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Hand-held Shears for Gardening and Method Related to Hand-held Shears

TECHNICAL FIELD

- 5 The disclosure relates to a hand-held shears for gardening purposes, and to a method of operating a hand-held shears for gardening purposes.

BACKGROUND

- 10 Battery powered hand-held shears for gardening purposes are known. One type of such shearers may be utilised for cutting grass applying one set of cutting blades, and utilised for cutting branches, such as e.g. in a shrub, applying a different set of cutting blades. That is, two sets of cutting blades are interchangeably connectable to a housing of the hand-held shears.

- 15 The battery of the hand-held shears is rechargeable and provides electric energy to an electric motor arranged in a housing of the shears. The electric motor, in turn, drives the relevant set of cutting blades connected to the housing.

- 20 The operating time of battery power hand-held shears is of concern. Thus, friction forces between individual cutting blades of a set of cutting blades for such shears have been reduced, e.g. by applying a layer of PTFE, or oiled black oxide, on surfaces of the individual cutting blades. Also, any abutting pressure between the cutting blades of a set of cutting blades has been adapted to the relevant task of a particular set of cutting blades. That is, a comparatively high abutting pressure is used in a set of cutting blades for cutting grass, while
- 25 a relatively low abutting pressure, or no abutting pressure, is used in a set of cutting blades for cutting branches. Thus, at least when idling, i.e. when the cutting blades are not engaged cutting, less energy is consumed when the cutting blades for cutting branches are connected to the shears than when the cutting blades for cutting grass are connected to the shears.

30 SUMMARY

It is an object to provide a battery powered hand-held shears for gardening purposes wherein operating time is improved.

- 35 According to an aspect, the object is achieved by a hand-held shears for gardening purposes, comprising: a housing, an electric motor arranged inside the housing, a battery connectable to the electric motor, and a first set of cutting blades and/or a second set of

cutting blades. The first set of cutting blades and the second set of cutting blades are connectable one at a time to the housing to be driven by an output shaft of the electric motor. The hand-held shears are configured to provide a first maximum speed of a first blade of the first set of cutting blades, when the first set of cutting blades is connected to the output shaft, and to provide a second maximum speed of a first blade of the second set of cutting blades, when the second set of cutting blades is connected to the output shaft.

Since the hand-held shears are configured to provide a different maximum speed of a blade depending on which of the first and second sets of cutting blades are connected to the output shaft of the electric motor, the energy consumption of the electric motor from the battery will be adapted to the relevant set of cutting blades connected to the output shaft of the electric motor and thus, adapted to the relevant cutting task to be performed. Accordingly, only the necessary amount of electric energy for a particular cutting task will be drawn from the battery. As a result, the above mentioned object is achieved.

It is a further object, to provide a method of operating a battery powered hand-held shears for gardening purposes wherein operating time of the hand-held shears is improved.

According to a further aspect, there is provided a method of operating a hand-held shears for gardening purposes, the hand-held shears comprising a housing, an electric motor arranged inside the housing, a battery connectable to the electric motor, a first set of cutting blades, and a second set of cutting blades, wherein the first and second sets of cutting blades are connectable one at a time to the housing to be driven by an output shaft of the electric motor, and wherein the method comprises steps of:

- operating, at a first maximum speed, a first blade of the first set of cutting blades, when the first set of cutting blades is connected to the output shaft, and
- operating, at a second maximum speed, a first blade of the second set of cutting blades, when the second set of cutting blades is connected to the output shaft.

Since the method comprises steps of operating, at a first maximum speed, a first blade of the first set of cutting blades, when the first set of cutting blades is connected to the output shaft, and operating, at a second maximum speed, a first blade of the second set of cutting blades, when the second set of cutting blades is connected to the output shaft, the energy consumption of the electric motor from the battery will be adapted to the relevant set of cutting blades connected to the output shaft of the electric motor and thus, adapted to the relevant cutting task to be performed. Accordingly, only the necessary amount of electric

energy for a particular cutting task will be drawn from the battery. As a result, the above mentioned object is achieved.

It has been realised by the inventors, that linking a maximum speed of a blade of a set of cutting blades to a relevant set of cutting blades connected to the output shaft of the electric motor, provides for using only the necessary electric energy for performing a particular cutting task, for which the relevant set of cutting blades is devised. Thus, operating time of the battery of the hand-held shears may be enhanced, as compared to prior art hand-held shears, wherein one common maximum speed is used for all cutting tasks, the cutting task requiring the highest speed of one blade determining the common maximum speed.

The hand-held shears may be configured for a number of different cutting operations to be performed in a garden. Different sets of cutting blades may be used for different cutting operations. Each of the different sets of cutting blades may be devised for a particular cutting operation, such as e.g. cutting grass or cutting shrubs. A set of cutting blades may comprise two cutting blades arranged adjacent to each other. At the least one blade of the set of the cutting blades may be driven by the electric motor to perform e.g. a reciprocating motion. One or more linkage and/or gear arrangements may be arranged between the output shaft of the electric motor and the at least one driven blade of the set of cutting blades. Accordingly, the at least one driven blade of the set of cutting blades may be indirectly driven by the electric motor. When the at least one blade of the set of cutting blades is driven, the two cutting blades may perform a shearing motion. Each of the cutting blades of the set of cutting blades comprises at least one cutting edge. Each of the cutting blades of the set of cutting blades may comprise a number of cutting edges. The hand-held shears may be configured to be operated at a fixed first maximum speed or a fixed second maximum speed, depending on the set of cutting blades. Alternatively, the hand-held shears may be configured to be operated at one or more speeds up to a maximum speed corresponding to the first maximum speed or the second maximum speed, depending on the set of cutting blades. The first and second maximum speeds may be provided electronically or mechanically.

According to embodiments, the first set of cutting blades may be configured for grass cutting, and the second set of cutting blades may be configured for shrub cutting. In this manner, the first and second sets of cutting blades may be devised for two particular cutting tasks.

Moreover, as the grass cutting and shrub cutting require different kinds of cutting blades working under different operating conditions, it has been realised by the inventors that utilising the first maximum speed when cutting grass with the first set of cutting blades and

utilising the second maximum speed with the second set of cutting blades when cutting shrubs, may save electric energy. Namely, shrub cutting requires high kinetic energy from a rotor of the electric motor for the second set of cutting blades to cut branches of a shrub. With the comparatively compact and light electric motor of a hand-held tool, such high kinetic energy is provided by a high rotational speed of the electric motor. The inventors realised that using the electric motor at such a high rotational speed when cutting grass with the first set of cutting blades led to an excessive use of electric energy. Firstly, grass cutting does not require the same kinetic energy as shrub cutting. Secondly, in the first set of cutting blades configured for grass cutting, the blades are arranged to abut against each other. Thus, frictional forces affect the movement of the first blade of the first set of cutting blades. Accordingly, by using a lower first maximum speed for of the first blade of the first set of cutting blades, electric energy may be saved while still providing good grass cutting capability.

