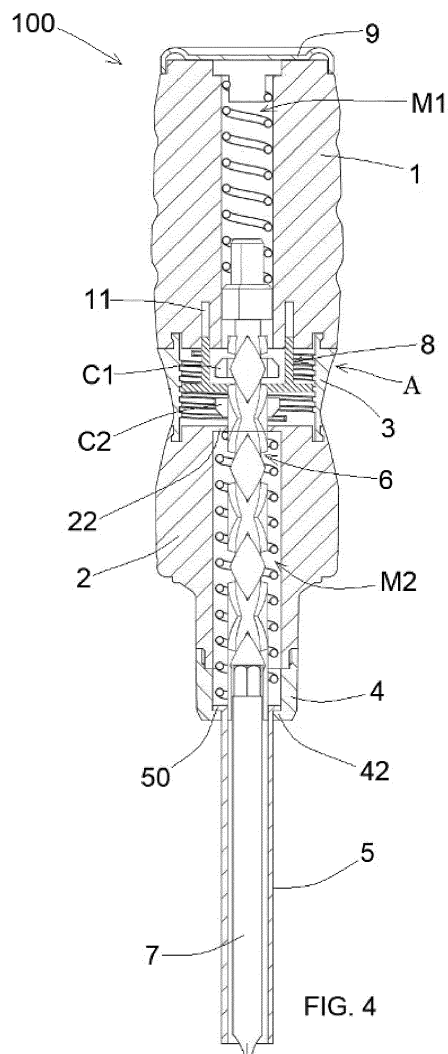


FIG. 4

## Description

**[0001]** The present invention relates to a manual tool and in particular to a screwdriver.

**[0002]** Various types of screwdrivers are known on the market, which comprise a handle, a stem and a tip with a shaped head, in such a way to be engaged in a head of a screw to rotate the screw in such a way to screw or unscrew the screw.

**[0003]** The user engages the head of the screwdriver in the head of the screw and rotates the handle manually by approximately 45° (maximum rotation permitted by the user's wrist) in such a way to rotate the screw; then, the user must detach the head of the screwdriver from the head of the screw in order to bring the wrist back to the initial position and start a new rotation of the screw.

**[0004]** When the user detaches the head of the screwdriver from the head of the screw, the risk is that the screw can move from its screwing position and therefore the user must use his or her fingers to center the screw in its screwing position.

**[0005]** Moreover, every time the head of the screwdriver engages the head of the screw, the movement of the screwdriver tends to incline the axis of the screw relative to an ideal screwing axis. Consequently, the screw is not screwed correctly, often stripping the thread of the screw and/or of the female screw where the screw is to be screwed.

**[0006]** Moreover, it must be considered that the screwing of a screw generally requires more than ten complete turns of the screw. With a traditional screwdriver, considering that the head of the screwdriver must be detached from the head of the screw approximately every fourth of a turn, the user will have to engage/disengage the head of the screwdriver in/from the head of the screw for more than 40 times in order to screw a screw. Such a system converts the screwing of a screw in an extremely time-consuming, complicated operation.

**[0007]** US1304714 discloses a tool-driver consisting in a screwdriver according to the preamble of claim 1.

**[0008]** The purpose of the present invention is to eliminate the drawbacks of the prior art by disclosing a tool that, when operated as a screwdriver, is capable of constantly holding the screw, when screwing and when unscrewing the screw.

**[0009]** Another purpose of the present invention is to disclose such a tool that, when operated as a screwdriver, is capable of guiding the screw during the screwing and the unscrewing of the screw.

**[0010]** An additional purpose of the present invention is to disclose such a tool that is effective, reliable and easy to use.

**[0011]** Another purpose of the present invention is to disclose a versatile manual tool that is suitable for being used as a screwdriver, a drill or a cable clamp tool according to the tip installed in the tool.

**[0012]** These purposes are achieved according to the invention with the characteristics of the independent

claim 1.

**[0013]** Advantageous embodiments of the invention appear from the dependent claims.

**[0014]** The tool of the invention is defined by claim 1.

**[0015]** Additional features of the invention will appear manifest from the following detailed description, which refers to its merely illustrative, not limiting embodiments, as illustrated in the appended figures, wherein:

Fig. 1 is an exploded side view of the parts of the tool according to the invention;

Fig. 2 is a perspective view of the tool of Fig. 1 in assembled condition;

Fig. 3 is a side view of the tool of Fig. 2 according to the invention, wherein the selector is omitted;

Fig. 4 is an axial sectional view taken along the sectional plane IV-IV of Fig. 3;

Fig. 5 is a cross-sectional view taken along the sectional plane V-V of Fig. 3;

Fig. 6 is a side view of the stem, the cover and an upper spring of the screwdriver according to the invention, wherein the selector is omitted;

Fig. 7 is an axial sectional view of the handle and the tube of the tool according to the invention;

Fig. 8 is a perspective view of the stem, the cover and the two springs of the tool;

Figs. 9A, 9B and 9C are side views of a portion of the splined shaft of the stem, wherein the selector, which is partially shown in a sectional view, is disposed in intermediate, lowered and raised position, respectively;

Fig. 10 is an axial sectional view of the tool according to the invention in a working position;

Figs. 11 and 12 are perspective side views of the internal portion of the tool in working position;

Fig. 13 is a top view of a freewheel;

Fig. 14 is an exploded side view of a second embodiment of the tool according to the invention;

Fig. 15 is a sectional view of the handle of the tool of Fig. 14 and of the internal parts in assembled condition;

Fig. 16 is a sectional view of the tool of Fig. 14;

Fig. 16A is an enlarged view of a detail of Fig. 16;

Fig. 17 is a perspective view of a third embodiment, wherein the tip of the screwdriver is replaced with a spindle tip;

Fig. 18 is an axial sectional view of the tip of the tool of Fig. 17;

Fig. 19 is an exploded view of a fourth embodiment of the tool of the invention;

Fig. 20 is a sectional view of the handle of the tool of Fig. 19 and of the internal parts in assembled condition;

Fig. 21 is an axial sectional view of the tool of Fig. 19;

Fig. 21A is an enlarged view of a detail of the tool of Fig. 21;

Figs. 22A, 22B and 22C are sectional views of a portion of the tool of Fig. 21, wherein the selector is

disposed in intermediate, lowered and raised position, respectively.

**[0016]** With reference to the Figures, a tool according to the invention is described, which is generally indicated with reference numeral 100.

**[0017]** The tool (100) comprises an internally empty handle (I). A splined shaft (6) is disposed inside the handle (I) and is connected to a tip (7) that protrudes frontally from the handle. The tip (7) is provided with a head (70) that is suitably shaped in such a way to actuate a screw.

**[0018]** A first freewheel (C1) is mounted on the splined shaft (6) so that the first freewheel can rotate freely on the splined shaft in anticlockwise direction, but cannot rotate in clockwise direction.

**[0019]** A second freewheel (C2) is mounted on the splined shaft (6) so that the second freewheel can rotate freely on the splined shaft in clockwise direction, but cannot rotate in anticlockwise direction.

**[0020]** Equivalent means, such as free wheels, unidirectional couplings and the like, can be used instead of the freewheels (C1, C2).

**[0021]** A selector (8) is mounted inside the handle (I) between the first freewheel (C1) and the second freewheel (C2). The selector (8) rotates integrally with the handle (I).

**[0022]** The selector (8) can be axially moved between three positions:

- an intermediate position (Fig. 9A) wherein the selector rotates integrally with the first freewheel (C1) and the second freewheel (C2);
- a first position (Fig. 9B) wherein the selector rotates integrally only with the first freewheel (C1),
- a second position (Fig. 9C) wherein the selector rotates integrally only with the second freewheel (C2).

**[0023]** Actuation means (A) are mounted in the handle (I) in such a way to be actuated by the user to move the selector (8) to the above mentioned three positions. When the selector (8) is disposed in one of the three positions, the selector translates integrally with the handle.

**[0024]** When the selector is in intermediate position, the screwdriver operates in a traditional way. Otherwise said, a rotation in clockwise or anticlockwise direction of the handle will involve a rotation of the tip (7) in clockwise or anticlockwise direction.

**[0025]** When the selector is in the first position, the screwdriver only works for screwing. Otherwise said, a rotation in clockwise direction of the handle will involve a rotation of the tip (7) in clockwise direction, but a rotation in anticlockwise direction of the handle will not involve any rotation of the tip, which keeps on holding the head of the screw.

**[0026]** When the selector is in the second position, the screwdriver only works for unscrewing. Otherwise said, a rotation in anticlockwise direction of the handle will in-

volve a rotation of the tip (7) in anticlockwise direction, but a rotation in clockwise direction of the handle will not involve any rotation of the tip, which keeps on holding the head of the screw.

**[0027]** Advantageously, the handle (I) comprises a back body (1) and an intermediate body (2). The actuation means (A) comprise a metal ring (3) that is revolvingly mounted between the back body and the intermediate body of the handle.

**[0028]** With reference to Figs. 4 and 7, the metal ring (3) has an internal thread (30). The selector (8) has a cylindrical body (80) with an external thread (81) that is engaged in the internal thread (30) of the metal ring. In view of the above, when rotating the metal ring (3), the selector (8) will move axially inside the handle.

**[0029]** The back body (1) of the handle has a through axial channel (10) wherein the splined shaft (6) is disposed.

**[0030]** A back spring (M1) is disposed in the axial channel (10) of the back body to frontally push the splined shaft (6). A cover (9) is mounted in rear position in the back body (1) to close the axial channel (10) of the back body.

**[0031]** The first end of the back spring (M1) is stopped against a percussion pin (60) that is integral with the splined shaft (6), and the second end of the back spring (M1) is stopped against the cover (9). The percussion pin (60) of the splined shaft has a cylindrical shank (61) around which a front portion of the back spring (M1) is wound. The cover (9) has a cylindrical shank (90) wherein a back end portion of the back spring (M1) is wound.

**[0032]** The back body (1) of the handle has an annular groove (11) wherein the cylindrical body (80) of the selector can slide axially.

**[0033]** With reference to Fig. 1, the selector has a longitudinal groove (82) that is engaged with a longitudinal rib of the back body (1) of the handle to prevent a rotation of the selector (8) relative to the back body (1) of the handle.

**[0034]** With reference to Fig. 9A and 13, each freewheel (C1, C2) is provided with teeth (85) that protrude radially outwards, defining grooves (86). Moreover, each freewheel (C1, C2) has an internal thread (88) that is engaged with the splined shaft (6).

**[0035]** The selector (8) is provided with upper teeth (83) that protrude inwards in upper position and are suitable for being engaged in the grooves (86) of the first freewheel (Fig. 9B) and with lower teeth (84) that protrude inwards in lower position and are suitable for being engaged in the grooves (86) of the second freewheel (Fig. 9C).

**[0036]** The intermediate body (2) has a through axial channel (20) wherein the splined shaft (6) is disposed.

**[0037]** A front body (4) is fixed to the intermediate body (2).

**[0038]** A tube (5) is slidably mounted in the front body (4) of the handle, in such a way to cover the tip (7) disposed inside the tube (5),

**[0039]** A front spring (M2) is disposed in the axial channel (20) of the intermediate body to push the tube (5) in an extracted position wherein the tube (5) protrudes frontally from the front body (4).

**[0040]** The tube (5) has a back collar (50) that protrudes radially outwards and is disposed in the front body (4) of the handle. The intermediate body (2) of the handle has a back collar (22) that protrudes radially inwards in the axial channel (20) of the intermediate body.

**[0041]** The front body (4) has a front collar (42) that protrudes radially inwards to hold the back collar (50) of the tube.

**[0042]** The first end of the front spring (M2) is stopped against the back collar (50) of the tube, and the second end of the front spring (M2) is stopped against the back collar (22) of the intermediate body of the handle.

**[0043]** In view of the above, the tube (5) always surrounds the screw, both when screwing and when unscrewing, preventing the screw from taking an incorrect direction and/or from being ejected from its housing.

**[0044]** A dynamometer (D) can be disposed between the tip (7) and the splined shaft (6).

**[0045]** With reference to Fig. 5, the splined shaft (6) has a front end portion with a prismatic coupling (62), which is suitable for engaging with a complementary prismatic coupling (72) disposed in a back portion of the tip (6) or of the dynamometer (D) or of other tools.

**[0046]** For illustrative purposes, the prismatic coupling (62) of the splined shaft (6) can be a hexagonal female coupling. On the contrary, the complementary prismatic coupling (72) of the tip or of the dynamometer (D) can be a hexagonal male coupling.

