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(54) **POWER TOOL, AND ASSEMBLY OF SUCH A POWER TOOL AND AN ACCESSORY**

(57) The present invention relates to a power tool (1), comprising:
- a drive (2); and
- a first drive shaft (3) that is connected to said drive (2), and having a first engagement (4) that is configured to engage a first type of accessory (5);
- a second drive shaft (6) that is connected to said drive (2), and having a second engagement (7) that is configured to engage a second type of accessory (8); and
- wherein the drive (2) is configured to drive the first drive shaft (3) and the second drive shaft (6) simultaneously.

The invention further relates to an assembly of such a power tool and an accessory.

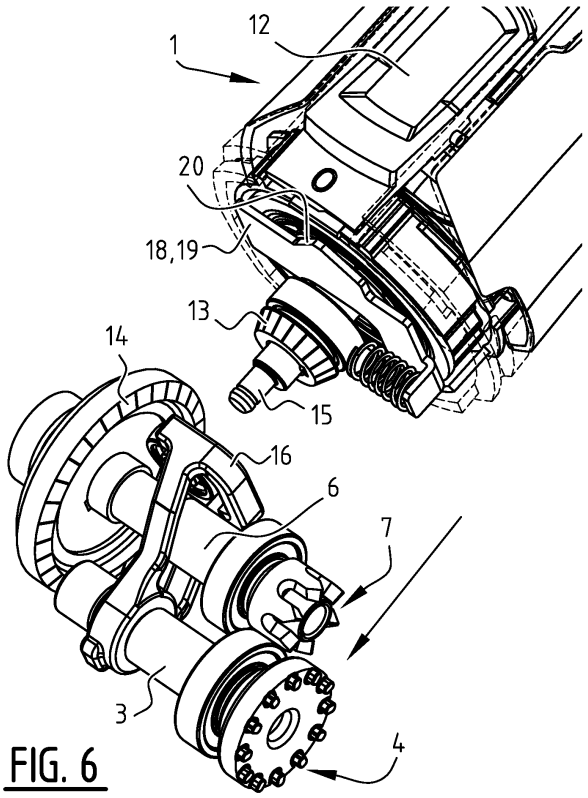

FIG. 6

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Description

[0001] The present invention relates to a power tool, and to an assembly of a power tool and an accessory.

[0002] Power tools are often designed for one specific type of use. Whereas professional users posses tools dedicated for each purpose, this is often not the case for do-it-yourself (DIY) workers. Many DIY-workers would prefer to have a power tool capable of being adapted for multiple purposes.

[0003] The United Kingdom patent application GB 2 396 127 is considered the closest prior art. The United States patent US 4 818 916 and the German patent application DE 10 2812 221877 are acknowledged as further prior art.

[0004] One disadvantage GB 2 396 127 and US 4 818 916 have in common, is that also the drive shaft that is not in use remains exposed. A user may come into contact with such a driven drive shaft, and get hurt or even injured.

[0005] An object of the present invention is to provide a power tool, that is improved relative to the prior art and wherein at least one of the above stated problems is obviated.

[0006] Said object is achieved with the power tool according to the present invention, comprising:

- a drive; and
- a first drive shaft that is connected to said drive, and having a first engagement that is configured to engage a first type of accessory;
- a second drive shaft that is connected to said drive, and having a second engagement that is configured to engage a second type of accessory; and
- wherein the drive is configured to drive the first drive shaft and the second drive shaft simultaneously.

[0007] During use, the drive drives both the first drive shaft and the second drive shaft simultaneously. A user may couple a desired type of accessory that is configured to be used for a dedicated purpose. In this way, a power tool is provided that is capable of being adapted for multiple purposes.

[0008] For example, the first drive shaft may be an oscillating drive shaft, and the first type of accessory may be a unit that is configured to drive an oscillating tool. The second drive shaft may be a rotating drive shaft, and the second type of accessory may be a unit that is configured to drive a rotating tool, e.g. a circular saw blade.

[0009] According to a preferred embodiment, the first drive shaft and the second drive shaft extend in the same direction relative to the drive. This allows an accessory that is coupled to one of the first drive shaft or the second drive shaft to shield the other of the first or the second drive shaft.

[0010] According to a preferred embodiment, said power tool further comprises a trigger that is configured to switch said drive on and off, wherein the trigger comprises:

- a lock-on state in an engaged state of the first type of accessory; and
- a momentary state in an engaged state of the second type of accessory.

[0011] In the context of this invention, a momentary state is a state wherein the power tool is automatically turned "off' when the trigger is released. For certain types of power tools and certain types of use, there is a risk associated with a continued running after a release of the trigger. A trigger that comprises a lock-on state is to be interpreted as a trigger that can be locked in an "on"-state.

[0012] Contrary to an oscillating multi tool saw blade, e.g. a circular saw is regarded as a tool with a relatively high risk associated with continued locked-on operation. By applying a momentary state when high risk tools are coupled to the power tool, it is guaranteed that the trigger does not stay 'on' by itself, but it must be actively hold in an on-position by a user.

[0013] Further preferred embodiments are the subject of the dependent claims.

[0014] In the following description preferred embodiments of the present invention are further elucidated with reference to the drawing, in which:

Figure 1 is a perspective view of a power tool according to the invention;
Figure 2 is a detailed perspective view of the first drive shaft;
Figure 3 is the power tool of Figure 1 with a first type of accessory;
Figure 4 is the power tool of Figure 1 with a second type of accessory;
Figure 5 in a perspective view of the drive shafts of the power tool of Figure 1;
Figure 6 is a partially exploded perspective view of Figure 5;
Figure 7 shows the tool of Figure 5 before attachment of the second type of accessory;
Figures 8 and 9 show the tool of Figure 5 after attachment of the second type of accessory;
Figure 10 shows a tool conform Figure 9; and
Figures 11A-11C show different states of the trigger.

[0015] A power tool 1 according to an embodiment of the invention, comprises a drive 2 and a first drive shaft 3 that is connected to said drive 2, and that has a first engagement 4 that is configured to engage a first type of accessory 5. The power tool 1 further comprises a second drive shaft 6 that is connected to said drive 2, and that has a second engagement 7 that is configured to engage a second type of accessory 8. The drive 2 is configured to drive the first drive shaft 3 and the second drive shaft 6 simultaneously.

[0016] A user may couple a desired type of accessory

5, 8 that is configured to be used for a dedicated purpose. In this way, the power tool 1 is capable of being adapted for multiple purposes.