Further features of, and advantages with, the invention will become apparent when studying the appended claims and the following detailed description.

BRIEF DESCRIPTION OF THE DRAWINGS

Various aspects and/or embodiments of the invention, including its particular features and advantages, will be readily understood from the example embodiments discussed in the following detailed description and the accompanying drawings, in which:

Figs. 1a – 1d illustrate a hand-held shears according to embodiments,

Figs. 2a and 2b illustrate two cutting blades of a first set of cutting blades,

Figs. 3a and 3b illustrate two cutting blades of a second set of cutting blades,

Fig. 4a shows a hand-held shears with housing thereof opened up,

Fig. 4b shows a cross section through a hand-held shears,

Fig. 5 schematically illustrates embodiments of a control system of a hand-held shears, and

Fig. 6 illustrates a method of operating a hand-held shears for gardening purposes.

DETAILED DESCRIPTION

Aspects and/or embodiments of the invention will now be described more fully. Like numbers refer to like elements throughout. Well-known functions or constructions will not necessarily be described in detail for brevity and/or clarity.

Figs. 1a – 1d illustrate a hand-held shears 2 according to embodiments. The hand-held shears 2 are configured for gardening purposes. The hand-held shears 2 are battery powered.

The hand-held shears 2 comprise a housing 4, and a first set of cutting blades 6 (as shown in **Figs. 1a and 1b**) or a second set of cutting blades 8 (as shown in **Figs. 1c and 1d**). The first set of cutting blades 6 and the second set of cutting blades 8 are connectable one at a time to the housing 4. The housing 4 is configured to be connected to either one of the first and second sets of cutting blades 6, 8. The hand-held shears 2 may be supplied to a user, e.g. sold to a user, with one only of the first and second sets of cutting blades 6, 8.

Alternatively, the hand/held shears 2 may comprise the first set of cutting blades 6, and the second set of cutting blades 8. That is, a shear kit may comprise the housing 4, the first set of cutting blades 6 (as shown in **Figs. 1a and 1b**), and the second set of cutting blades 8 (as shown in **Figs. 1c and 1d**). Again, the first set of cutting blades 6 and the second set of cutting blades 8 are connectable one at a time to the housing 4. Accordingly, the hand-held shears 2 may be supplied to a user, e.g. sold to a user, as a shear kit including both the first and second sets of cutting blades 6, 8.

The housing 4 comprises a handle portion 10 and a connecting portion 12. The handle portion 10 is configured for grasping by a user of the hand-held shears 2. The handle portion 10 may be configured for grasping by one hand only. The connecting portion 12 is configured for connecting thereto the first or second set of cutting blades 6, 8. The first set of cutting blades 6 comprises a first attachment portion 14, and two cutting blades 16, 16'. The second set of cutting blades 8 comprises a second attachment portion 18, and two cutting blades 20, 20'. The first and second attachment portions 14, 18 are configured for being connected to the connecting portion 12 of the housing 4.

Any suitable connecting mechanism may be utilised for releasably connecting the first or second set of cutting blades 6, 8 to the housing 4. In these embodiments, the connecting mechanism comprises protruding elements 22 arranged in the connecting portion 12, and recesses 24 arranged in the first and second attachment portions 14, 18. The protruding elements 22 engage with the recesses 24 in order to securely connect the first or second set of cutting blades 6, 8 to the housing 4.

The protruding elements 22 are resiliently arranged in the connecting portion 12 of the housing 4. The protruding elements 22 may be drawn at least partially into the housing 4 by means of one or more push buttons 26. Thus, a user may actuate the one or more push buttons 26 in order to disconnect a set of cutting blades 6, 8 from the housing 4. The actuation of the one or more push buttons 26 will withdraw the protruding elements 22 from their engagement with the recesses 24.

In **Figs. 1a and 1b** embodiments of a first set of cutting blades 6 configured for grass cutting is shown. In **Figs. 1c and 1d** embodiments of a second set of cutting blades 8 configured for shrub cutting is shown. Naturally, sets of cutting blades devised for other cutting purposes may be connected to the housing 4.

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Figs. 2a and 2b illustrate the two cutting blades 16, 16' of the first set of cutting blades 6 of **Figs. 1a and 1b** in more detail. **Fig. 2a** shows a top view and **Fig. 2b** shows a cross section along line B – B in **Fig. 2a**, of the two cutting blades 16, 16'.

10 A first blade 16 of the two cutting blades 16, 16' is brought to reciprocate in relation to a second blade 16' of the two cutting blades 16, 16', in a known manner. The first blade 16 reciprocates in a direction as indicated by arrow 28. That is, the first blade 16 reciprocates approximately perpendicularly to a longitudinal direction 30 of the hand-held shears. The longitudinal direction 30 extends along the handle portion 10 and the two cutting blades 16,
15 16' of the first set of cutting blades 6, see also **Fig. 1a**.

Each of the two cutting blades 16, 16' is provided with a number of cutting edges 32. The reciprocating motion of the first blade 16 brings about a shearing motion between pairs of the cutting edges 32.

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The first set of cutting blades 6 is configured for grass cutting, inter alia due to the first blade 16 abutting against the second blade 16', such that the cutting edges 32 shear firmly against each other.

25 **Figs. 3a and 3b** illustrate two cutting blades 20, 20' of the second set of cutting blades 8 in **Figs. 1c and 1d** more detail. **Fig. 3a** shows a top view and **Fig. 3b** shows a cross section along line B – B in **Fig. 3a**, of the two cutting blades 20, 20'.

A first blade 20 of the two cutting blades 20, 20' is brought to reciprocate in relation to a
30 second blade 20' of the two cutting blades 20, 20', in a known manner. The first blade 20 reciprocates in a direction as indicated by arrow 34. That is, the first blade 20 reciprocates approximately along a longitudinal direction 30 of the hand-held shears. The longitudinal direction 30 extends along the handle portion 10 and the two cutting blades 20, 20' of the second set of cutting blades 8, see also **Fig. 1c**.

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Each of the two cutting blades 20, 20' is provided with a number of cutting edges 36. The reciprocating motion of the first blade 20 brings about a shearing motion between pairs of the cutting edges 36.

- 5 The second set of cutting blades 8 is configured for shrub cutting, inter alia due to the first blade 20 being arranged at a slight distance from the second blade 20', such that the first blade 20 reciprocates freely without frictional engagement with the second blade 20'.

Figs. 4a and 4b, illustrate the hand-held shears 2 of **Figs. 1a – 1d** with the first set of cutting blades 6 connected. **Fig. 4a** shows the hand-held shears 2 with the housing 4 opened up and a partial see-through view indicated with broken lines. **Fig. 4b** shows a cross section through the hand-held shears 2.

The hand-held shears 2 comprise an electric motor 40 arranged inside the housing 4 and a battery 42 connectable to the electric motor 40. In these embodiments, the battery 42 is connectable to the electric motor 40 via a user operable switch 44. In order to switch on and off the hand-held shears 2, a user manipulates the user operable switch 44. The user operable switch 44 may be biased towards an off position of the switch 44. The battery 42 may be rechargeable.