**[0047]** Obviously, the dynamometer (D) will have a front portion with a hexagonal female coupling (62) that is suitable for coupling with the hexagonal male coupling of the tip (7).

**[0048]** With reference to Fig. 4, in an initial idle position, the springs (M1, M2) are not unloaded and the two freewheels (C1, C2) are in a back portion of the splined shaft.

**[0049]** The first freewheel (C1) can translate in forward position on the splined shaft, determining a rotation in clockwise direction of the splined shaft and can translate in rear position on the splined shaft, without determining any rotation of the splined shaft.

**[0050]** The second freewheel (C2) can translate in forward position on the splined shaft, determining a rotation in anticlockwise direction of the splined shaft and can translate in rear position on the splined shaft, without determining any rotation of the splined shaft.

**[0051]** When the selector (8) is in the first position, wherein the first freewheel (C1) is engaged, the selector (8) translates integrally with the handle (1). Therefore, when pushing the handle (1) towards the screw to be screwed, the first freewheel (C1) translates in forward position on the splined shaft and the splined shaft (6) is forcedly rotated in clockwise direction. Therefore, the tip (7) rotates in clockwise direction, screwing the screw.

**[0052]** As shown in Fig. 10, when rotating in clockwise

direction, the splined shaft (8) is moved backwards inside the back body (1) of the handle, compressing and loading the back spring (M1) and the tube (5) is moved backwards inside the intermediate body (4) of the handle, compressing and loading the front spring (M2). Figs. 11 and 12 illustrate a working step of the screwdriver, wherein the freewheels (C1, C2) are disposed in a front portion of the splined shaft (6) and the two springs (M1, M2) are compressed and loaded.

**[0053]** When manually moving the handle backwards, the two springs (M1, M2) are unloaded and the selector (8) is brought back to the idle position of Fig. 4. It must be considered that the selector (8) is engaged in the first freewheel (C1), which slides freely backwards on the splined shaft (6) without determining any rotation of the splined shaft. Therefore, the handle can be pushed again towards the screw to determine an additional screwing.

**[0054]** Likewise, when the selector (8) is in the second position, wherein the second freewheel (C2) is engaged, the selector (8) translates integrally with the handle (1). Therefore, when pushing the handle (1) towards the screw to be unscrewed, the second freewheel (C2) translates in forward position on the splined shaft (6) that rotates in anticlockwise direction. Therefore, the tip (7) rotates in anticlockwise direction, unscrewing the screw.

**[0055]** Also in this case, when rotating in anticlockwise direction, the splined shaft (8) is moved backwards inside the back body (1) of the handle, compressing and loading the back spring (M1) and the tube (5) is moved backwards inside the intermediate body (4) of the handle, compressing and loading the front spring (M2).

**[0056]** When manually moving the handle backwards, the two springs (M1, M2) are unloaded and the selector (8) is brought back to the idle position of Fig. 4. It must be considered that the selector (8) is engaged in the second freewheel (C2) that slides freely backwards on the splined shaft (6) without determining any rotation of the splined shaft. Therefore, the handle can be pushed again towards the screw to determine an additional screwing.

**[0057]** The tool (100) according to the invention can be used to screw and unscrew a screw, without turning the wrist, by simply pushing the handle towards the screw.

**[0058]** In the following description, the parts that are identical or equivalent to the ones that are described above will be identified with the same reference numerals, omitting their detailed description.

**[0059]** With reference to Figs. 14, 15, 16 and 16A, a tool (200) according to a second embodiment is disclosed.

**[0060]** Each freewheel (C1, C2) comprises: a splined bushing (201) that is engaged in the splined shaft (6), a unidirectional bearing (202) and a toothed wheel (203). The unidirectional bearing (202) has an internal ring that is fixed to the splined bushing (201) and an external ring that is fixed to the toothed wheel (203). The internal ring and the external ring of the unidirectional bearing (202) are fixed to the splined bushing (201) and to the toothed

wheel (203) by means of a temperature difference. The toothed wheel has a seat for an elastic ring that provides the fixing with the body of the tool.

**[0061]** The percussion pin (60) is separate from the splined shaft and is splined in an upper end of the splined shaft.

**[0062]** If the screw gets blocked, the structure of such a tool permits to hit the cover (9) with a hammer in such a way to create impulsive torques on the tip (7), acting on the head of the blocked screw and making unscrewing easier.

**[0063]** Figs. 1 to 16 show a tool consisting in a screwdriver wherein the tip (7) has a head (70) suitable for engaging with the head of a screw. However, the tip (7) can be replaced with a different tip, such as for example a head of a drill used for drilling holes.

**[0064]** Figs. 17 and 18 show a tool (300) according to a third embodiment, wherein the tip (7) is replaced with a spindle tip (307).

**[0065]** The spindle tip (307) comprises an internally empty stem (370) with an axial channel (371). The stem (370) has a head (372) that comprises flexible tabs (373) that define a hole (374) in communication with the axial channel (371) of the stem. A collar (376) is disposed around the stem. A slider (375) is disposed around the flexible tabs (373) to go from an extracted position, wherein the flexible tabs are pushed, reducing the hole (374), to a retracted position, wherein the flexible tabs are spread outwards, enlarging the hole (374). A spring (377) is disposed between the slider and the collar to push the slider to the extracted position.

**[0066]** For example, the spindle tip (307) can be used to tighten a cable that is disposed inside the axial channel (371) of the stem. In such a case, the percussion pin (60) and the splined shaft (6) have a through axial hole for inserting the cable.

**[0067]** The user moves the slider (375) to the retracted position, inserting the cable in the axial channel of the stem. The user inserts the cable from the cover (9). The cable passes through the axial channel (10), the percussion pin (60) and the splined shaft (6), reaching the axial channel (371) of the tip. Then, the user releases the slider (375) and the spring (377) pushes the slider to the extracted position, in such a way that the cable is tightened by the tabs (373).

**[0068]** Figs. 19 and 21 show a tool (400) according to a fourth embodiment of the invention.

**[0069]** The tool (400) comprises a handle (I) that comprises:

- a back body (1) with ergonomic shape that permits a safe grip in order to apply the necessary working force,
- a cover (9) that is screwed in the back body (1) and permits to disassemble the tool for cleaning purposes,
- a front body (4) with a conduit (40) that acts as a guide for a tube (5),

- a first intermediate body (2) screwed to the front body (4) by means of an internal thread that is screwed in an external thread (41) of the front body,
- a second intermediate body (402) screwed to the front body (1) by means of an external thread (441) that is screwed in an internal thread of the front body, and
- actuation means (A) comprising a metal ring disposed between the first intermediate body and the second intermediate body.

**[0070]** The tool (400) comprises an internal mechanism that comprises:

- a splined shaft (6) with a percussion pin (60) at an upper end and a coupling (65) at a lower end to receive a prismatic coupling (72) of the tip,
- a back spring (M1) disposed between the percussion pin (60) and the cover (9) to push the splined shaft (6),
- a front spring (M1) disposed in the front body (4) in order to push the tube (5),
- a first freewheel (C1) and a second freewheel (C2) disposed on the splined shaft (6) to permit a rotation of the splined shaft in clockwise direction or in anticlockwise direction relative to the back body (1),
- a selector (8) mounted between the first intermediate body and the second intermediate body, which interacts with the metal ring (3) in order to select the first freewheel (C1) or the second freewheel (C2).

**[0071]** The percussion pin (60) and the splined shaft are provided with through axial holes for inserting a cable.

**[0072]** Each freewheel (C1, C2) comprises:

- a splined bushing (201) that is engaged in the splined shaft (6),
- a toothed wheel (203) with an elastic ring (204) disposed on the toothed wheel (203); and
- a unidirectional bearing (202) disposed between the splined bushing (201) and the toothed wheel (203).

**[0073]** It must be noted that the selector (8) is a sleeve with internal grooves (89) suitable for being engaged in the toothing of the toothed wheels (203) of the two freewheels.

**[0074]** Such a tool (400) can use a screwdriver tip (7), a drill tip (not shown), a spindle tip (307), a tip (407) with a dynamometer (D) disposed between a screwdriver head (70) and a stem (470) that is fixed to the coupling (65) of the splined shaft.

**[0075]** By means of the metal ring (3), the user can choose the rotational direction or can block the tip (7) of the tool relative to the handle (I).

**[0076]** With reference to Fig. 22A, if the metal ring (3) is positioned in an intermediate position, the selector (8) is simultaneously coupled with the two toothed wheels (203) of the first freewheel and of the second freewheel,

preventing a rotation of the two toothed wheels (203) of the first freewheel and of the second freewheel. Therefore, the splined shaft (6) cannot rotate relative to the handle (I), forcing the tool to operate as an ordinary screwdriver wherein the tip (7) is integral with the handle (I).

**[0077]** With reference to Fig. 22B, when rotating the metal ring (3) in clockwise direction, the selector (8) is pushed upwards. Therefore, the selector (8) will only engage the toothed wheel (203) of the first freewheel, preventing its rotation and leaving the toothed wheel of the second freewheel free to rotate. In such a position, when pushing the handle (I) towards the screw, the tip (7) is forced to rotate in clockwise direction relative to the handle. Therefore, the tool can act as a screwdriver with freewheel for screwing the screw in clockwise direction.

**[0078]** With reference to Fig. 22C, when rotating the metal ring (3) in anticlockwise direction, the selector (8) is moved downwards; therefore the selector (8) will only engage the toothed wheel (203) of the second freewheel (C2), preventing its rotation and leaving the toothed wheel of the first freewheel (C1) free to rotate. In such a position, when pushing the handle (I) towards the screw, the tip (7) is forced to rotate in anticlockwise direction relative to the handle. Therefore, the tool can operate as a screwdriver with freewheel for unscrewing the screw in anticlockwise direction.

**[0079]** Numerous equivalent variations and modifications, which are within the reach of an expert of the field, can be made to the present embodiments of the invention, falling in any case within the scope of the invention as disclosed by the appended claims.

## Claims

### 1. Tool (100; 200; 300; 400) comprising:

- an internally empty handle (I),
- a splined shaft (6) mounted in such a way to slide axially inside the handle (I),
- a tip (7; 307; 407) connected to the splined shaft (6) and frontally protruding from the handle,
- a first freewheel (C1) mounted on the splined shaft (6) in such a way that the splined shaft rotates in clockwise direction when the first freewheel translates forwards relative to the splined shaft and the splined shaft does not rotate relative to the first freewheel when the first freewheel translates backwards relative to the splined shaft,
- a second freewheel (C2) mounted on the splined shaft (6) in such a way that the splined shaft rotates in anticlockwise direction when the second freewheel translates forwards relative to the splined shaft and the splined shaft does not rotate when the second freewheel translates

backwards relative to the splined shaft,

- a selector (8) that rotates integrally with the handle (I) and can be moved to a first position, wherein the selector rotates integrally only with the first freewheel (C1), and a second position, wherein the selector rotates integrally only with the second freewheel (C2),
- actuation means (A) mounted in the handle (I) in such a way to be actuated by the user to move the selector (8) to said first and second position, and
- a back spring (M1) disposed in the handle to push the splined shaft (6) frontally;

wherein the handle (I) comprises a back body (1) and an intermediate body (2) and the actuation means (A) comprise a metal ring (3) that is revolvingly mounted between the back body and the intermediate body of the handle;

### characterized in that

the metal ring (3) has an internal thread (30) and the selector (8) has a cylindrical body (80) with an external thread (81) that is engaged in the internal thread (30) of the metal ring.

**2.** The tool (100) of claim 1, wherein the back body (1) of the handle has an annular groove (11) wherein the cylindrical body (80) of the selector can axially slide and the selector has a longitudinal groove (82) that is engaged with a longitudinal rib of the back body (1) of the handle to prevent the selector (8) from rotating relative to the back body (1) of the handle.

**3.** The tool (100) of any one of the preceding claims, wherein each freewheel (C1, C2) is provided with teeth (85) that protrude radially outwards, defining grooves (86), and the selector (8) is provided with upper teeth (83) that protrude inwards in upper position, suitable for being engaged in the grooves (86) of the first freewheel (C1), and lower teeth (84) that protrude inwards in lower position, suitable for being engaged in the grooves (86) of the second freewheel (C2).

**4.** The tool of claim 1, wherein each freewheel (C1, C2) comprises a splined bushing (201) that is engaged in the splined shaft (6), a unidirectional bearing (202) and a toothed wheel (203); the unidirectional bearing (202) being provided with an internal ring fixed to the splined bushing (201) and an external ring fixed to the toothed wheel (203).