[0017] In the embodiment shown, the first drive shaft 3 is an oscillating drive shaft, and the first type of accessory 5 is a unit 9 that is configured to drive an oscillating tool 10. The second drive shaft 6 is a rotating drive shaft, and the second type of accessory 8 is a unit 11 that is configured to drive a rotating tool 17, e.g. a circular saw blade. As shown in figure 5, a set of conical gears 13, 14 is used to drive the second drive shaft 6, i.e. the rotating drive shaft. The partially exploded Figure 6 shows an eccentric shaft 15 that engages an arm 16 that is fixed to the first drive shaft 3, i.e. the oscillating drive shaft.

[0018] The power tool 1 further comprises a trigger 12 that is configured to switch said drive 2 on and off. The trigger 12 comprises a lock-on state or position (Figure 11C) in an engaged state of the first type of accessory 5, and a momentary state or position (Figure 11B) in an engaged state of the second type of accessory 8. In this way, only the first type of accessory 5 may be locked in an "on"-state during use. The second type of accessory 8 is embodied in the Figures as a rotating tool 17 in the form of a circular saw blade. Such a circular saw blade is a tool with a relatively high risk associated with continued locked-on operation. According to the invention, the high risk circular saw blade must be actively held in an "on"-position by the user for activation thereof. As a result, the power tool 1 is capable of being adapted for multiple purposes, and also provides the comfort of a locked-on operation where appropriate on the one hand, whereas safety is safeguarded for other situations on the other hand.

[0019] In Figure 7, the unit 11 of the second type of accessory 8 accommodates a rotating tool 17 in the form of a circular saw blade. The unit 11 may further comprise a transmission 18 configured to drive said tool 17. The transmission 18 may comprise a gear ratio, such that the rotations per minute of said tool 17 are decreased or increased relative to the rotations per minute of the second drive shaft 6. The gear ratio may differ between different accessories 8.

[0020] Although not shown, the first type of accessory 5 may also comprise a transmission with a gear ratio, allowing the oscillations per minute to be changed relative to the oscillations per minute of the first drive shaft 3. Again, the gear ratio may differ between different accessories 5.

[0021] The second type of accessory 8 is configured to cover the first drive shaft 3 when it is engaged to the second drive shaft 6 (see Figures 8 and 9). Likewise, not shown, the first type of accessory 5 may be configured to cover the second drive shaft 6 when it is engaged to the first drive shaft 3, and/or the second drive shaft 6 may be arranged in a countersunk manner, thereby shielding it from exposure.

[0022] In the shown embodiment, the trigger 12 is a sliding trigger, and the second type of accessory 8 activates a barrier 18 that is configured to prevent the sliding trigger 12 from locking in an on-position when said second type of accessory 8 is engaged to the second drive shaft 6 (Figure 11B).

[0023] The barrier 18 is movable via said second type of accessory 8 and is pre-tensioned when said second type of accessory 8 is engaged to the second drive shaft 6. When the second type of accessory 8 is disengaged from the second drive shaft 6 and taken apart from the power tool 1, the pre-tensioning moves the barrier 18 relative to the trigger 12. The trigger 12 may now be moved again into a locked-on position (Figure 11C).

[0024] The barrier 18 is a moveable element 19, such as a plate 19 that comprises a guide 20 in the form of a chamfer 20. Said guide 20 is configured to engage said trigger 12 (Figures 8-10 and 11B). If the trigger 12 would accidentally be in a locked-on position when the second type of accessory 8 is brought into engagement with the second drive shaft 6, the guide will force the trigger 12 to an off-position. Alternatively, instead of a barrier, a (not shown) activating member may enable a locked position of the trigger 12, so that - e.g. in an oscillating tool mode - the power tool 1 may be held in an on-state.

[0025] The trigger 12 is connected to an arm 21 with a flange 22 that is configured to engage a micro switch 23. The micro switch 23 is connected to a controller 24, which also controls the drive 2.

[0026] The above described embodiment is intended only to illustrate the invention and not to limit in any way the scope of the invention.

[0027] In the example embodiment, the second type of accessory 8 that is associated with the rotating second drive shaft 6 is a high risk tool 17 such as a circular saw blade. However, not all types of rotating tools impose such a high risk. For example, a grinder may only require a restart protection that guarantees that the power tool is always "off' when the power tool is connected to a power supply, such as a wall socket. This can be obtained using a momentary switch. A sander may however be lockable in an "on" position during use. Such low risk rotating tools may be provided as a (not shown) third type of accessory that is configured to engage the rotating second drive shaft 6, but will not evoke the momentary state. The third type of accessory will not activate a barrier that is configured to prevent the pressure trigger or any part of a trigger construction from locking in an on-state when said third type of accessory is engaged to the second drive shaft.

[0028] It should be understood that where features mentioned in the appended claims are followed by reference signs, such signs are included solely for the purpose of enhancing the intelligibility of the claims and are in no way limiting on the scope of the claims. The scope of the invention is defined solely by the following claims.

Claims

1. Power tool, comprising:

   - a drive; and
   - a first drive shaft that is connected to said drive, and having a first engagement that is configured to engage a first type of accessory;
   - a second drive shaft that is connected to said drive, and having a second engagement that is configured to engage a second type of accessory; and
   - wherein the drive is configured to drive the first drive shaft and the second drive shaft simultaneously.

2. Power tool according to claim 1, wherein the first drive shaft is an oscillating drive shaft.

3. Power tool according to claim 1 or 2, wherein the first drive shaft and the second drive shaft extend in the same direction relative to the drive.

4. Power tool according to any of the foregoing claims, wherein the second drive shaft is a rotating drive shaft.

5. Power tool according to any of the foregoing claims, further comprising a trigger that is configured to switch said drive on and off, wherein the trigger comprises:

   - a lock-on state in an engaged state of the first type of accessory; and
   - a momentary state in an engaged state of the second type of accessory.

6. Assembly of a power tool according to any claims 1-5 and at least an accessory that is configured to drive a tool.

7. Assembly according to claim 6, wherein the accessory further comprises a transmission configured to drive said tool.

8. Assembly according to claim 6 or 7, wherein the accessory is of the first type, and wherein the accessory of the first type is a unit that is configured to drive an oscillating tool.

9. Assembly according to claim 2 and 8, wherein the oscillating tool is directly coupleable to the oscillating drive shaft.