20 Mentioned purely as an example, the electric motor 40 may be a 50 Watt DC motor having a nominal voltage within a range of 3 – 12 Volt. It may have a maximum rotational speed within a range of 12 000 – 22 000 rpm.

25 Mentioned purely as an example, the battery 42 may be of Lithium Ion type with a nominal voltage of 3.6 V and may have a capacity of 2 - 3 Ah.

The electric motor 40 comprises an output shaft 46, which rotates when electric energy is provided from the battery 42 to the electric motor 40. That is, when a user moves the user operable switch 44 into its on position, electric energy is provided from the battery 42 to the electric motor 40.

When the electric motor rotates, the output shaft 46 drives the relevant set of cutting blades connected to the housing 4, i.e. the first set of cutting blades 6 in the situation shown in **Figs. 4a and 4b**. The first and second sets of cutting blades are connectable one at a time to the housing 4, as shown in **Figs. 1a – 1d**, to be driven by the output shaft 46 of the electric motor 40.

The hand-held shears 2 are configured to provide a first maximum speed of a first blade 16 of the first set of cutting blades 6, when the first set of cutting blades 6 is connected to the output shaft 46, and to provide a second maximum speed of a first blade 20 of the second set of cutting blades 8, when the second set of cutting blades 8 is connected to the output shaft 46. This may be achieved in a number of different ways as will be discussed further below.

According to some embodiments, the hand-held shears 2 may be configured to be operated at fixed speeds, the first maximum speed or the second maximum speed, depending on the set of cutting blades 6, 8 connected to the housing 4. That is, the first maximum speed is a fixed speed, which corresponds to a fixed rotational speed of the electric motor 40. When the first set of cutting blades 6 is connected to the housing 4 and the electric motor 40 is switched on, it revs up to the fixed rotational speed providing the fixed first maximum speed of the first blade 16 of the first set of cutting blades 6. Similarly, the second maximum speed is a fixed speed, which corresponds to a fixed rotational speed of the electric motor 40. When the second set of cutting blades 6 is connected to the housing 4 and the electric motor 40 is switched on, it revs up to the fixed rotational speed providing the fixed second maximum speed of the first blade 20 of the second set of cutting blades 8.

The hand-held shears 2 may comprise a switching device for setting the first and/or second maximum speed. The fixed first and/or second maximum speed may be set at different levels, e.g. to provide different operational modes of the hand-held shears 2, such as a boost mode with higher first and/or second maximum speed and an economy mode with lower first and/or second maximum speed.

According to alternative embodiments, the hand-held shears 2 may be configured to be operated at one or more speeds, up to a maximum speed corresponding to the first maximum speed or the second maximum speed, depending on the set of cutting blades connected to the housing 4. That is, the first blade 16 of the first set of cutting blades 6 may be operated steplessly, or in a number of steps, up to the first maximum speed. Accordingly, when the first set of cutting blades 6 is connected to the housing 4, the electric motor 40 may be operated steplessly, or in a number of steps, to provide different speeds of the first blade 16 of the first set of cutting blades 6 up to the first maximum speed. Similarly, the first blade 20 of the second set of cutting blades 8 may be operated steplessly, or in a number of steps, up to the second maximum speed. Accordingly, when the second set of cutting blades 8 is connected to the housing 4, the electric motor 40 may be operated steplessly, or in a number

of steps, to provide different speeds of the first blade 20 of the second set of cutting blades 8 up to the first maximum speed.

The first maximum speed is a nominal speed, which is reached when the voltage of the battery 42 is at a nominal voltage. Similarly, the second maximum speed is a nominal speed, which is reached when the voltage of the battery 42 is at a nominal voltage. In practical use of the hand-held shears 2, the maximum speed depends on the available voltage of the battery 42. A freshly charged battery will provide a higher voltage and thus, a higher maximum rotational speed, than a partially discharged battery. Also, the maximum speeds may only be compared and/or assessed when the hand-held shears 2 are run without cutting, i.e. without any load. Namely, the load on the hand-held shears 2 during cutting with the hand-held shears 2 varies to a large extent and naturally, also affects the speed of a blade 16, 20 of a set of cutting blades 6, 8.

According to embodiments, the first maximum speed may be lower than the second maximum speed.

According to embodiments, the first maximum speed may be a first maximum reciprocating speed of the first blade 16 of the first set of cutting blades 6, and the second maximum speed may be a second maximum reciprocating speed of the first blade 20 of the second set of cutting blades 8.

The reciprocating speed may for instance be measured by the number of times two cutting edges 32, 36 of a set of cutting blades 6, 8 perform a shearing motion per time unit.

Mentioned purely as an example, for the first set of cutting blades 6 the first maximum reciprocating speed may be 800 reciprocations/minute, and for the second set of cutting blades 8 the second maximum reciprocating speed may be 1100 reciprocations/minute. If the sets of cutting blades 6, 8 are provided with cutting edges 32, 36 on opposite sides of a reciprocating blade portion, as in the embodiments shown in e.g. in **Figs. 2a and 3a**, each reciprocation provides two cuts with the relevant set of blades 6, 8. Accordingly, in such embodiments the above mentioned example provides 1600 cuts/minute for the first maximum speed and 2200 cuts/minute for the second maximum speed.

In the illustrated embodiments, the first and second sets of cutting blades 6, 8 are indirectly driven by the output shaft 46. A gearbox 48 is arranged between the output shaft 46 of the electric motor 40 and the first blade of the first set of cutting blades 6, when connected to the

housing 4, or the first blade of the second set of cutting blades 8, when connected to the housing 4.

In these embodiments, the gearbox 48 comprises two cog wheels 47, 49, one small cog wheel 47 connected to the output shaft 46 and one large cog wheel 49 connected to a linkage arrangement and the first blade of the relevant set of cutting blades 6, 8. The linkage arrangement configured to provide e.g. the reciprocating movement of the first blade, in a known manner.

10 Mentioned purely as an example, a gear ratio of the gearbox 48 may be 15:1 or 20:1.

According to some embodiments, the hand-held shears 2 may comprise a control unit 50 connected to the electric motor 40 for controlling a rotational speed of the electric motor 40 and its output shaft 46. The control unit 50 may be configured to drive the electric motor 40 at a lower rotational speed for providing the first maximum speed and at a higher rotational speed for providing the second maximum speed. In this manner, the first maximum speed may be provided when the first set of cutting blades 6 is connected to the housing 4, and the second maximum speed may be provided when the second set of cutting blades 8 is connected to the housing 4.

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The hand-held shears 2 may comprise a switch 52 connected to the control unit 50. The switch 52 may be configured for providing input to the control unit 50 for controlling the rotational speed of the electric motor 40 between the lower rotational speed, and the higher rotational speed. In this manner, the first maximum speed may be provided by the lower rotational speed of the electric motor 40 when the first set of cutting blades 6 is connected to the housing 4, and the second maximum speed may be provided by the higher rotational speed of the electric motor 40 when the second set of cutting blades 8 is connected to the housing 4.