**5.** The tool of any one of the preceding claims, wherein the back spring (M1) is disposed in an axial channel (10) of the back body of the handle and a cover (9) is mounted in rear position in the back body (1) to close the axial channel (10) of the back body; the first end of the back spring (M1) is stopped against

a percussion pin (60) of the splined shaft (6) and the second end of the back spring (M1) is stopped against the cover (9).

**6.** The tool (100) of any one of the preceding claims, comprising: 5

- a tube (5) that is slidingly mounted in the handle and frontally protrudes from the handle in such a way to cover the tip (7) disposed inside the tube (5), 10
- a front spring (M2) disposed in the handle to push the tube (5) to an extracted position wherein the tube (5) protrudes frontally from the handle. 15

**7.** The tool (100) of any one of the preceding claims, wherein said selector (8) is movable to an intermediate position wherein it rotates integrally both with the first freewheel and the second freewheel. 20

**8.** The tool (100) of any one of the preceding claims, wherein the handle (1) comprises a front body (4) fixed to the intermediate body (2); the front spring (M2) is disposed in an axial channel (20) of the intermediate body; the tube (5) has a back collar (50) that protrudes radially outwards and is disposed in the front body (4) of the handle; the intermediate body (2) of the handle has a back collar (22) that protrudes radially inwards in the axial channel (20) of the intermediate body; the first end of the front spring (M2) is stopped against the back collar (50) of the tube, and the second end of the front spring (M2) is stopped against the back collar (22) of the intermediate body of the handle. 25 30 35

**8.** The tool of any one of the preceding claims, wherein said tool also comprises a dynamometer (D) disposed between the tip (7) and the splined shaft (6). 40

**10.** The tool of any one of the preceding claims, wherein said tip (7) has a head (70) of a screwdriver.

**11.** The tool of any one of claims 1 to 9, wherein said tip has a head of a drill. 45

**12.** The tool of any one of the preceding claims, wherein said tip of the tool comprises a spindle tip (307). 50

**13.** The tool of claim 12, wherein said spindle tip (307) comprises:

- an internally empty stem (370) with an axial channel (371) 55
- a head (372) comprising flexible tabs (373) that define a hole (374) in communication with the axial channel (371) of the stem,

- a collar (376) disposed around the stem,
- a slider (375) disposed around the flexible tabs (373) to go from an extracted position, wherein the flexible tabs are pushed, and the hole (374) is reduced, to a retracted position, wherein the flexible tabs are spread outwards and the hole (374) is enlarged, and
- a spring (377) disposed between the slider and the collar to push the slider to the extracted position.

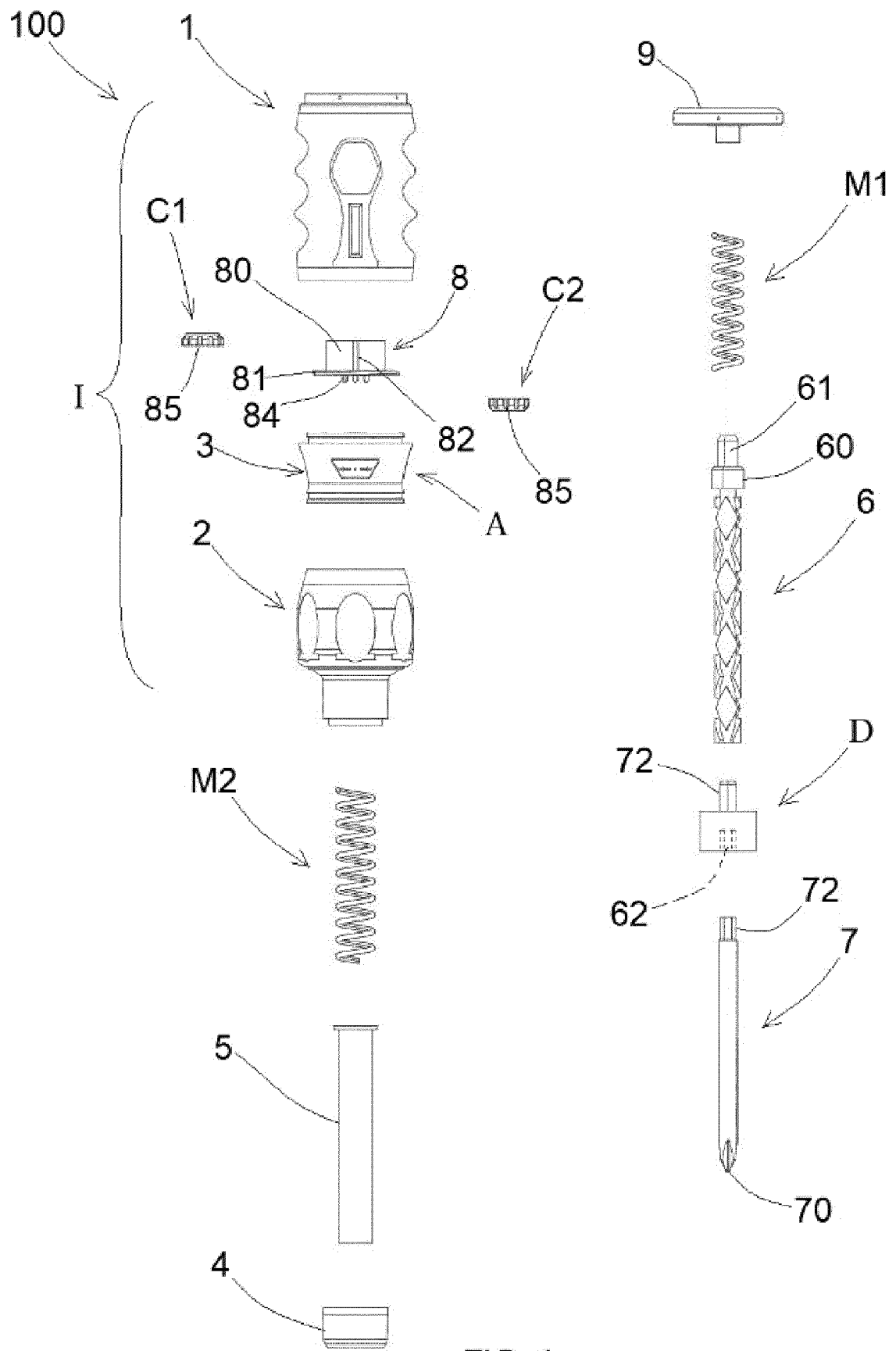


FIG. 1.

