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14 11 17

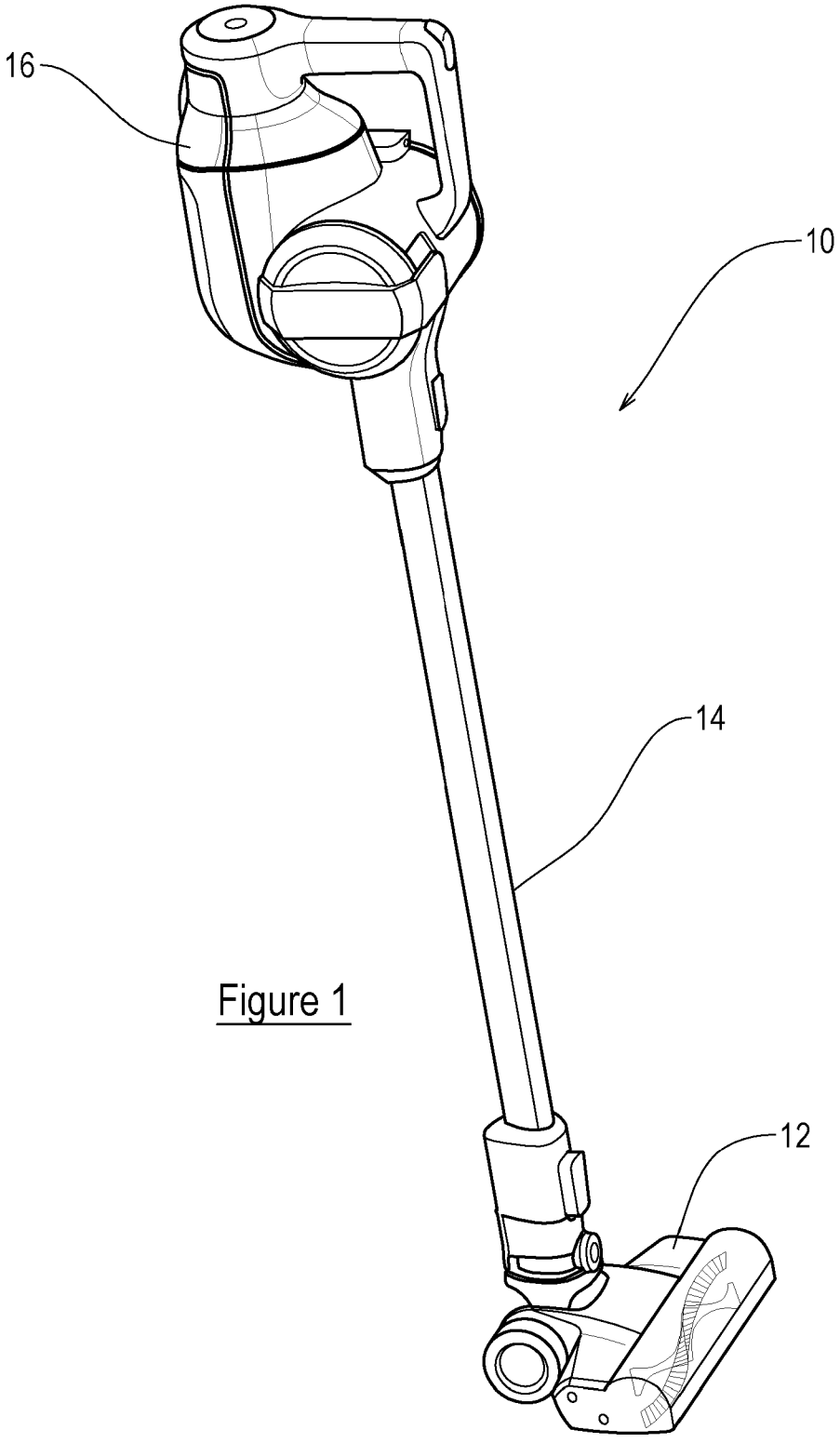