30 In these embodiments, the switch 52 is a manually actuatable switch. Thus, a user of the hand-held shears 2 manipulates the switch 52 in order to provide the first maximum speed when the first set of cutting blades 6 is connected to the housing 4, and the second maximum speed when the second set of cutting blades 8 is connected to the housing 4.

35 **Fig. 5** schematically illustrates embodiments of a control system 54 of a hand-held shears 2. The hand-held shears 2 may be hand-held shears according to any of the embodiments discussed above.

The control system 54 comprises the control unit 50 which may take the form of substantially any suitable type of processor circuit or microcomputer, e.g. a circuit for digital signal processing (digital signal processor, DSP), a Central Processing Unit (CPU), a processing unit, a processing circuit, a processor, an Application Specific Integrated Circuit (ASIC), a microprocessor, or other processing logic that may interpret and execute instructions. The control system 54 may comprises a memory unit. The control unit 50 is connected to the memory unit, which provides the control unit 50 with, for example, stored programme code and/or stored data which the control unit 50 needs to enable it to do calculations. The control unit 50 may also adapted to storing partial or final results of calculations in the memory unit. The memory unit may comprise a physical device utilised to store data or programs, i.e., sequences of instructions, on a temporary or permanent basis.

The control unit 50 is connected to the switches 44, 52, 52', and the electric motor 40. The positions of the switches 44, 52 provide control instruction to the control unit 50 for controlling the electric motor 40. Such control may relate to the above discussed operation of the hand-held shears 2:

- switching on and off the electric motor 40 when the switch 44 is manipulated by a user of the hand-held shears 2,
- switching between the lower and the higher rotational speed limit settings when the switch 52, 52' is manipulated, and
- controlling the rotational speed of the electric motor 40, e.g. to the lower rotational speed when the first set of cutting blades 6 is connected to the housing 4, or the higher rotational speed when the second set of cutting blades 8 is connected to the housing 4. This, may be achieved for instance by PWM control of the electric motor 40.

Also, the control unit 50 may control the charging of the battery 42.

Within the broken lines of **Fig. 5** an alternative embodiment of the control system 54 is shown. In these embodiments, the switch 52' is actuated by the first set of cutting blades 6 when the first set of cutting blades 6 is connected to the housing 4, and/or by the second set of cutting blades 8 when the second set of cutting blades 8 is connected to the housing 4. In this manner the first and second maximum speeds are automatically established by the relevant set of cutting blades 6, 8 manipulating the switch 52'. For instance, the first set of cutting blades 6 may manipulate the switch 52', and the second set of cutting blades 8 may not manipulate the switch 53, or vice versa. A different kind of switch may be manipulated to different positions by each of the first and second sets of cutting blades 6, 8.

According to alternative embodiments, the first and second maximum speeds may be mechanically provided. In such embodiments, the gearbox 48 is a first gearbox having a first gear ratio connected to the first blade of the first set of cutting blades 6, and the gearbox 48 is a second gearbox having a second gear ratio connected to the first blade of the second set of cutting blades 8. Thus, the electric motor may rotate with the same rotational speed when the first set of cutting blades 6 is connected to the housing 4 as when the second set of cutting blades 8 is connected to the housing 4.

In such embodiments, at the least one cog wheel of the gearbox 48, or the entire gearbox 48, is arranged in each of the first and second sets of cutting blades 6, 8. Thus the gear ratio is changed together with the set of cutting blades 6, 8.

Fig. 6 illustrates a method 100 of operating a hand-held shears for gardening purposes such as any hand-held shears 2 discussed above in connection with **Figs. 1a - 5**. Accordingly, the hand-held shears 2 comprise a housing, an electric motor arranged inside the housing, a battery connectable to the electric motor, a first set of cutting blades, and a second set of cutting blades, wherein the first and second sets of cutting blades are connectable one at a time to the housing to be driven by an output shaft of the electric motor. The method 100 comprises steps of:

- operating 102, at a first maximum speed, a first blade of the first set of cutting blades, when the first set of cutting blades is connected to the output shaft, and
- operating 104, at a second maximum speed, a first blade of the second set of cutting blades, when the second set of cutting blades is connected to the output shaft.

It is to be understood that the foregoing is illustrative of various example embodiments and that the invention is defined only by the appended claims. A person skilled in the art will realize that the example embodiments may be modified, and that different features of the example embodiments may be combined to create embodiments other than those described herein, without departing from the scope of the invention, as defined by the appended claims.

CLAIMS

1. A hand-held shears (2) for gardening purposes, comprising

a housing (4),

an electric motor (40) arranged inside the housing (4),

5 a battery (42) connectable to the electric motor (40), and

a first set of cutting blades (6) and/or a second set of cutting blades (8), wherein

the first set of cutting blades (6) and the second set of cutting blades (8) are

connectable one at a time to the housing (4) to be driven by an output shaft (46) of the electric motor (40),

10 characterised in that

the hand-held shears (2) are configured to provide a first maximum speed of a first blade (16) of the first set of cutting blades (6), when the first set of cutting blades (6) is connected to the output shaft (46), and to provide a second maximum speed of a first blade (20) of the second set of cutting blades (8), when the second set of cutting blades (8) is connected to the output shaft (46).

2. The hand-held shears (2) according to claim 1, wherein the first maximum speed is lower than the second maximum speed.

20 3. The hand-held shears (2) according to claim 1 or 2, wherein the first maximum speed is a first maximum reciprocating speed of the first blade (16) of the first set of cutting blades (6), and wherein the second maximum speed is a second maximum reciprocating speed of the first blade (20) of the second set of cutting blades (8).

25 4. The hand-held shears (2) according to any one of the preceding claims, wherein the first set of cutting blades (6) is configured for grass cutting, and wherein the second set of cutting blades (8) is configured for shrub cutting.

5. The hand-held shears (2) according to any one of the preceding claims, comprising a control unit (50) connected to the electric motor (40) for controlling a rotational speed of the electric motor (40) and its output shaft (46), the control unit (50) being configured to drive the electric motor (40) at a lower rotational speed for providing the first maximum speed and at a higher rotational speed for providing the second maximum speed.

6. The hand-held shears (2) according to claim 5, comprising a switch (52, 52') connected to the control unit (50), wherein the switch (52, 52') is configured for providing input to the control unit (50) for controlling the rotational speed of the electric motor (40) between the lower rotational speed, and the higher rotational speed.

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7. The hand-held shears (2) according to claim 6, wherein the switch (52) is a manually actuatable switch (52).

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8. The hand-held shears (2) according to claim 6, wherein the switch (52') is actuated by the first set of cutting blades (6) when the first set of cutting blades (6) is connected to the housing (4), and/or by the second set of cutting blades (8) when the second set of cutting blades (8) is connected to the housing (4).