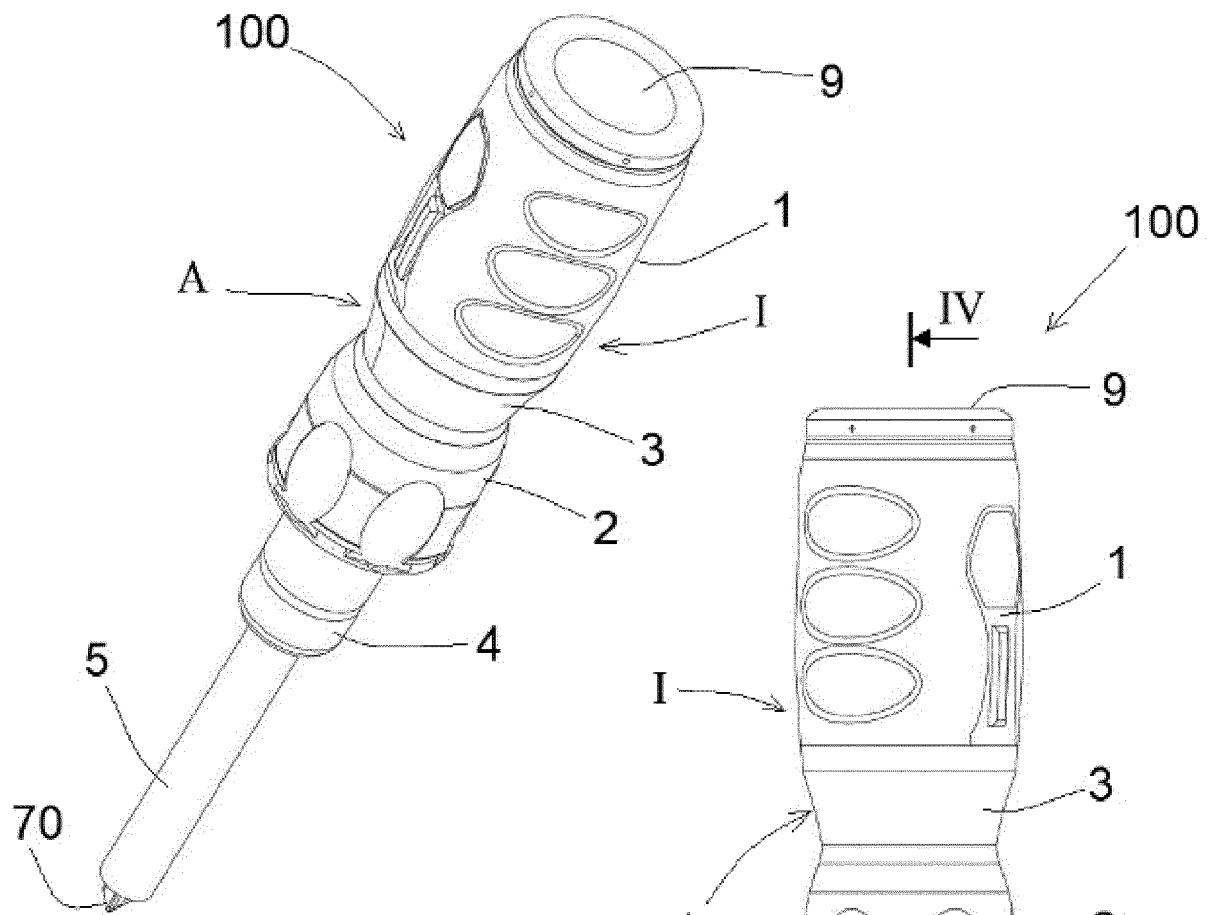


FIG. 2

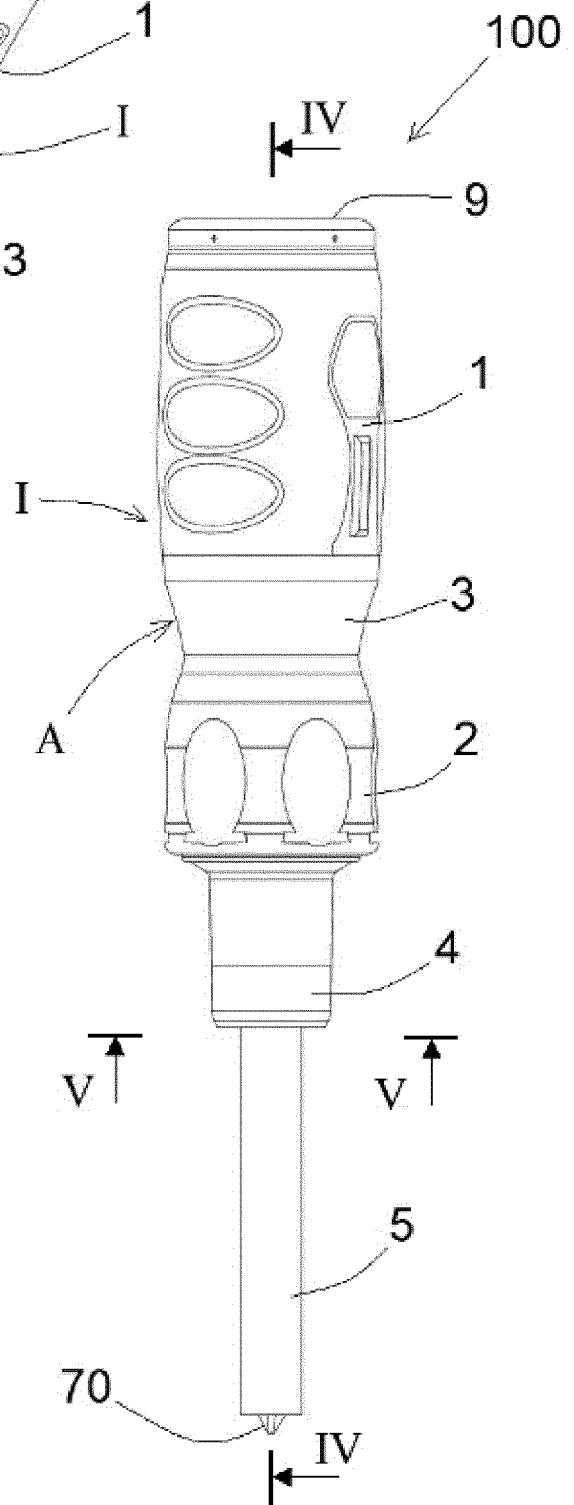
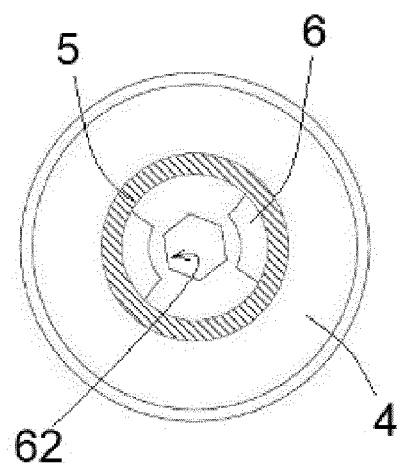
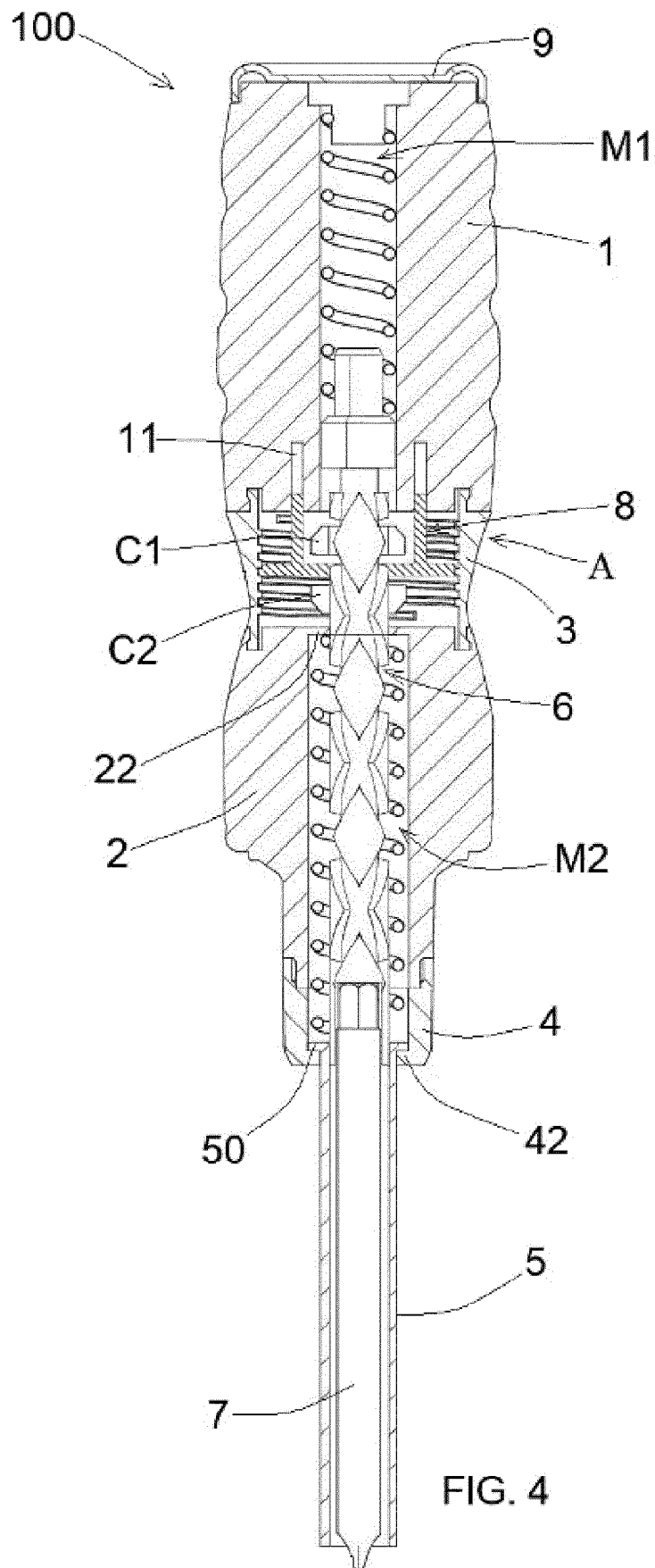