10. Assembly according to claim 8 or 9, wherein the first type of accessory is configured to cover the second drive shaft when it is engaged to the first drive shaft.

11. Assembly according to claim 6 or 7, wherein the accessory is of the second type, and wherein the second type of accessory is a unit that is configured to drive a rotating tool.

12. Assembly according to claim 11, wherein the second type of accessory is configured to cover the first drive shaft when it is engaged to the second drive shaft.

13. Assembly according to claim 11 or 12 , wherein the second type of accessory activates a barrier that is configured to prevent the trigger or any part of a trigger construction from locking in an on-state when said second type of accessory is engaged to the second drive shaft.

14. Power tool according to claim 13, wherein the barrier is movable via said second type of accessory and pre-tensioned when said second type of accessory is engaged to the second drive shaft.

15. Power tool according to claim 13 or 14, wherein the barrier is a moveable element that comprises a guide that is configured to engage the trigger or the trigger construction to activate the momentary state.

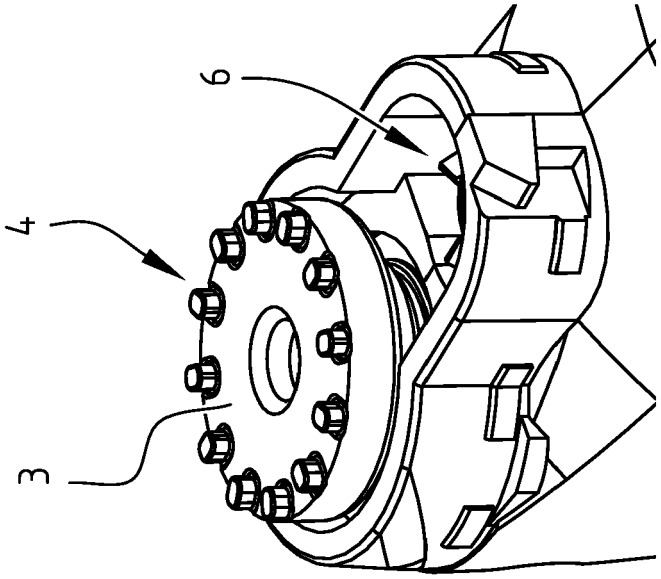

FIG. 2

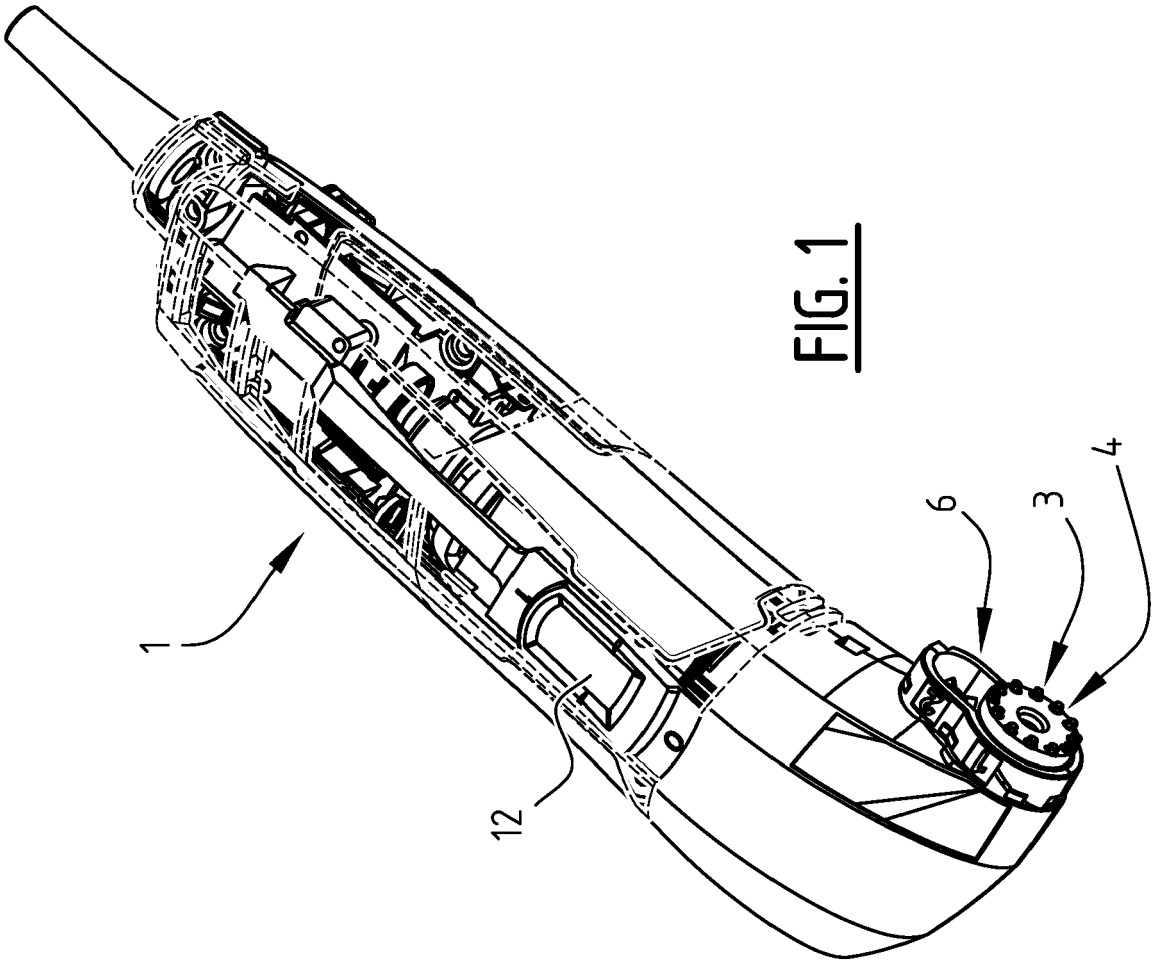

FIG. 1

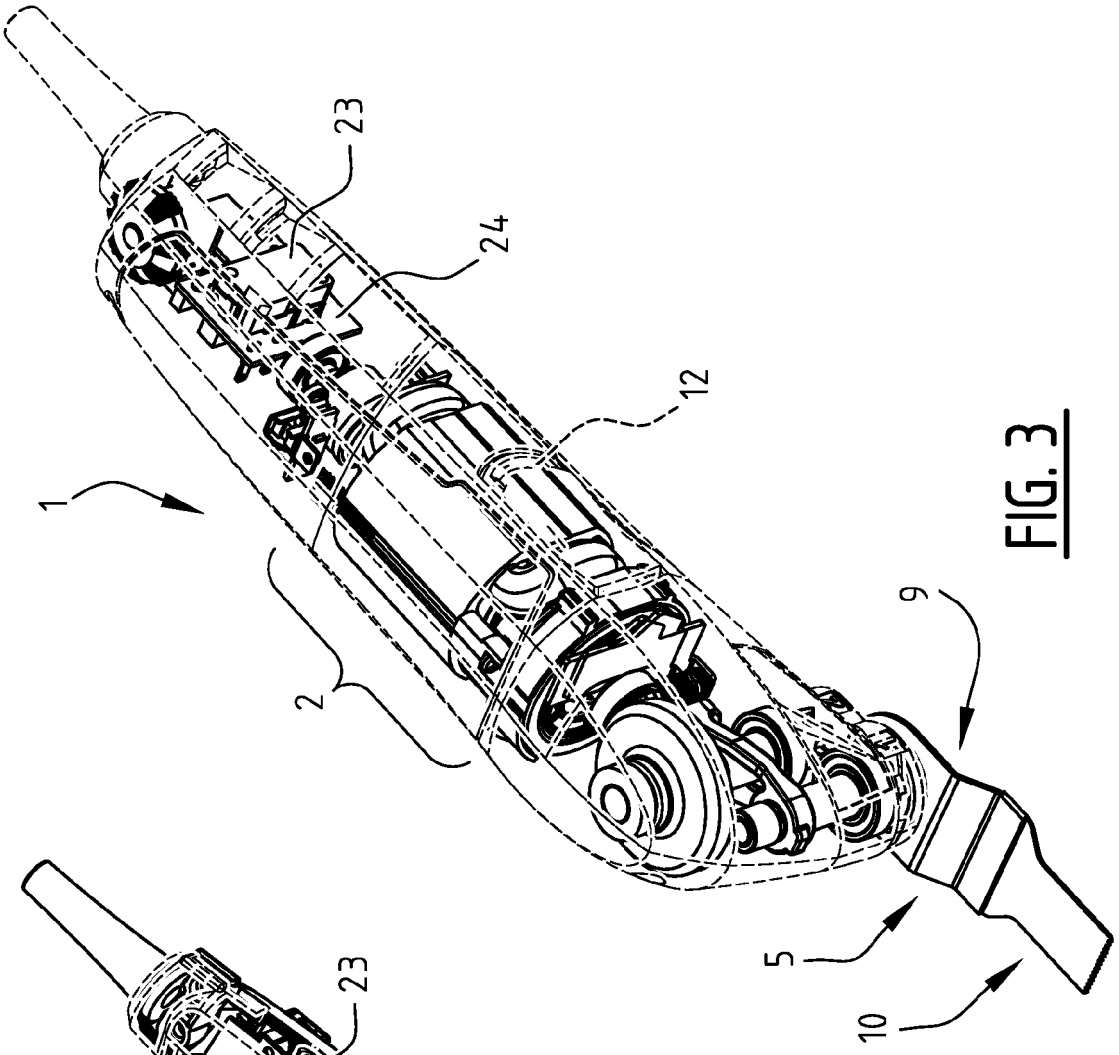

FIG. 3

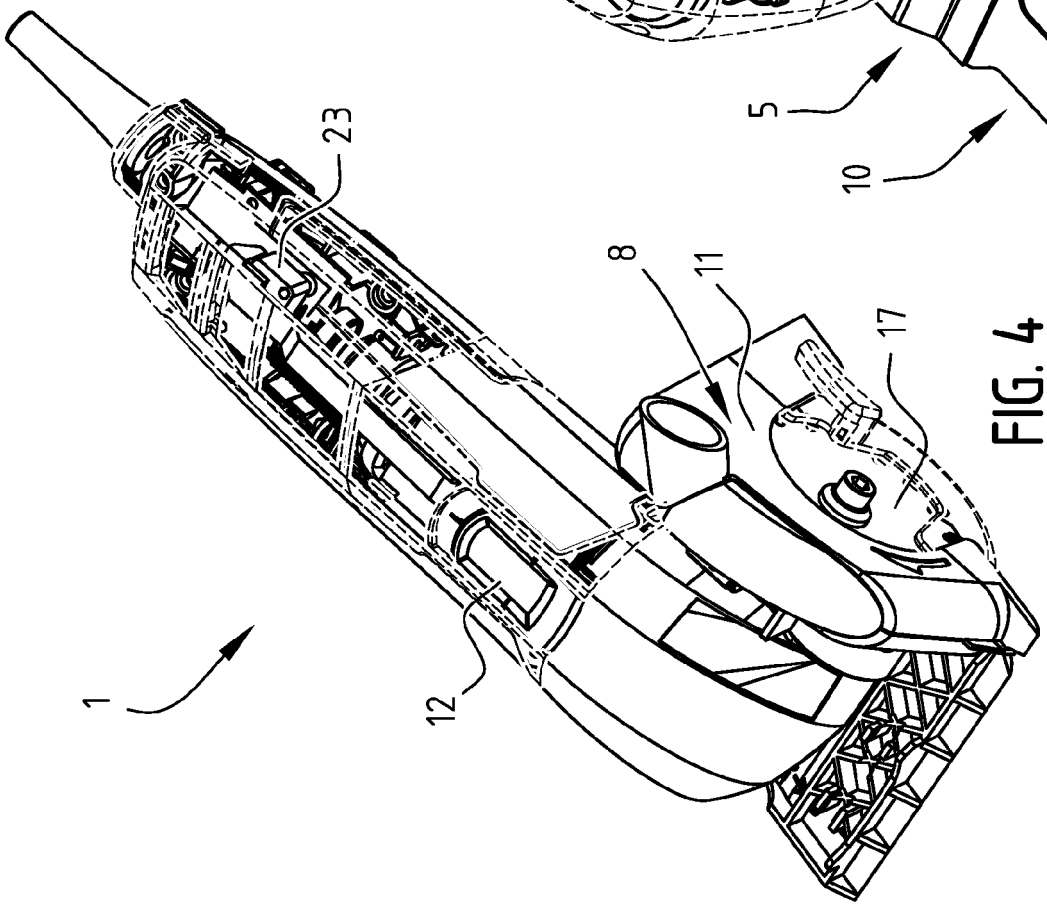

FIG. 4

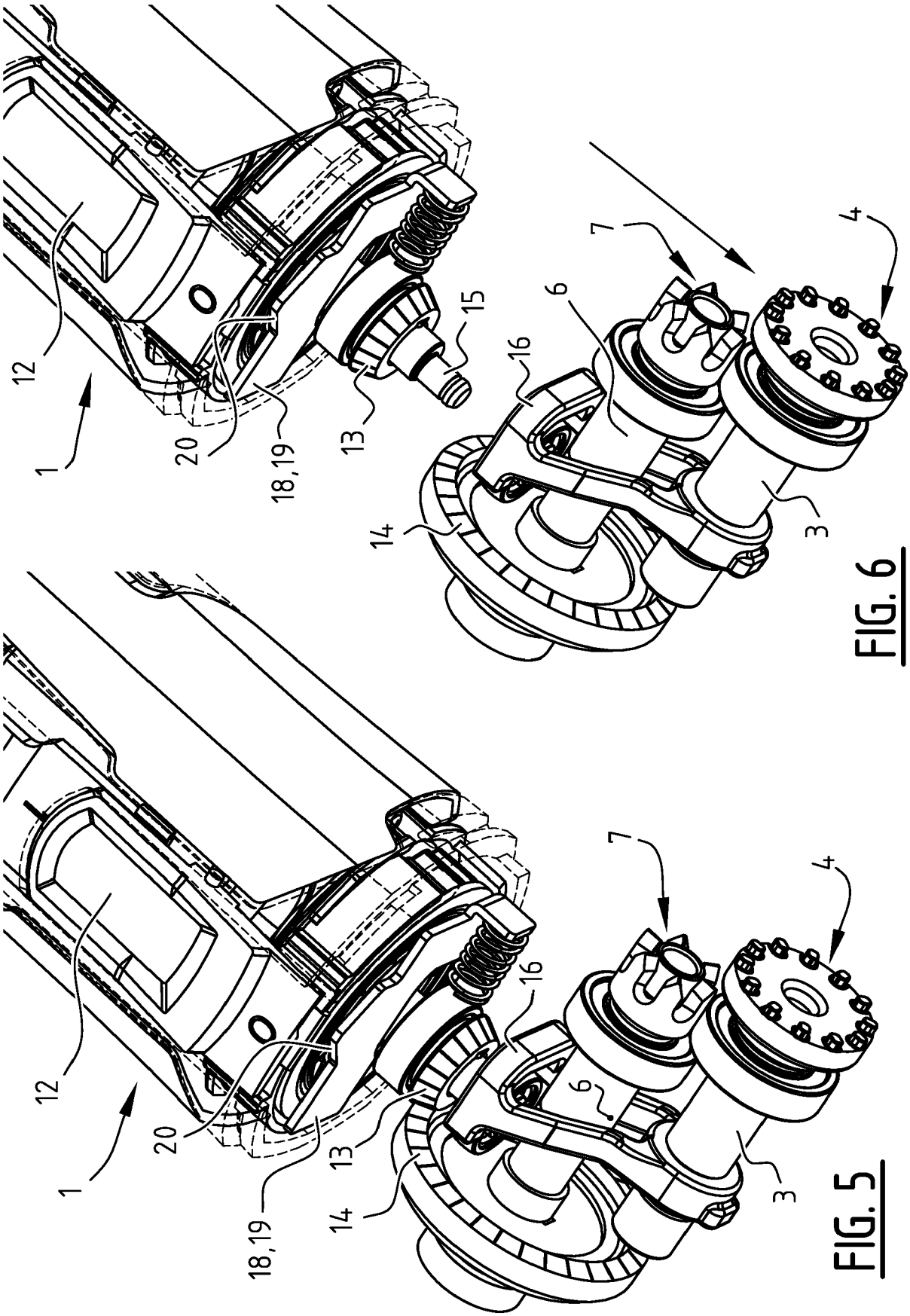

FIG. 6

FIG. 5

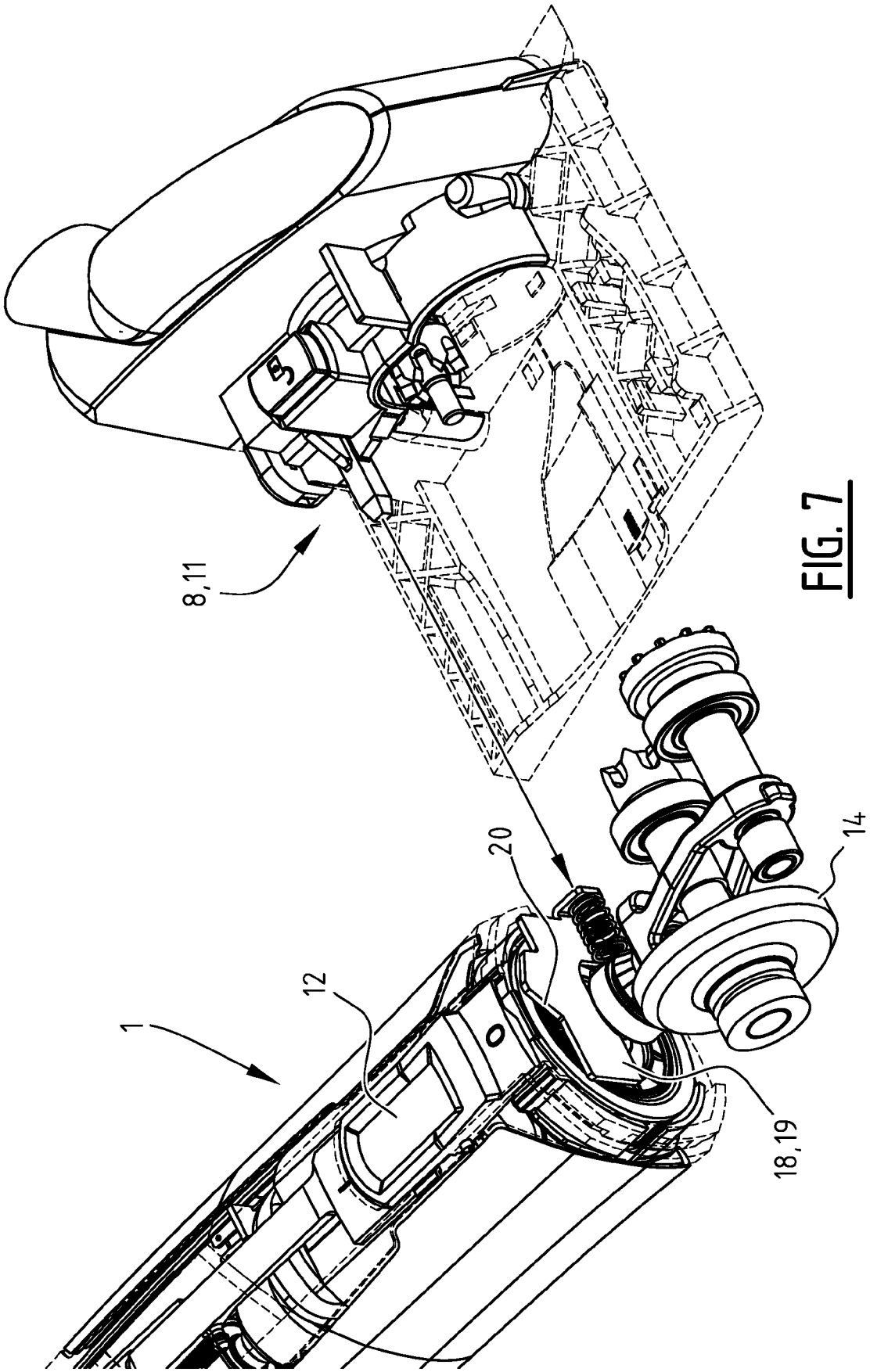

FIG. 7