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9. The hand-held shears (2) according to any one of the preceding claims, wherein a gearbox (48) is arranged between the output shaft (46) of the electric motor (40) and the first blade of the first set of cutting blades (6), when connected to the housing (4), or the first blade of the second set of cutting blades (8), when connected to the housing (4).

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10. The hand-held shears (2) according to claim 9, wherein the gearbox (48) is a first gearbox having a first gear ratio connected to the first blade (16) of the first set of cutting blades (6), and wherein the gearbox (48) is a second gearbox having a second gear ratio connected to the first blade (20) of the second set of cutting blades (8).

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11. The hand-held shears (2) according to any one of the preceding claims, comprising the first set of cutting blades (6) and the second set of cutting blades (8).

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12. A method of operating a hand-held shears (2) for gardening purposes, the hand-held shears (2) comprising a housing (4), an electric motor (40) arranged inside the housing (4), a battery (42) connectable to the electric motor (40), a first set of cutting blades (6), and a second set of cutting blades (8), wherein the first and second sets of cutting blades are connectable one at a time to the housing (4) to be driven by an output shaft (46) of the electric motor (40), and wherein the method (100) comprises steps of:

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- operating, at a first maximum speed, a first blade (16) of the first set of cutting blades (6), when the first set of cutting blades (6) is connected to the output shaft (46), and
- operating, at a second maximum speed, a first blade (20) of the second set of cutting blades (8), when the second set of cutting blades (8) is connected to the output shaft (46).

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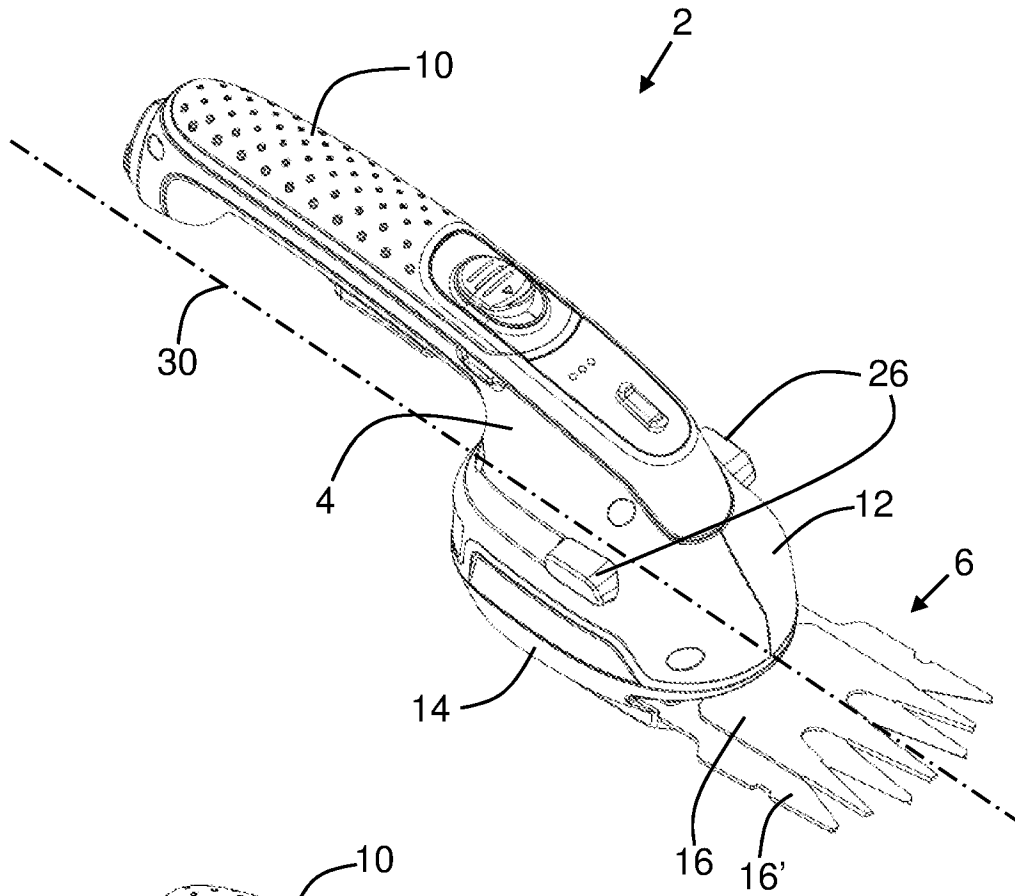