FIG. 3



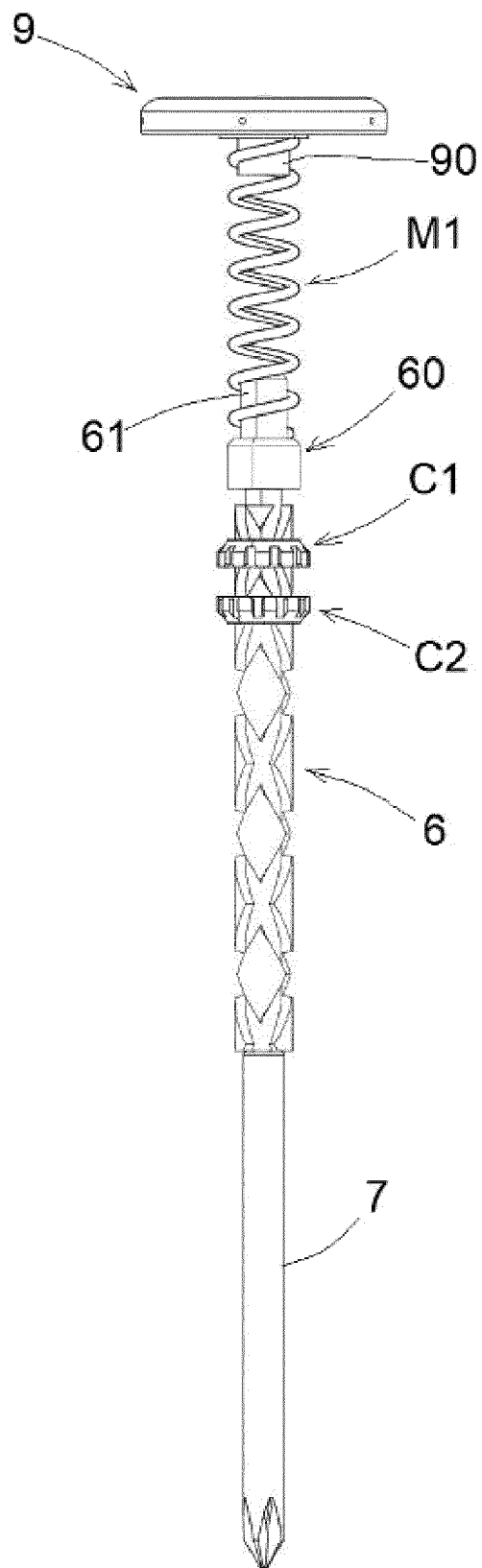


FIG. 6

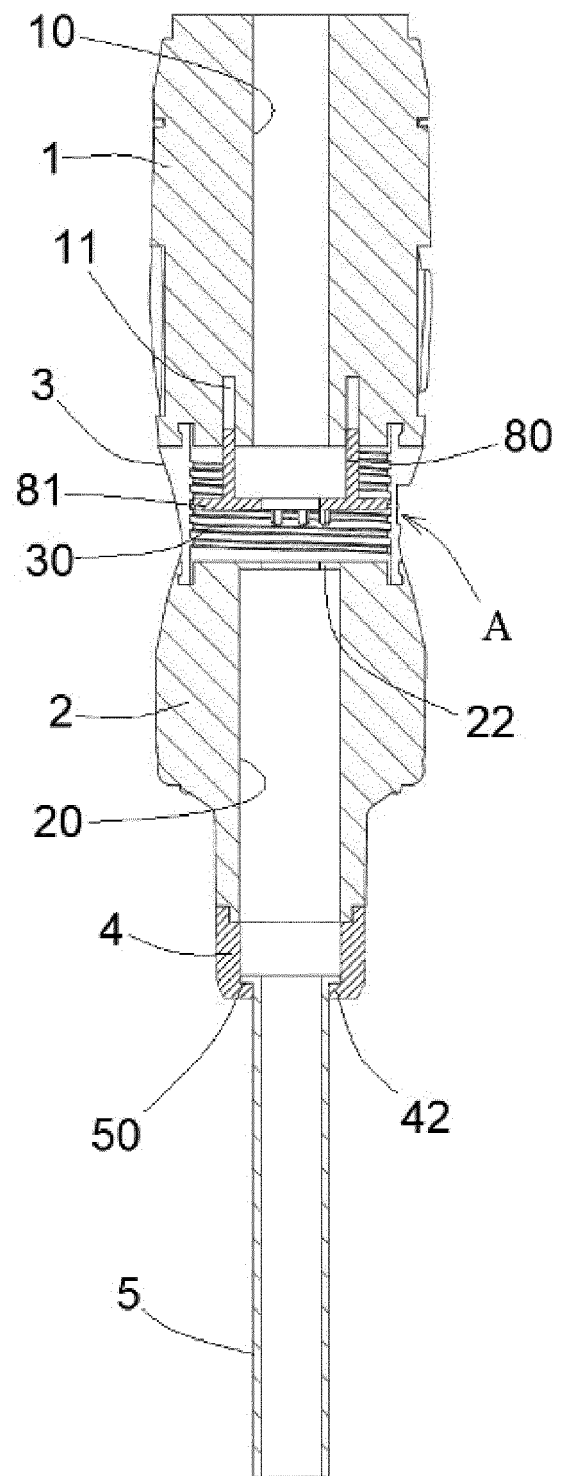


FIG. 7

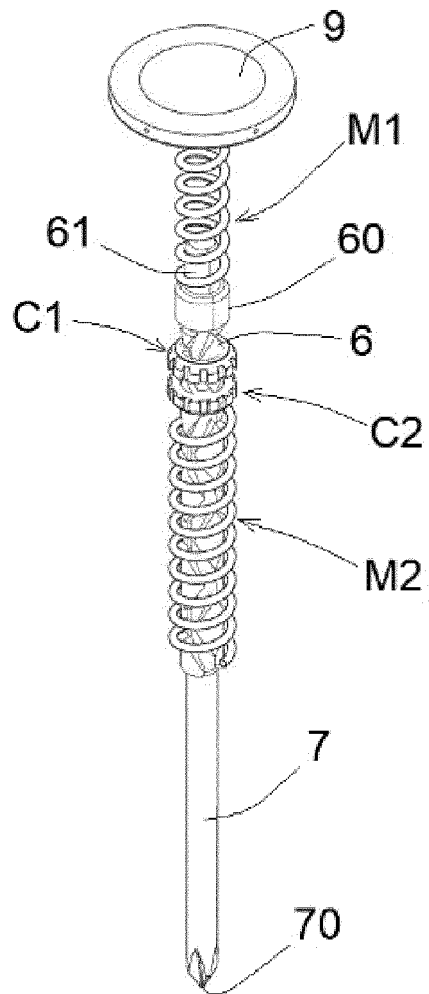


FIG. 8

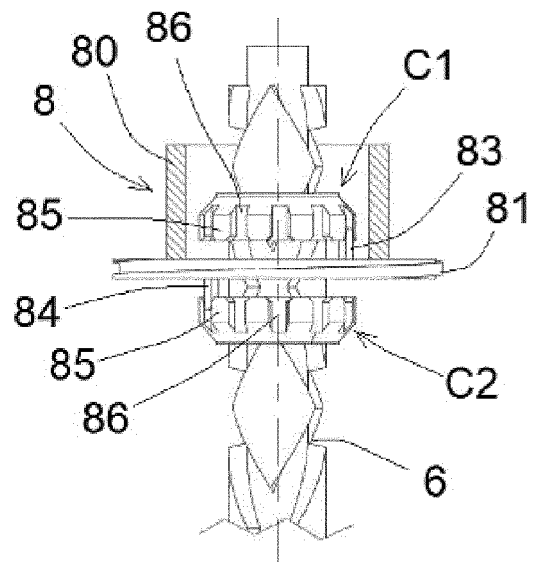


FIG. 9A

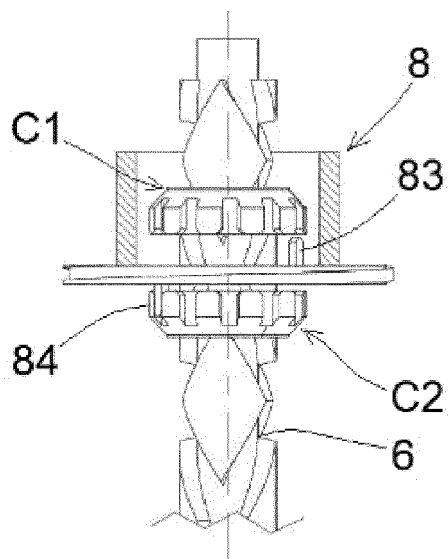