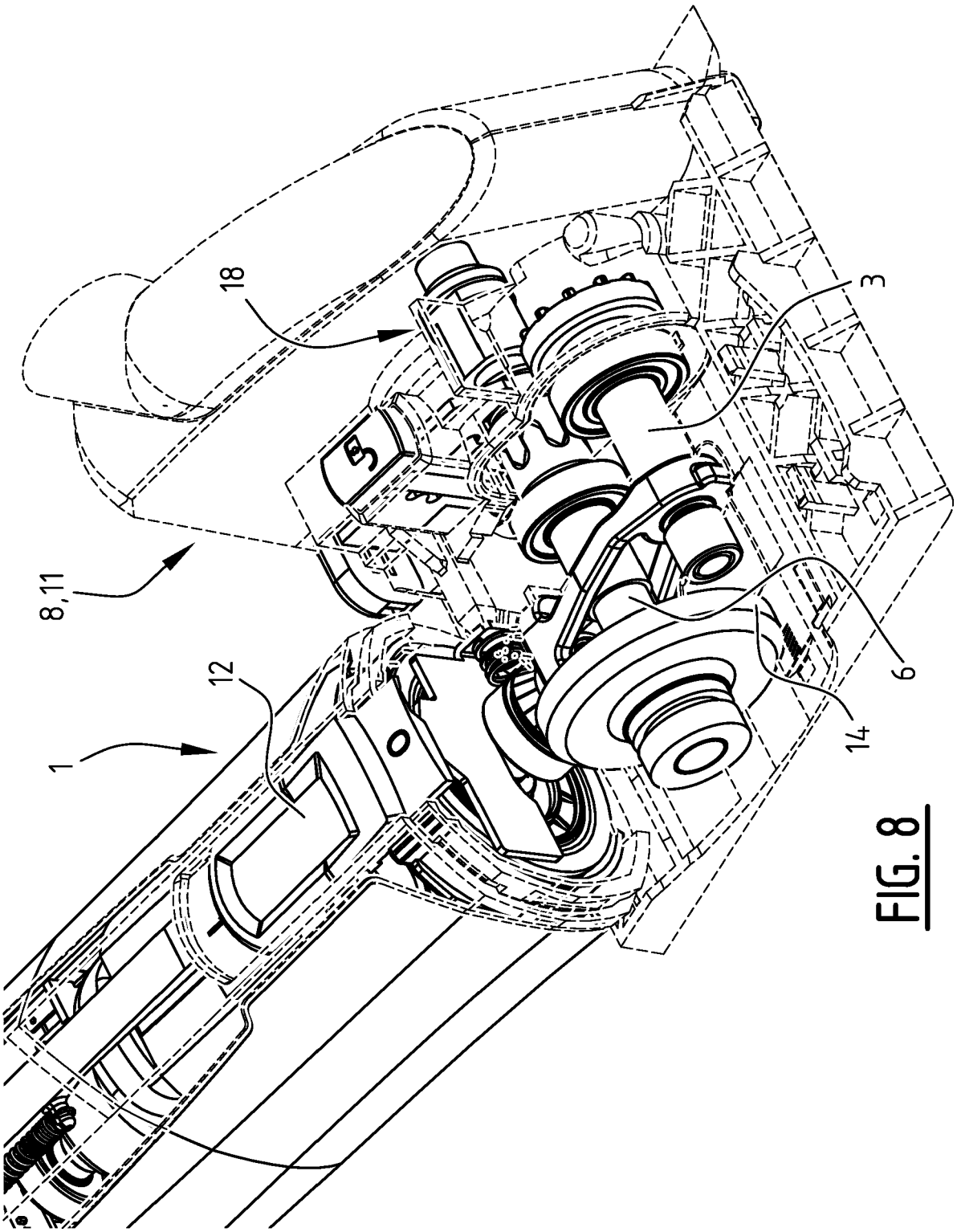

FIG. 8

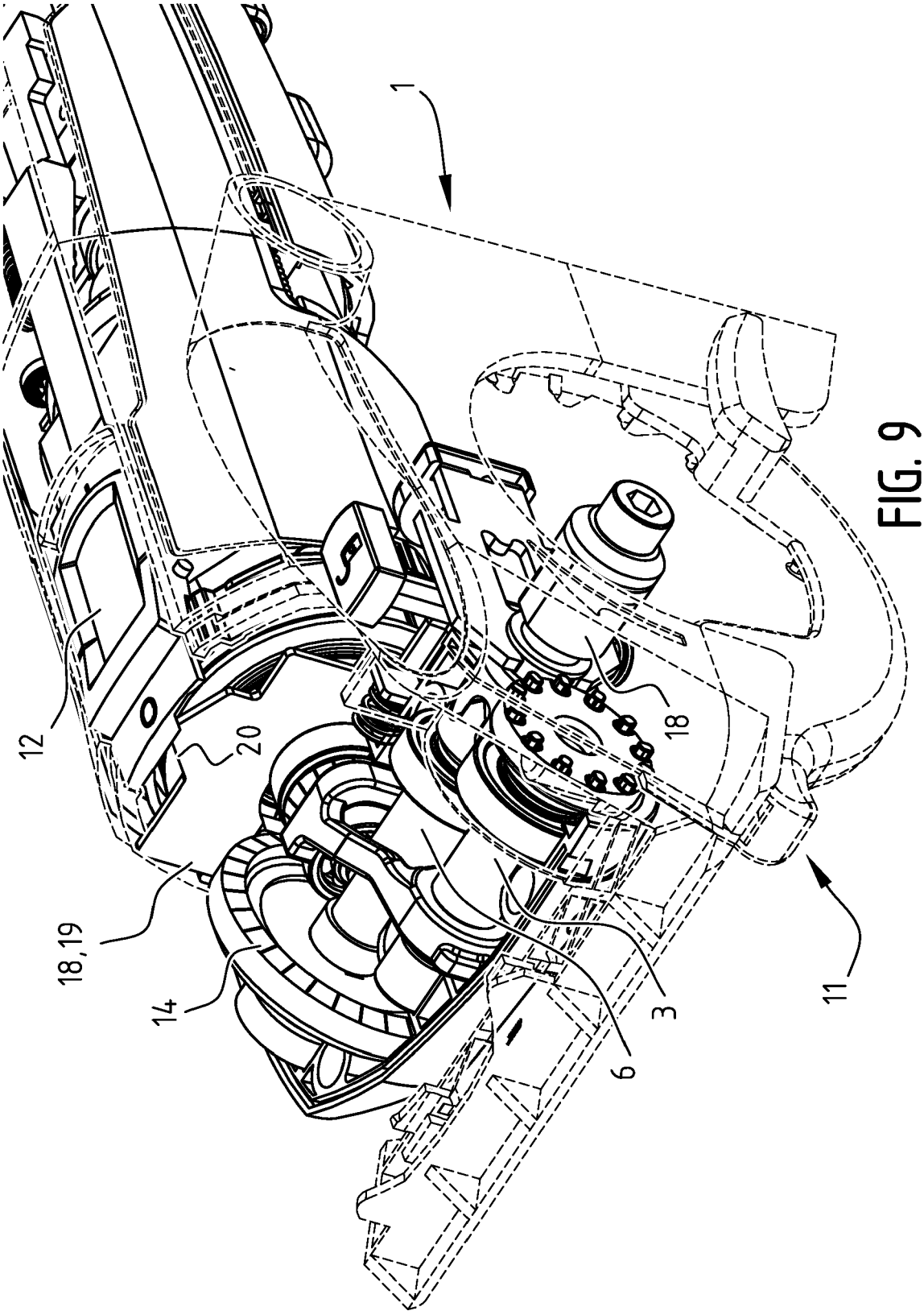

FIG. 9

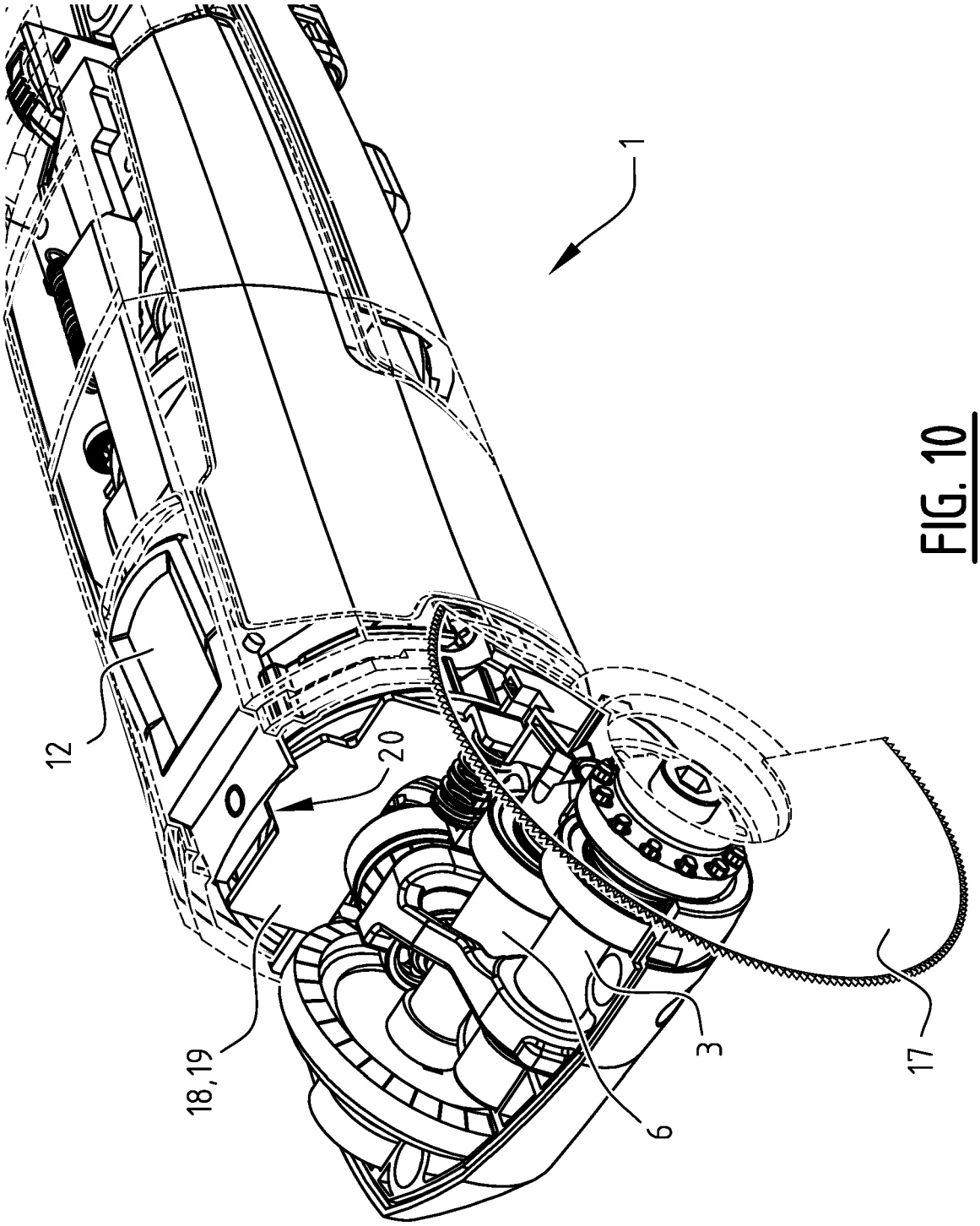

FIG. 10

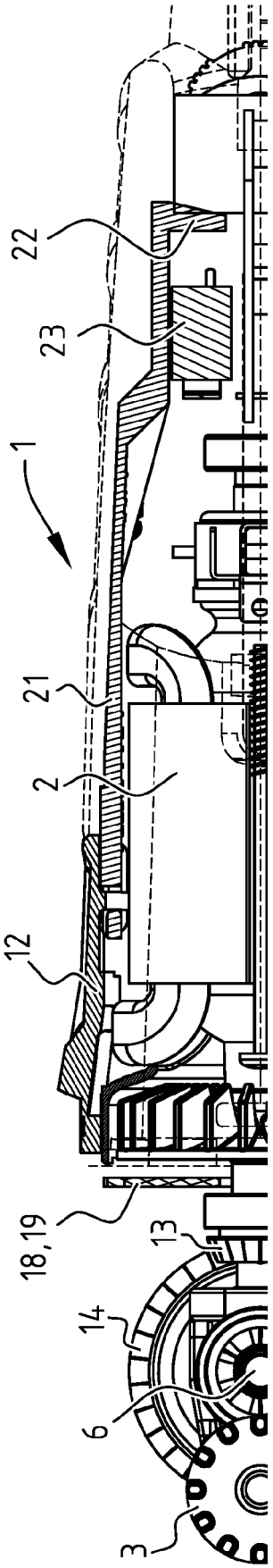

FIG. 11A

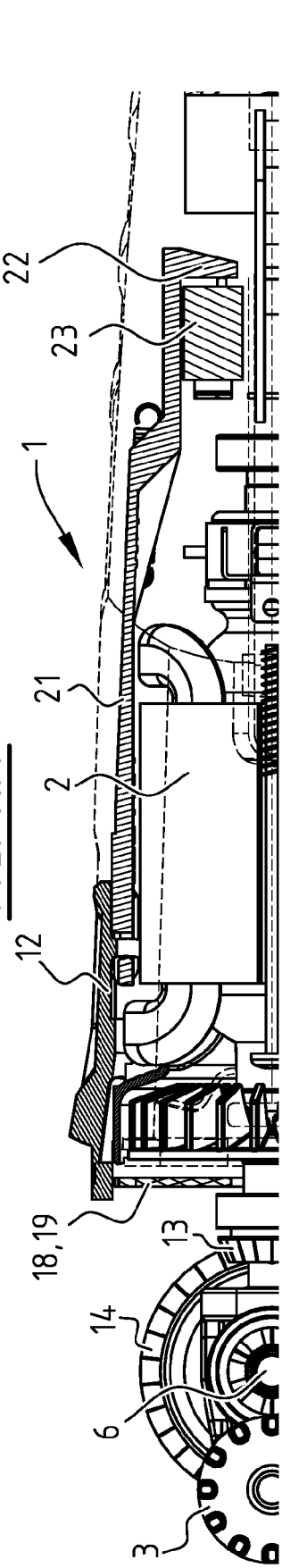

FIG. 11B

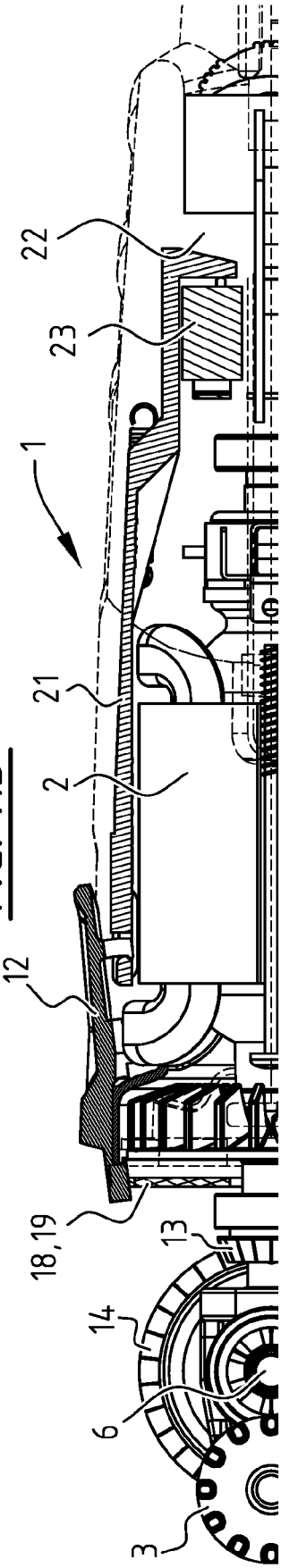

FIG. 11C

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EUROPEAN SEARCH REPORT

Application Number
EP 18 16 9042

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 4 810 916 A (MCBRIDE SCOTT [US]) 7 March 1989 (1989-03-07) * column 1, line 5 - line 7 * * column 2, line 8 - column 4, line 2 * * figures *	1,2,4,6, 7	INV. B25F3/00
X	DE 10 2012 221077 A1 (BOSCH GMBH ROBERT [DE]) 22 May 2014 (2014-05-22) * paragraph [0001] * * paragraph [0029] - paragraph [0057] * * claim 1 * * figures *	1,3,4	
X	GB 2 396 127 A (BLACK & DECKER INC [US]) 16 June 2004 (2004-06-16) * page 1, line 1 - line 10 * * page 3, line 25 - page 6, line 7 * * claims 1, 2 * * figures *	1,4	
A	EP 2 639 015 A2 (BLACK & DECKER INC [US]) 18 September 2013 (2013-09-18) * paragraph [0029] - paragraph [0044] * * figures *	1-15	TECHNICAL FIELDS SEARCHED (IPC) B25F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	25 September 2018	van Woerden, N

CATEGORY OF CITED DOCUMENTS

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25-09-2018

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REFERENCES CITED IN THE DESCRIPTION

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- US 4818916 A **[0003] [0004]**
- DE 102812221877 **[0003]**