Fig. 1a

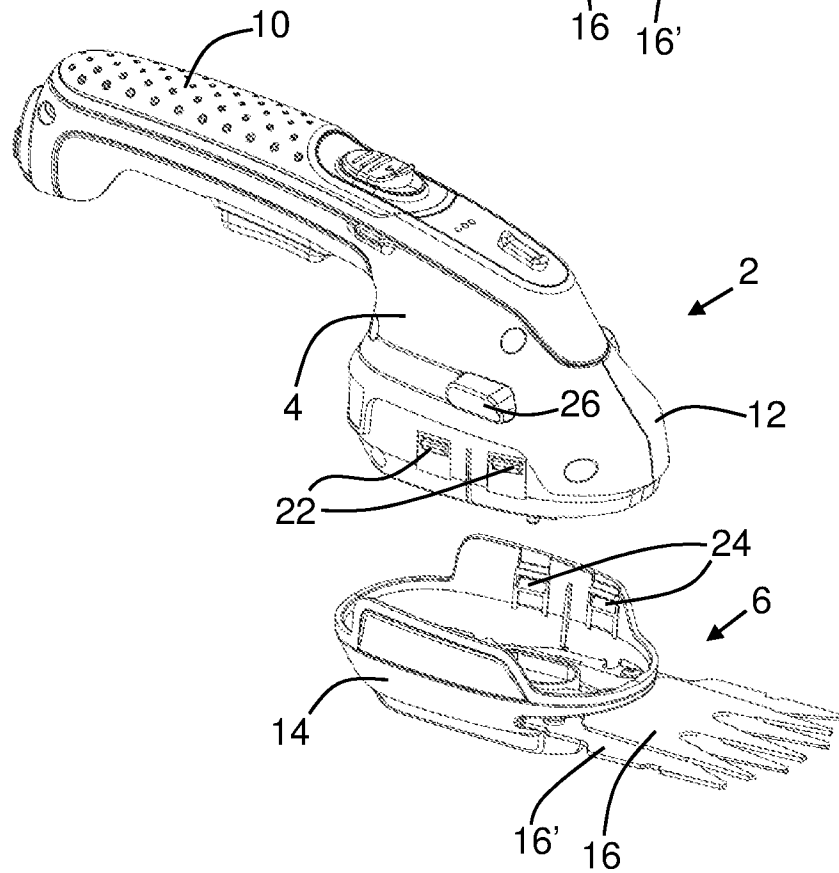


Fig. 1b

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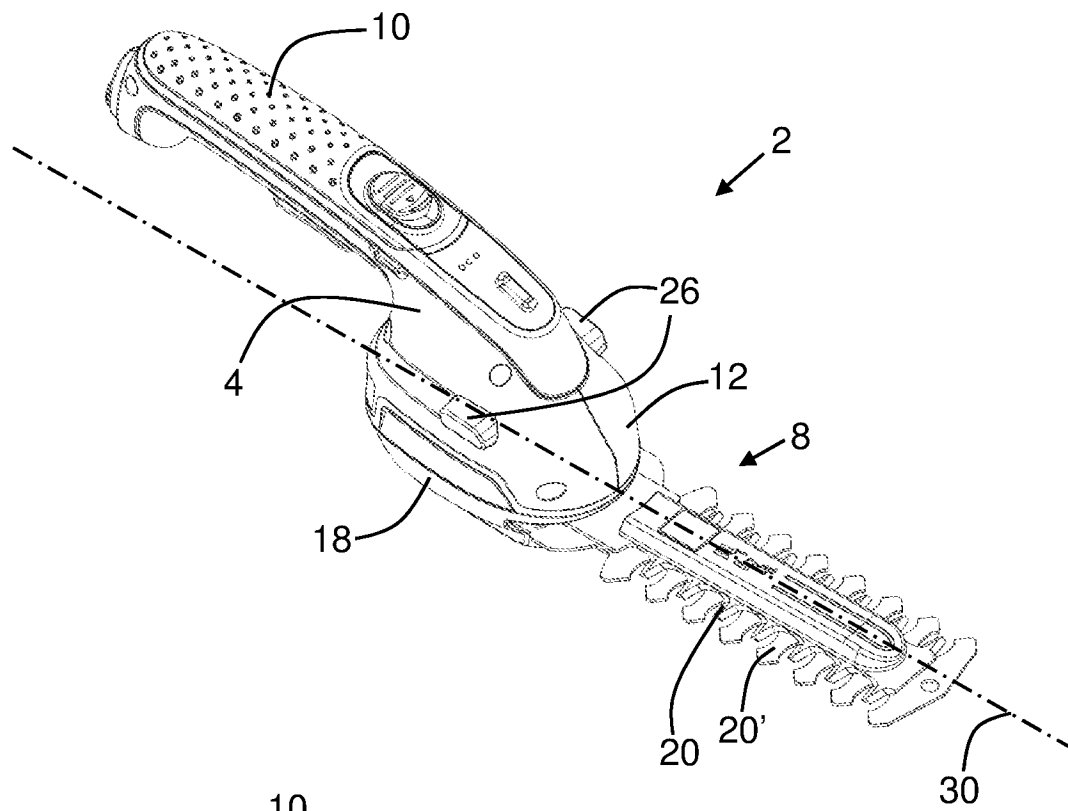


Fig. 1c

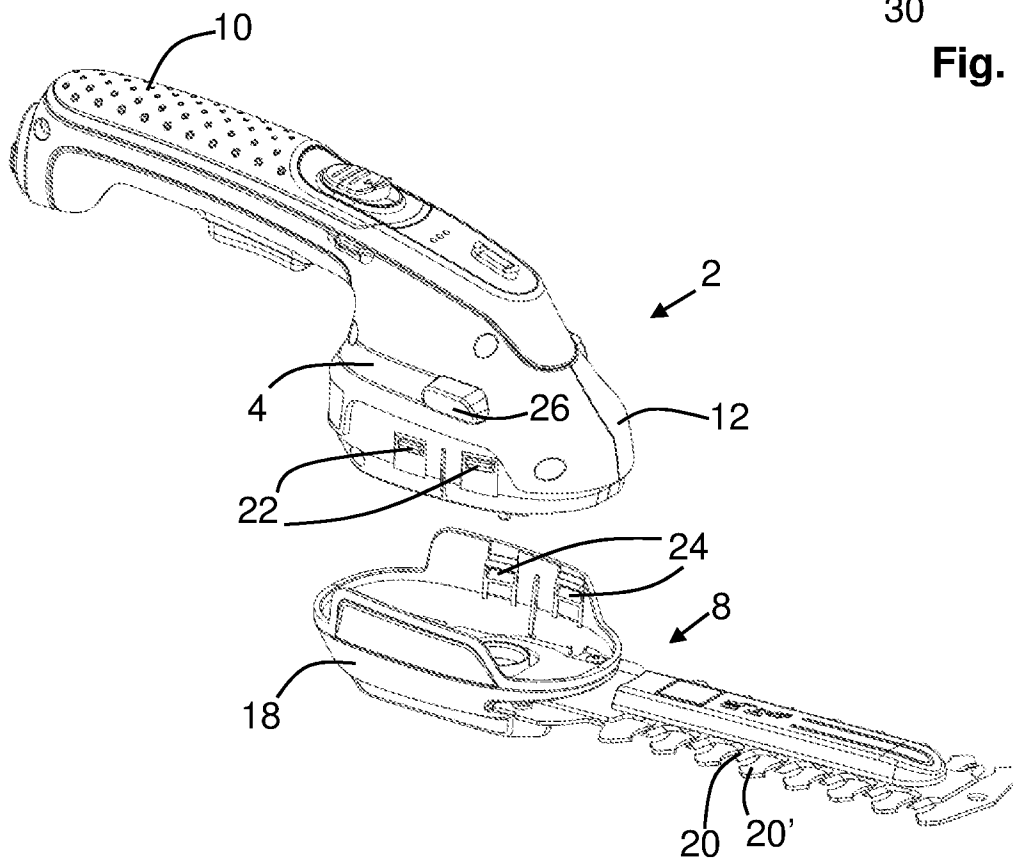


Fig. 1d

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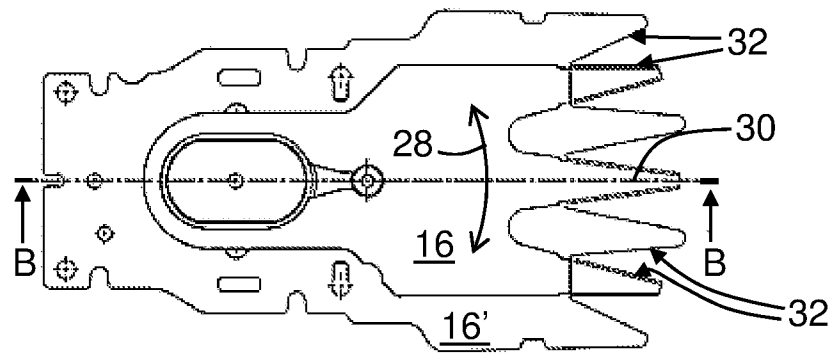