FIG. 9C

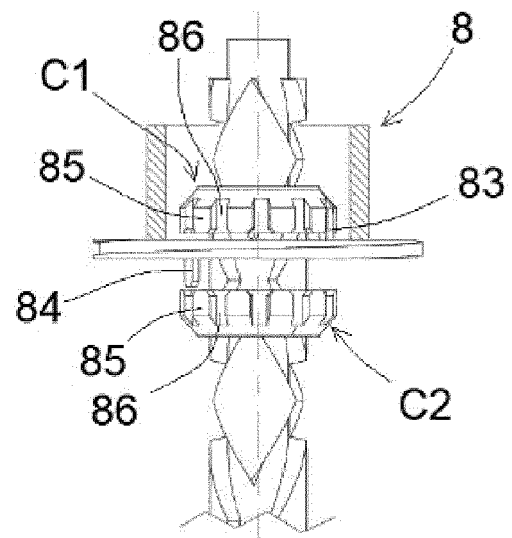


FIG. 9B

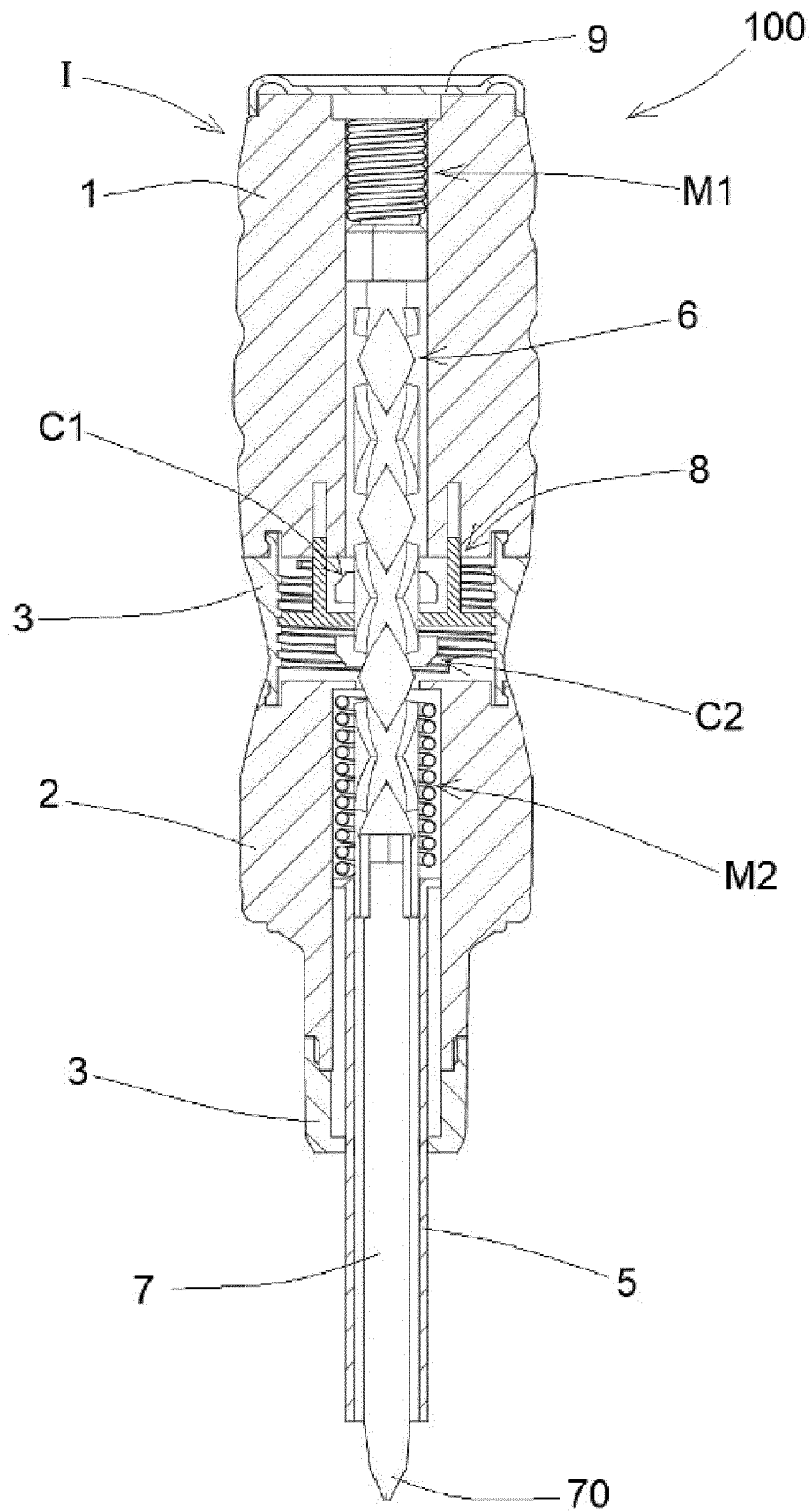


FIG. 10

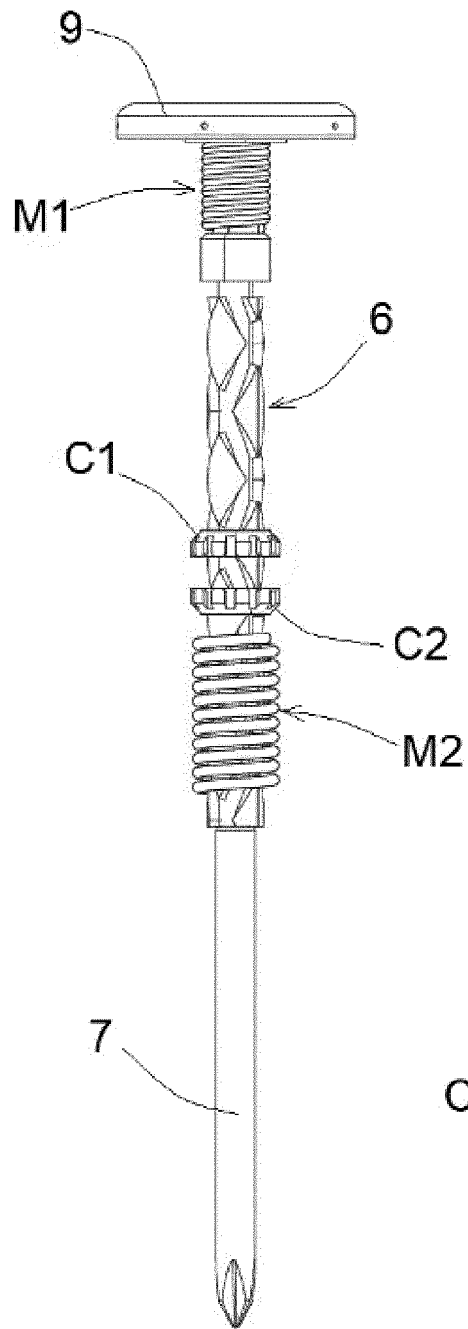


FIG. 11

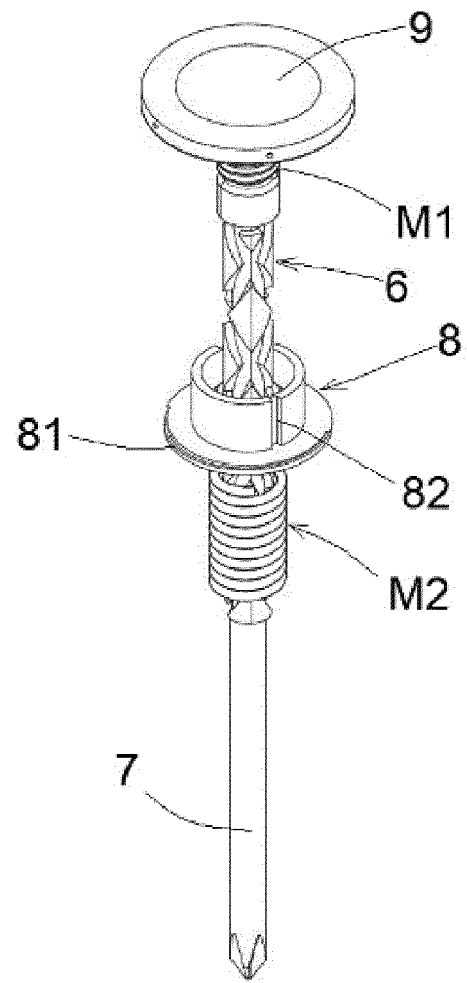


FIG. 12

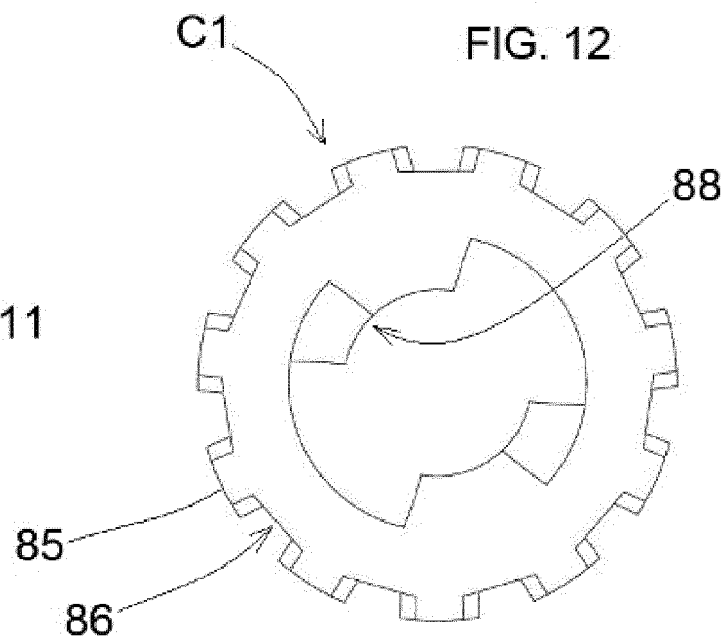