Fig. 2a

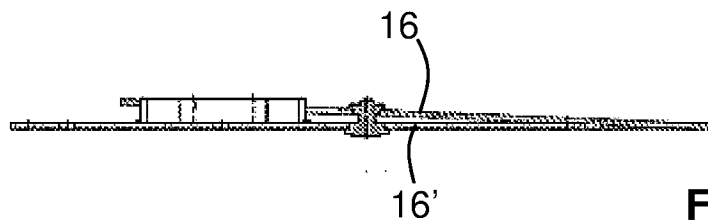


Fig. 2b

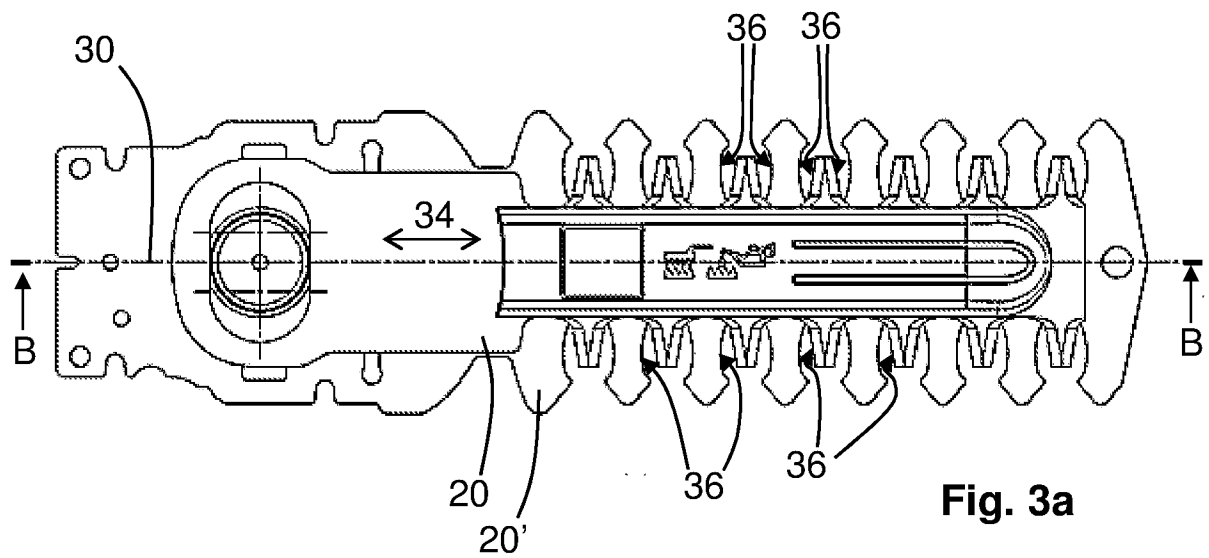


Fig. 3a

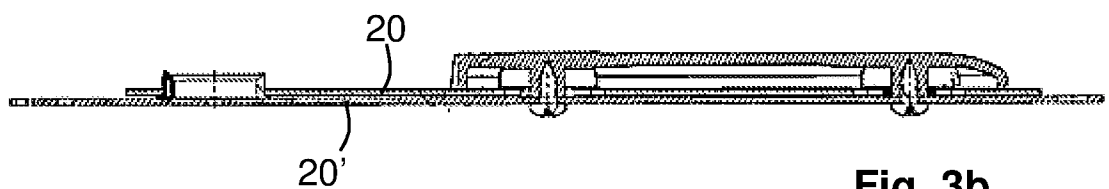


Fig. 3b

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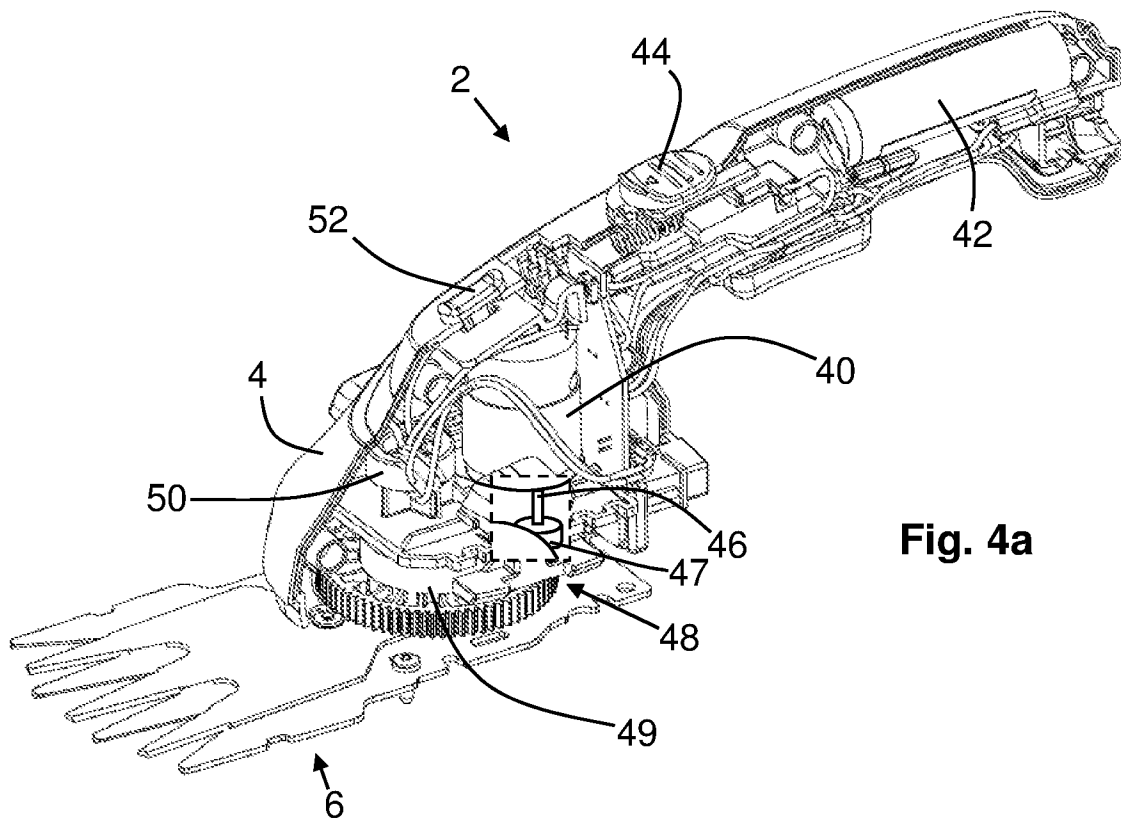