FIG. 13

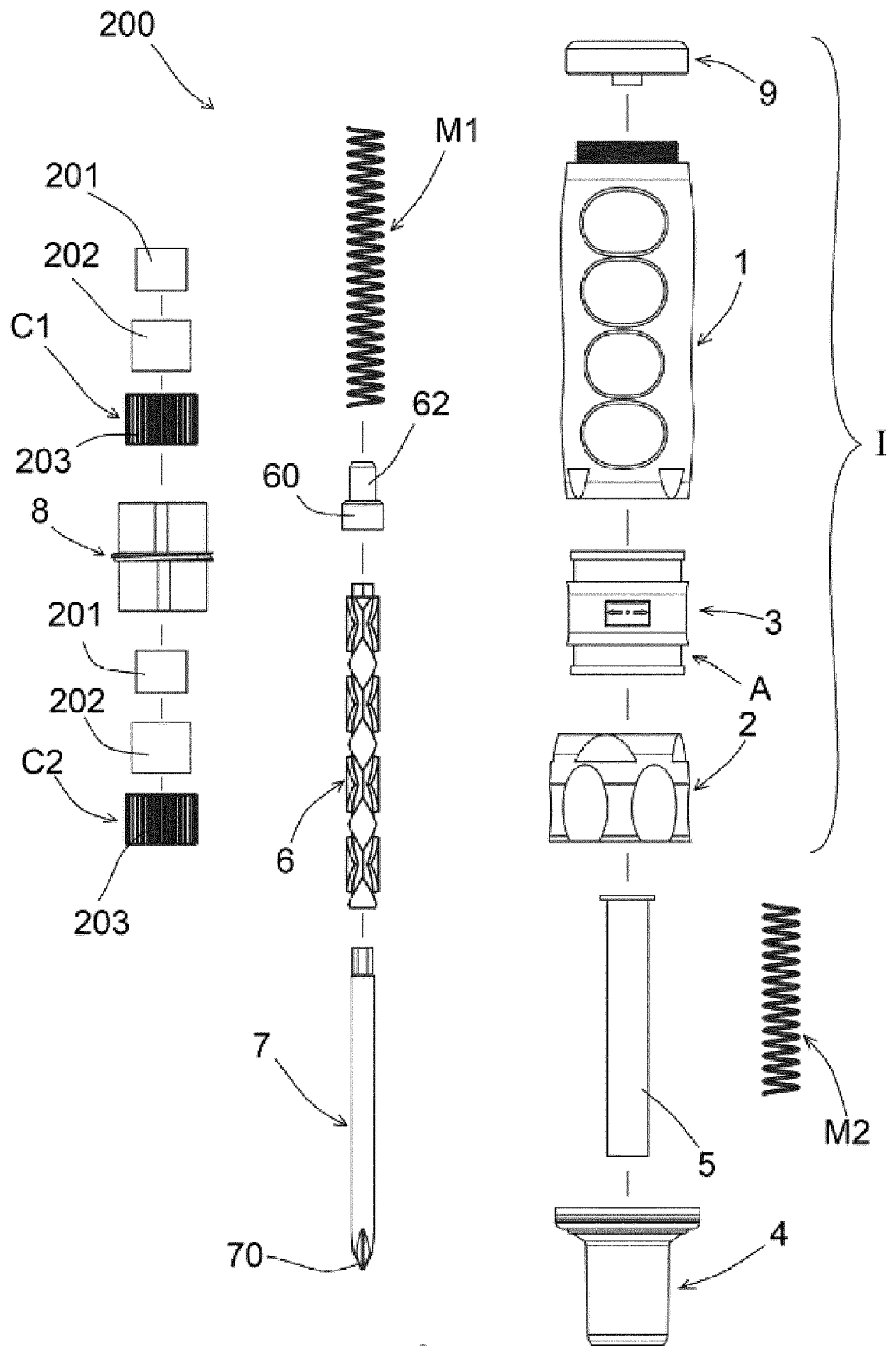


FIG. 14

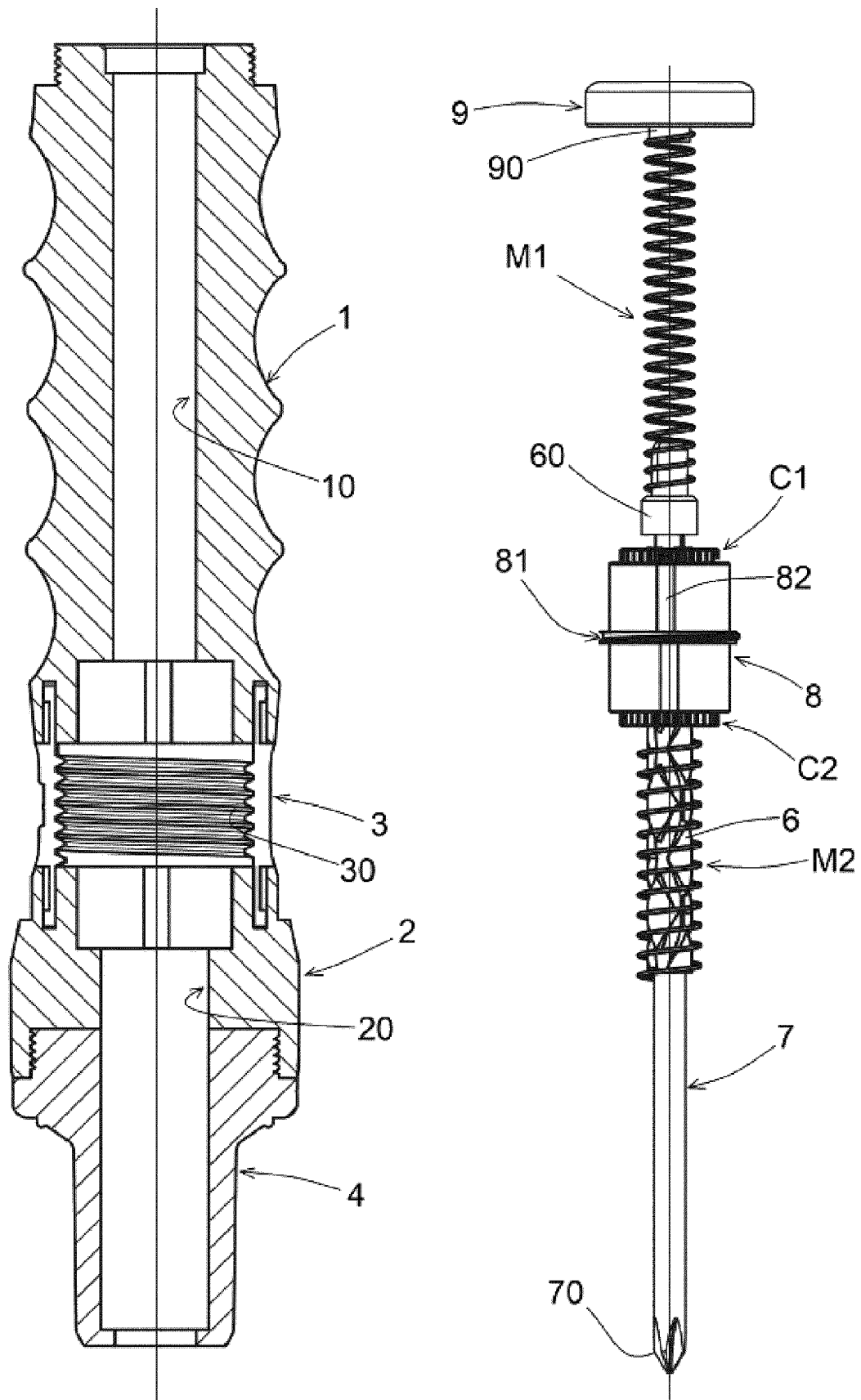
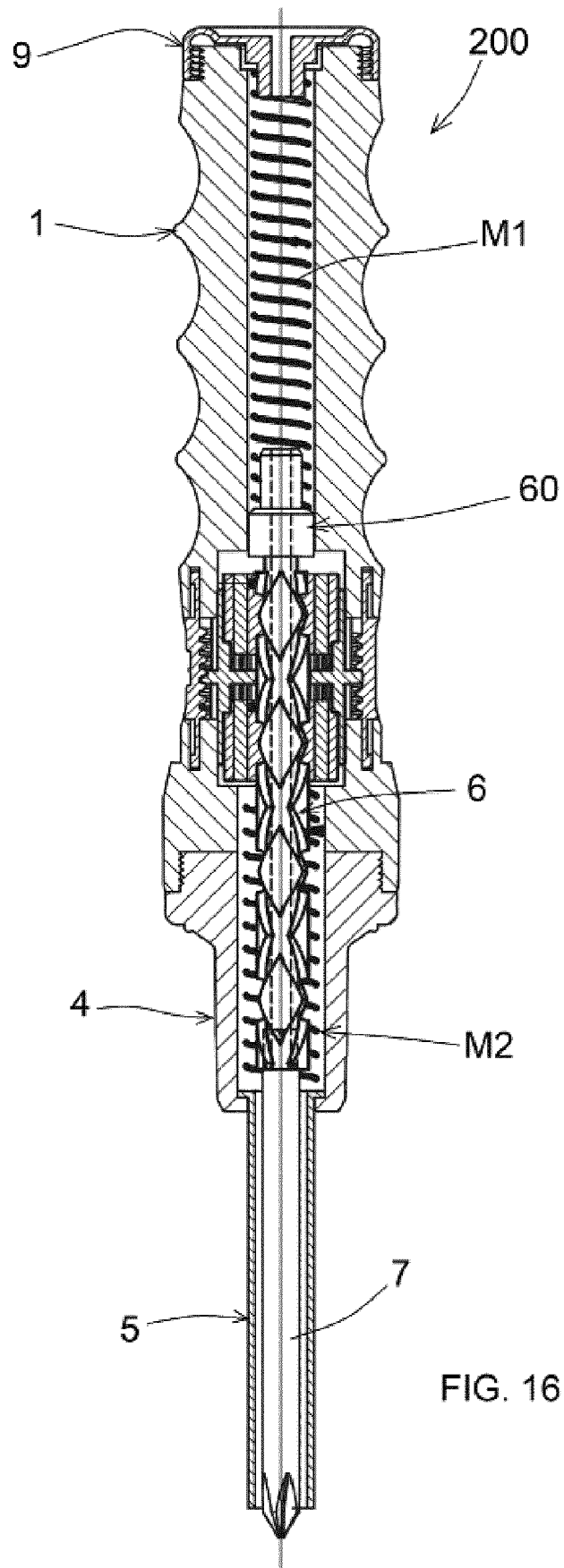


FIG. 15



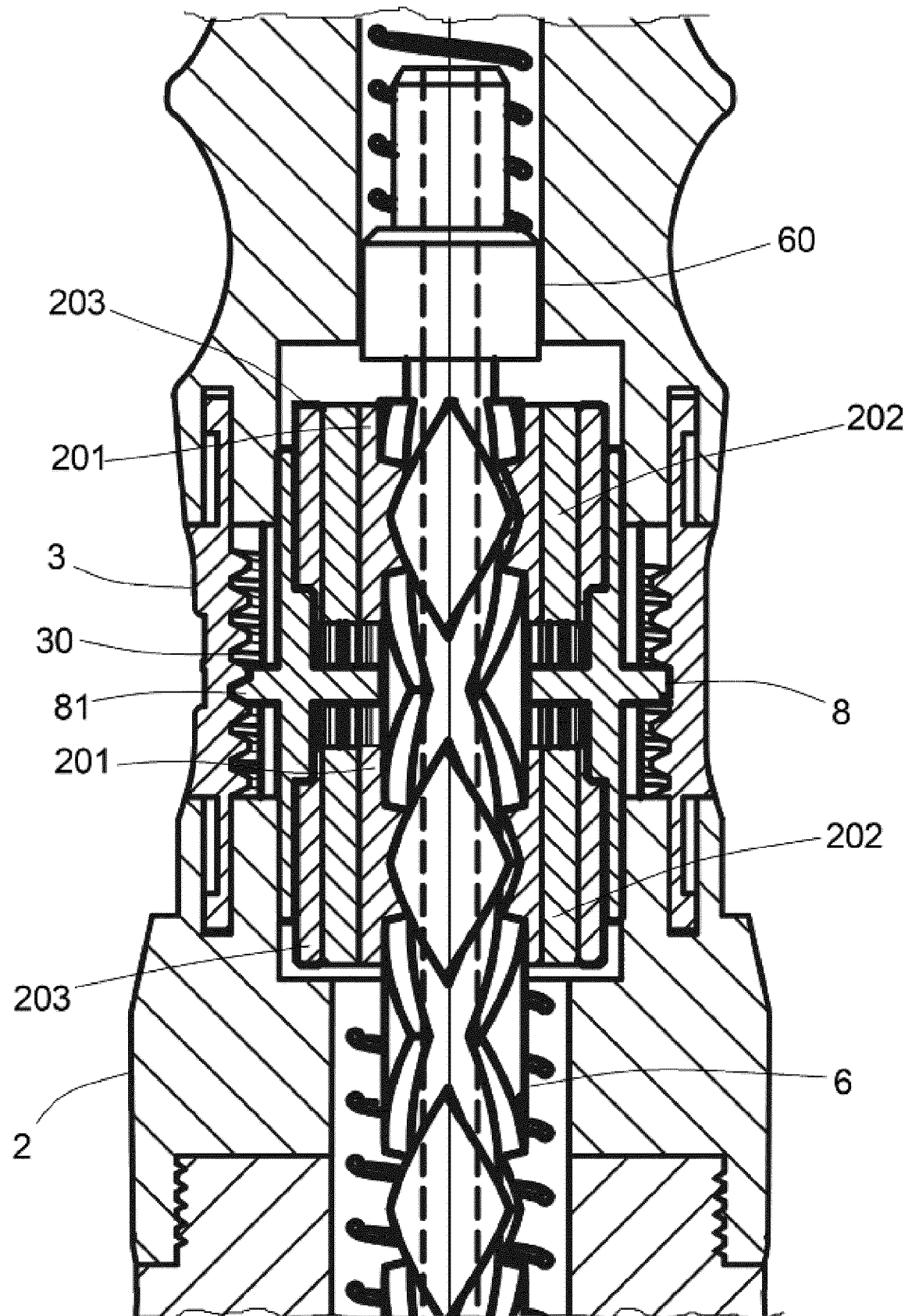
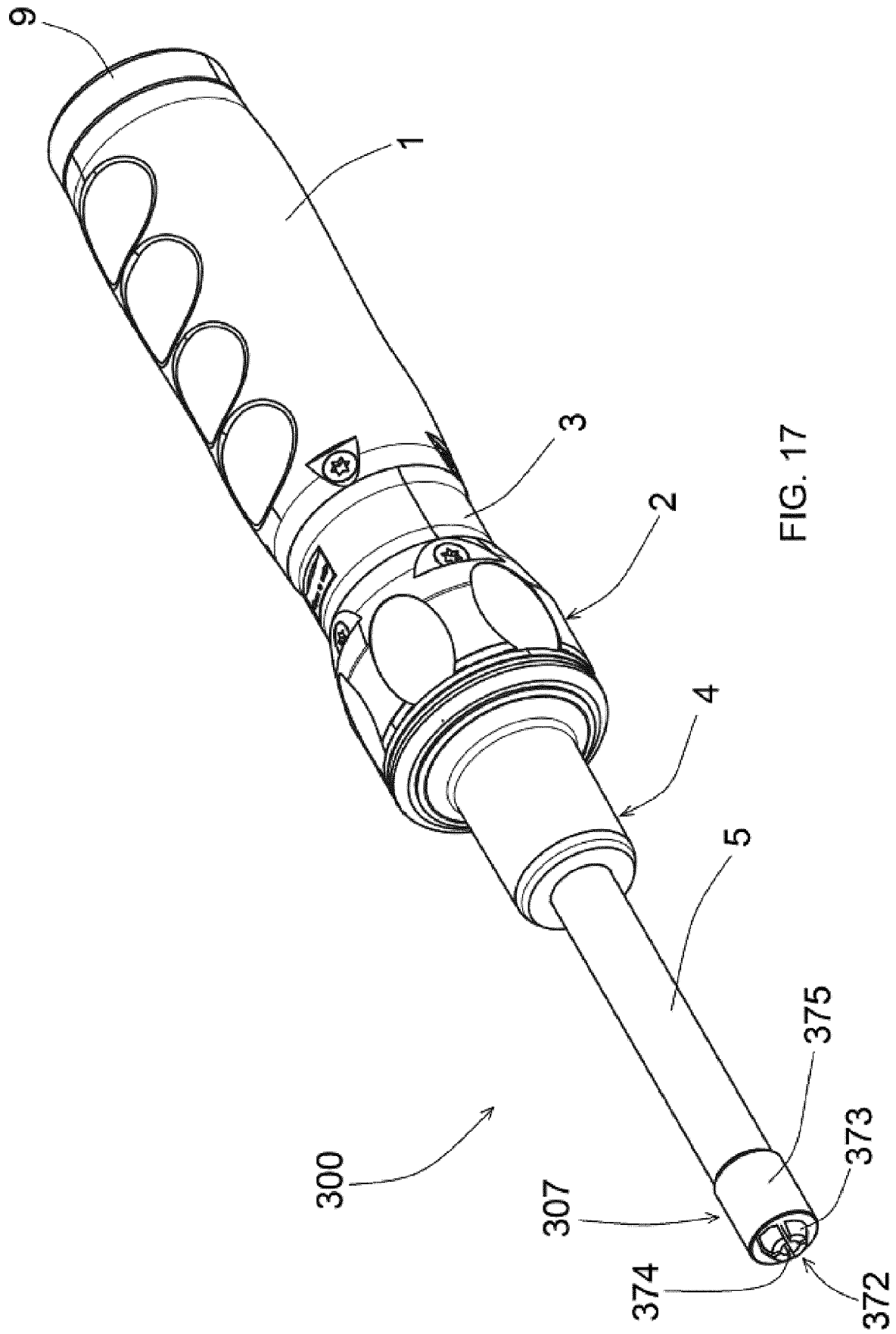