Fig. 4a

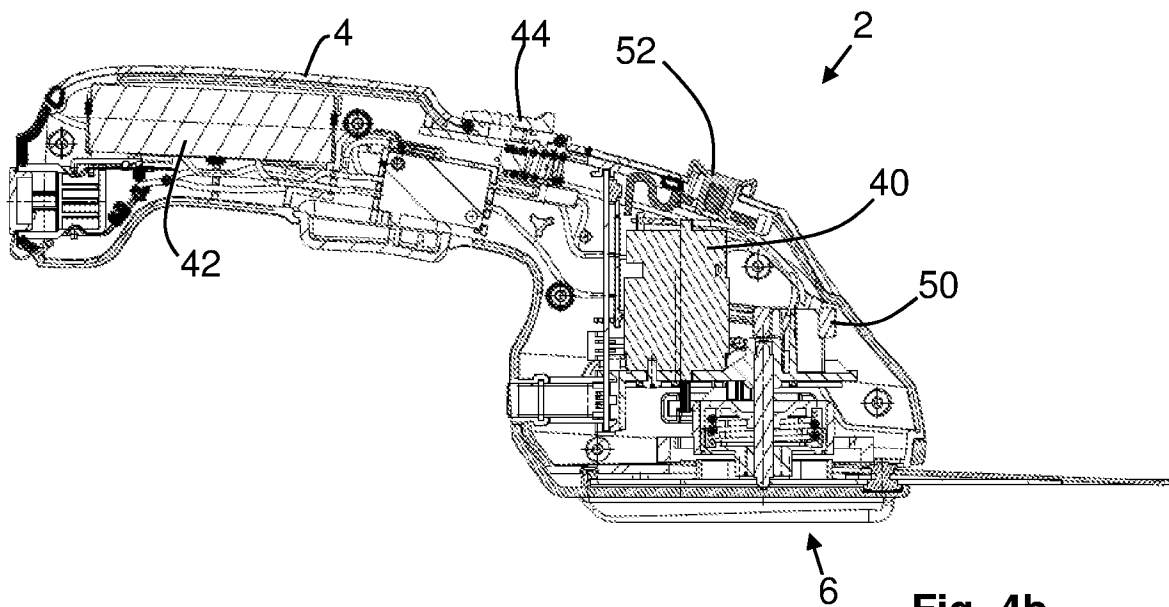
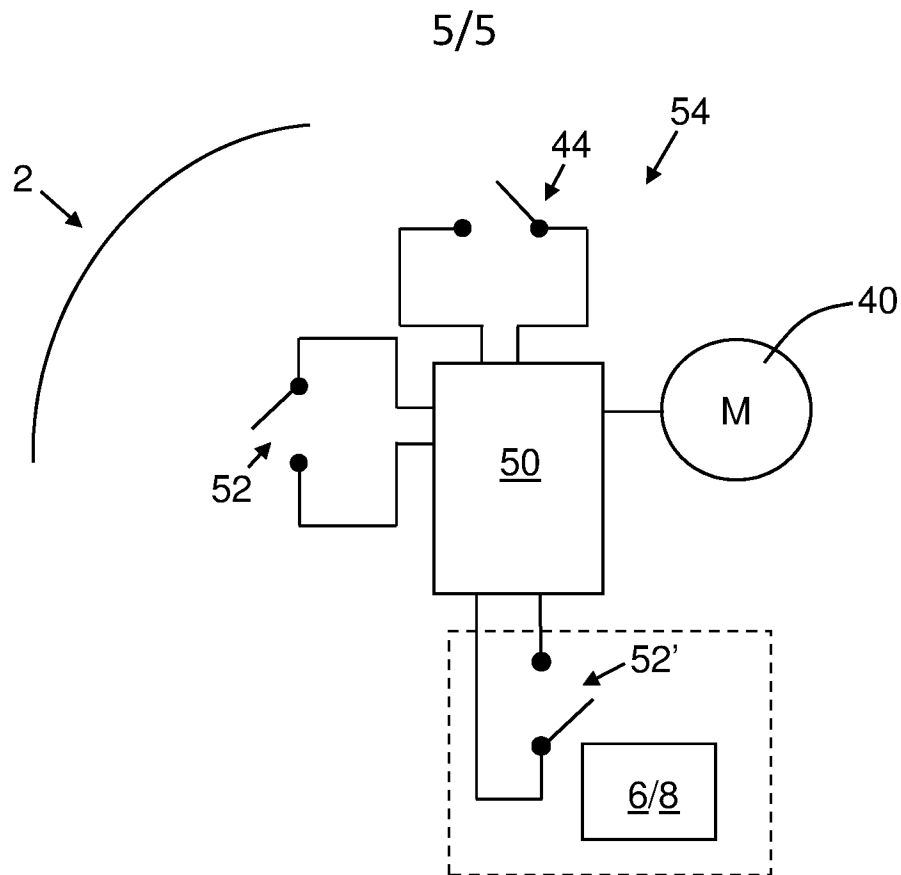
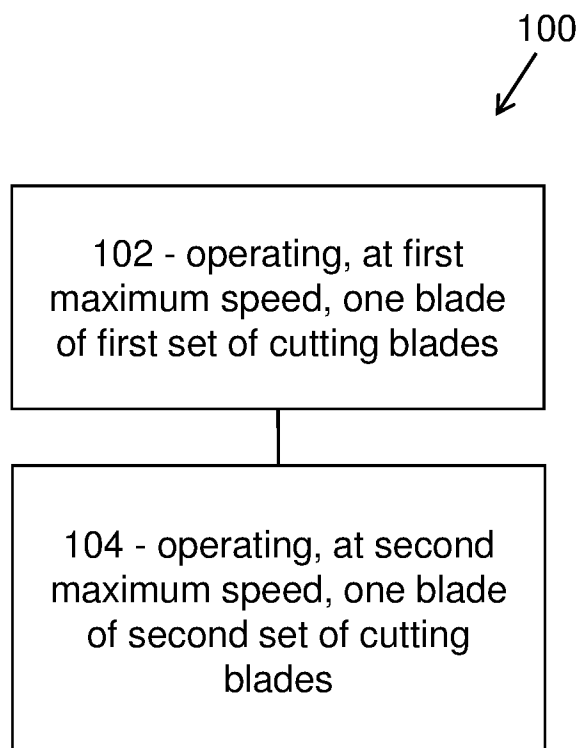


Fig. 4b

**Fig. 5****Fig. 6**

INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2018/050444

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: A01G, B26B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE, DK, FI, NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, PAJ, WPI data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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A	US 20140115903 A1 (PROUDLOCK DAVID ET AL), 1 May 2014 (2014-05-01); paragraphs [0010], [0040]-[0041], [0052]; figures 4-9; Y-document with EP 2281440 B1 --	1, 5-8
Y	EP 1762136 A2 (BLACK & DECKER INC), 14 March 2007 (2007-03-14); abstract; paragraphs [0011], [0013], [0020], [0022], [0029]-[0030]; figures 1,5; Y-document with WO 2017084040 A1 --	1-12



Further documents are listed in the continuation of Box C.



See patent family annex.

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"O" document referring to an oral disclosure, use, exhibition or other means	
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Date of the actual completion of the international search

27-06-2018

Date of mailing of the international search report

28-06-2018

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/SE2018/050444

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
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International Patent Classification (IPC)

A01G 3/053 (2006.01)

A01G 3/06 (2006.01)

B26B 15/00 (2006.01)

INTERNATIONAL SEARCH REPORT

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