FIG. 16A



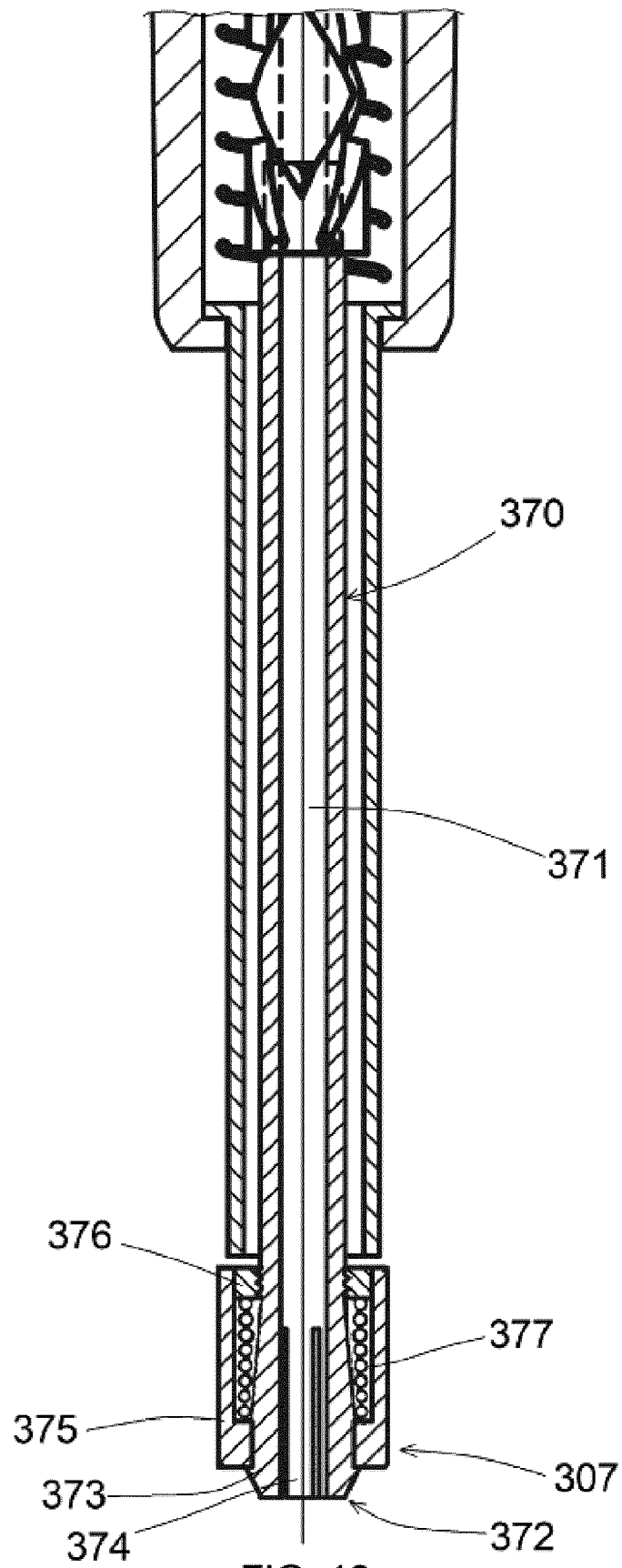


FIG. 18

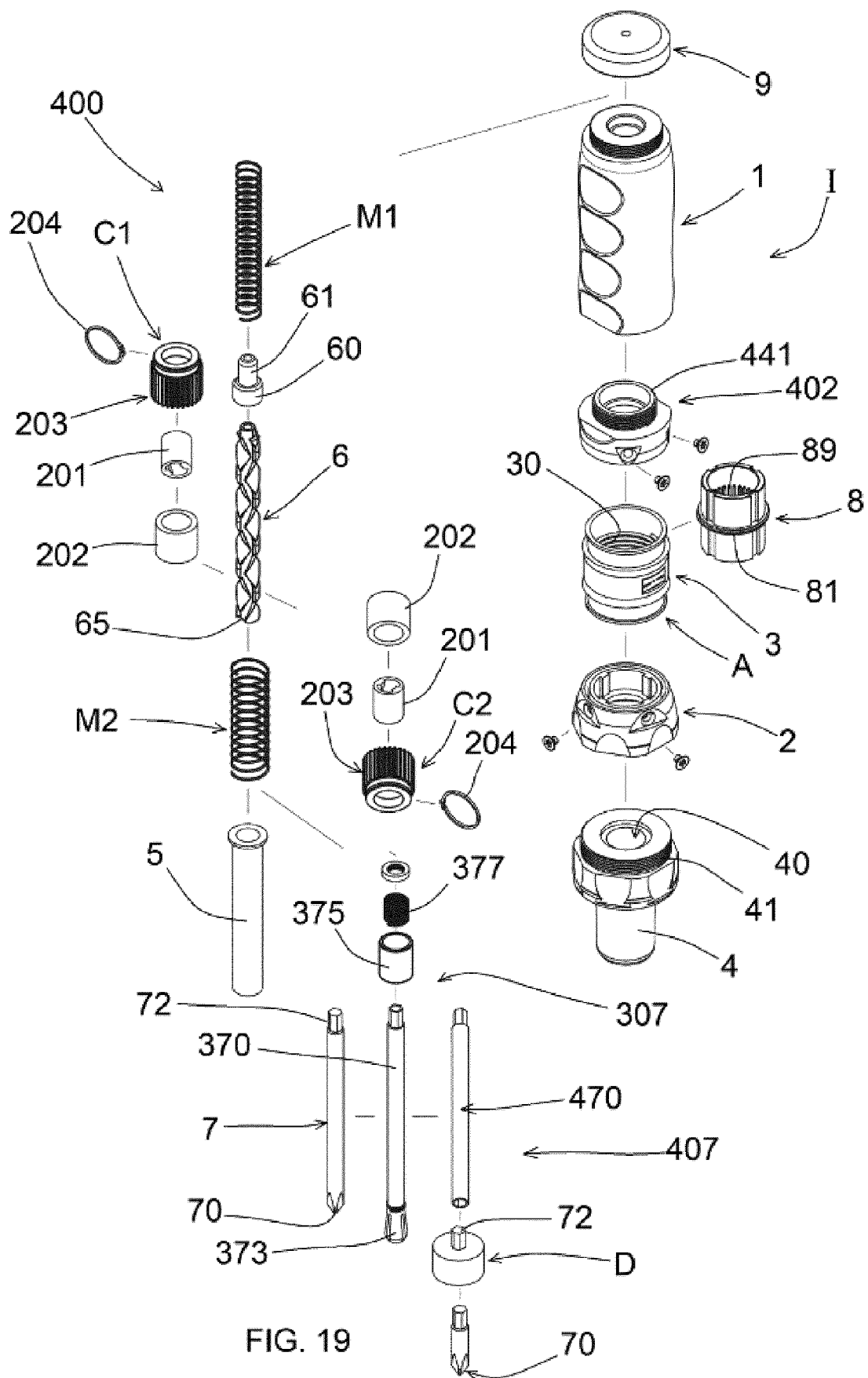


FIG. 19

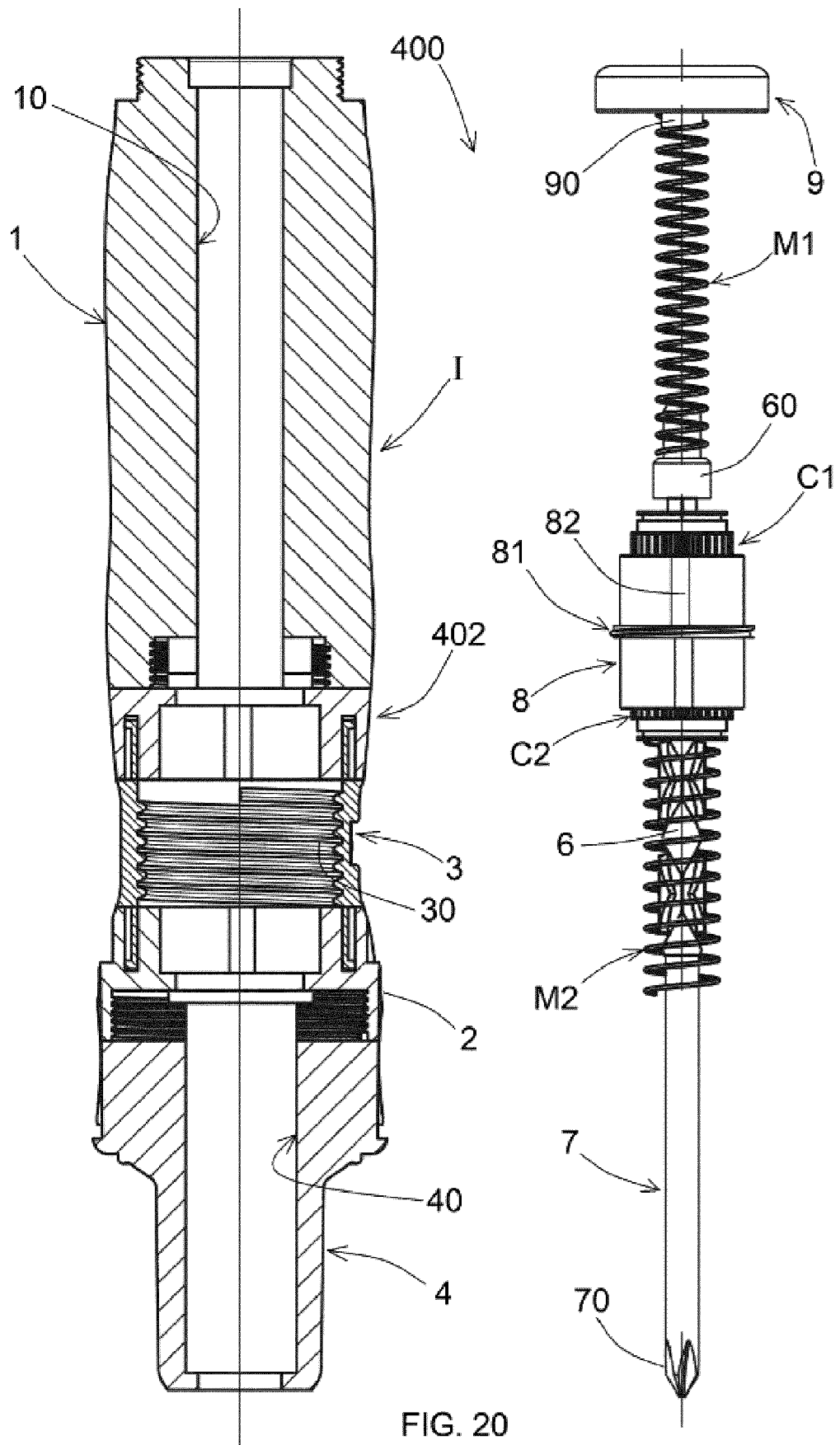


FIG. 20

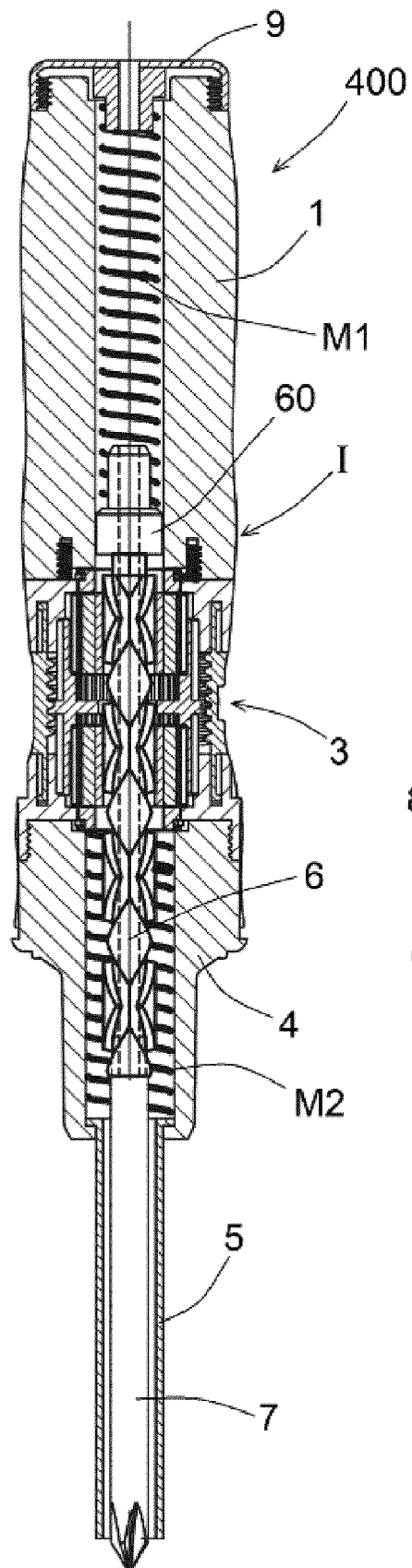


FIG. 21

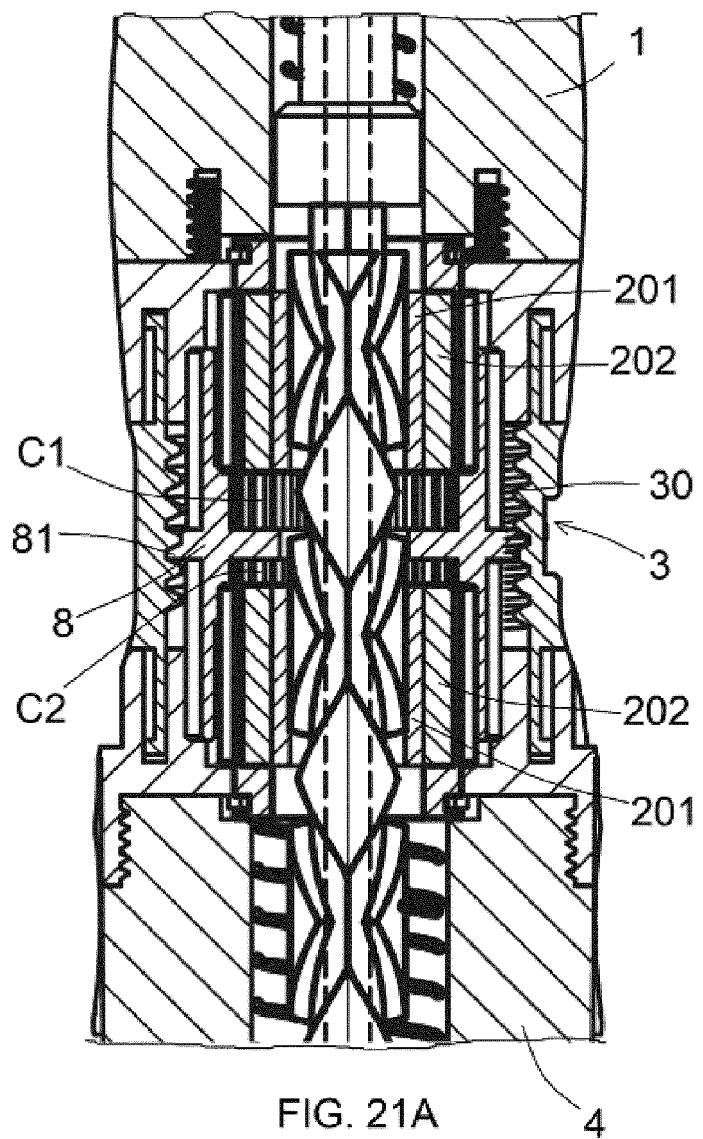


FIG. 21A

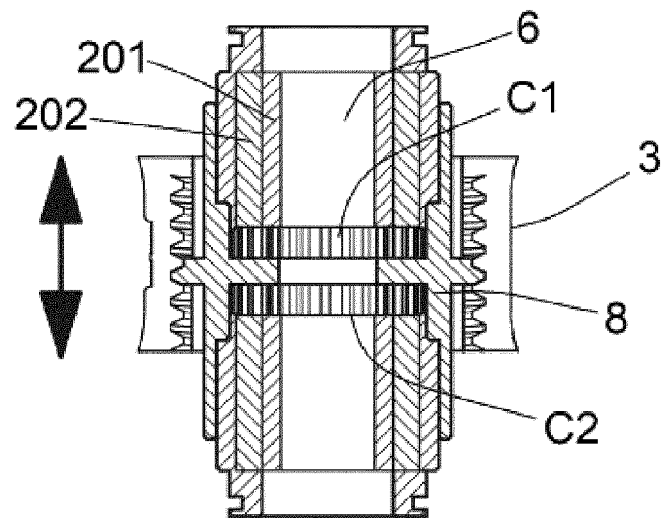


FIG. 22A

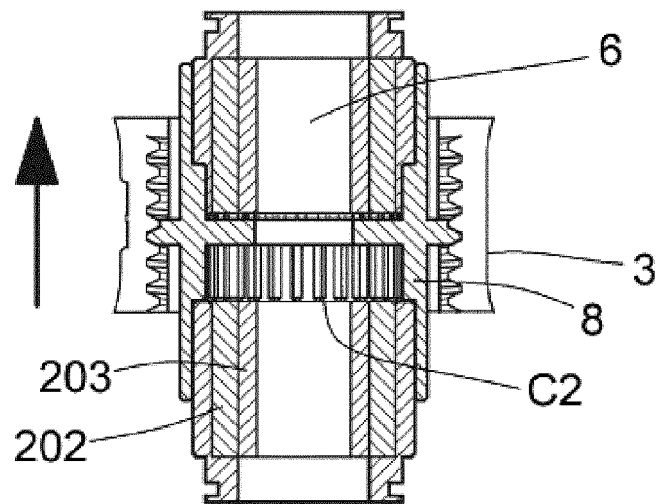


FIG. 22B

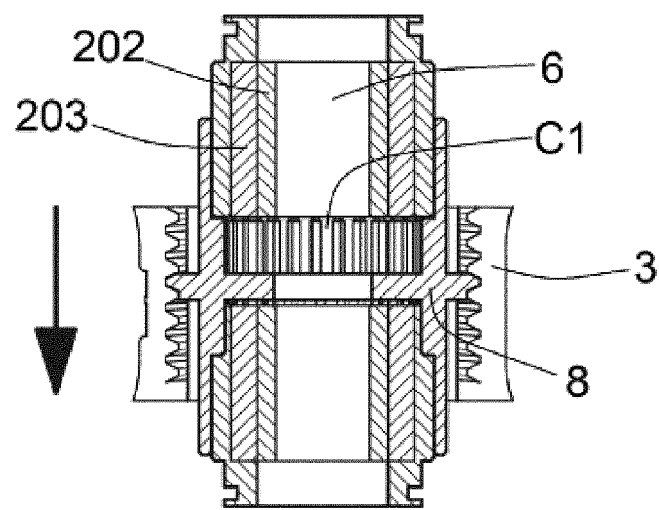


FIG. 22C



## EUROPEAN SEARCH REPORT

Application Number  
EP 20 15 1995

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| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                    |                                                 |                                         |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|-----------------------------------------|
| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Citation of document with indication, where appropriate, of relevant passages                                                      | Relevant to claim                               | CLASSIFICATION OF THE APPLICATION (IPC) |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | US 1 304 714 A (Z.T.FURBISH)<br>27 May 1919 (1919-05-27)<br>* page 2, line 5 - page 3, line 44;<br>figures 1,2,6,7,8 *             | 1-13                                            | INV.<br>B25B15/06                       |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | US 791 766 A (FURBISH ZACHRY T [US])<br>6 June 1905 (1905-06-06)<br>* page 1, line 26 - page 2, line 80;<br>figures 2,3,6 *        | 1-13                                            |                                         |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | US 2 646 687 A (DE WALD WILLIAM E)<br>28 July 1953 (1953-07-28)<br>* column 3, line 62 - column 7, line 30;<br>figures 1,2,11-15 * | 1-13                                            |                                         |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | US 2 188 158 A (ROCK GEORGE L)<br>23 January 1940 (1940-01-23)<br>* page 2, line 47 - page 4, line 58;<br>figures 2,4,6 *          | 1-13                                            |                                         |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | US 1 061 773 A (NAHLINGER JOHN [US])<br>13 May 1913 (1913-05-13)<br>* page 1, line 17 - page 2, line 36;<br>figures 1-7 *          | 1-13                                            | TECHNICAL FIELDS<br>SEARCHED (IPC)      |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | US 796 416 A (EAGER FRANK L [US])<br>8 August 1905 (1905-08-08)<br>* abstract; figures 1-4 *                                       | 1-13                                            | B25B                                    |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                    |                                                 |                                         |
| Place of search<br>The Hague                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                    | Date of completion of the search<br>11 May 2020 | Examiner<br>Pastramas, Nikolaos         |
| CATEGORY OF CITED DOCUMENTS<br>X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document<br>T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>& : member of the same patent family, corresponding document |                                                                                                                                    |                                                 |                                         |

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EPO FORM 1503 03/82 (P04C01)

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ON EUROPEAN PATENT APPLICATION NO.**

EP 20 15 1995

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
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11-05-2020

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|-------------------------------------------|---------------------|----------------------------|---------------------|
| US 1304714                                | A                   | 27-05-1919                 | NONE                |
| US 791766                                 | A                   | 06-06-1905                 | NONE                |
| US 2646687                                | A                   | 28-07-1953                 | NONE                |
| US 2188158                                | A                   | 23-01-1940                 | NONE                |
| US 1061773                                | A                   | 13-05-1913                 | NONE                |
| US 796416                                 | A                   | 08-08-1905                 | NONE                |

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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**Patent documents cited in the description**

- US 1304714 A [0007]