Figure 1

14 11 17

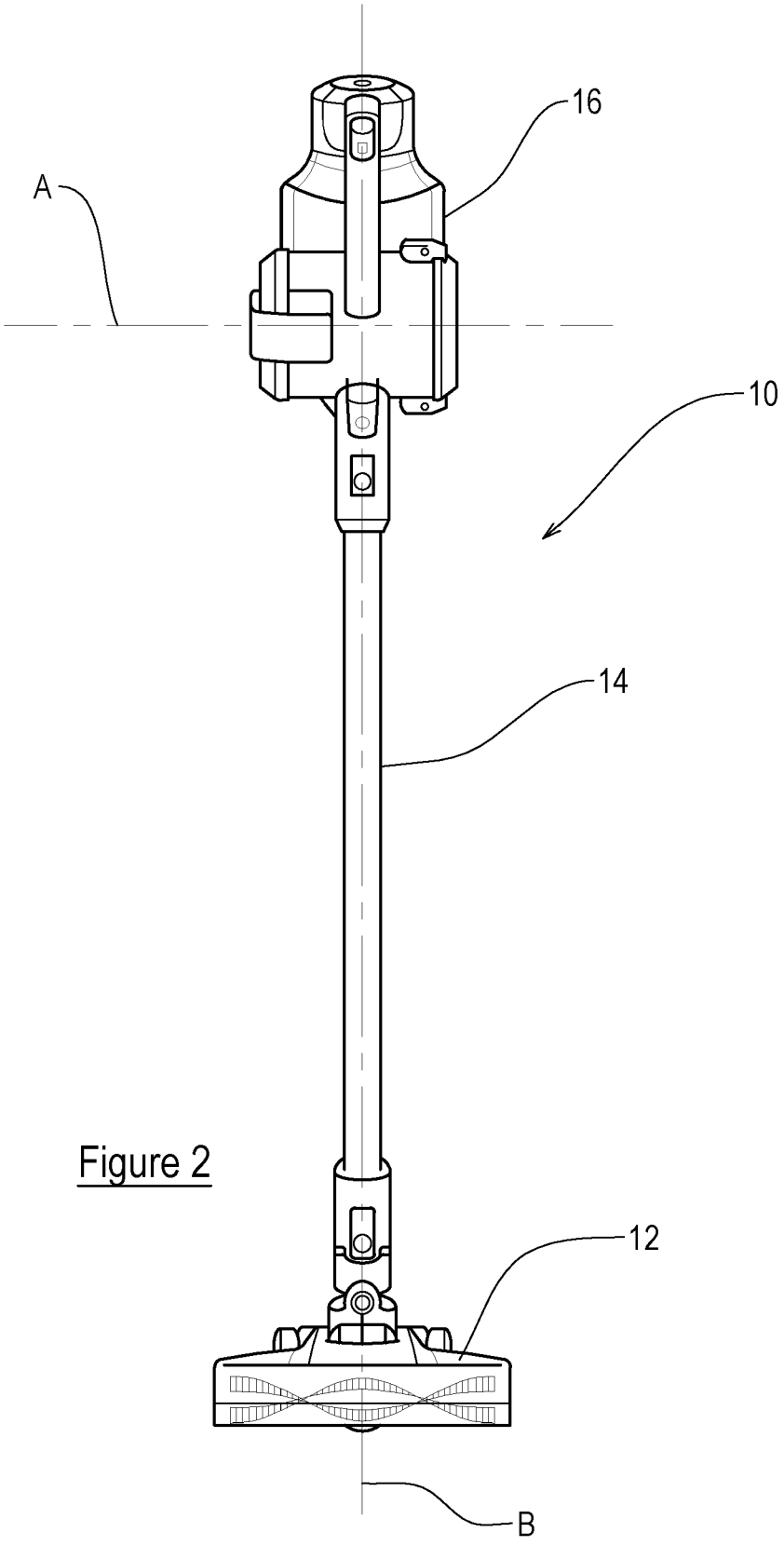


Figure 2

14 11 17

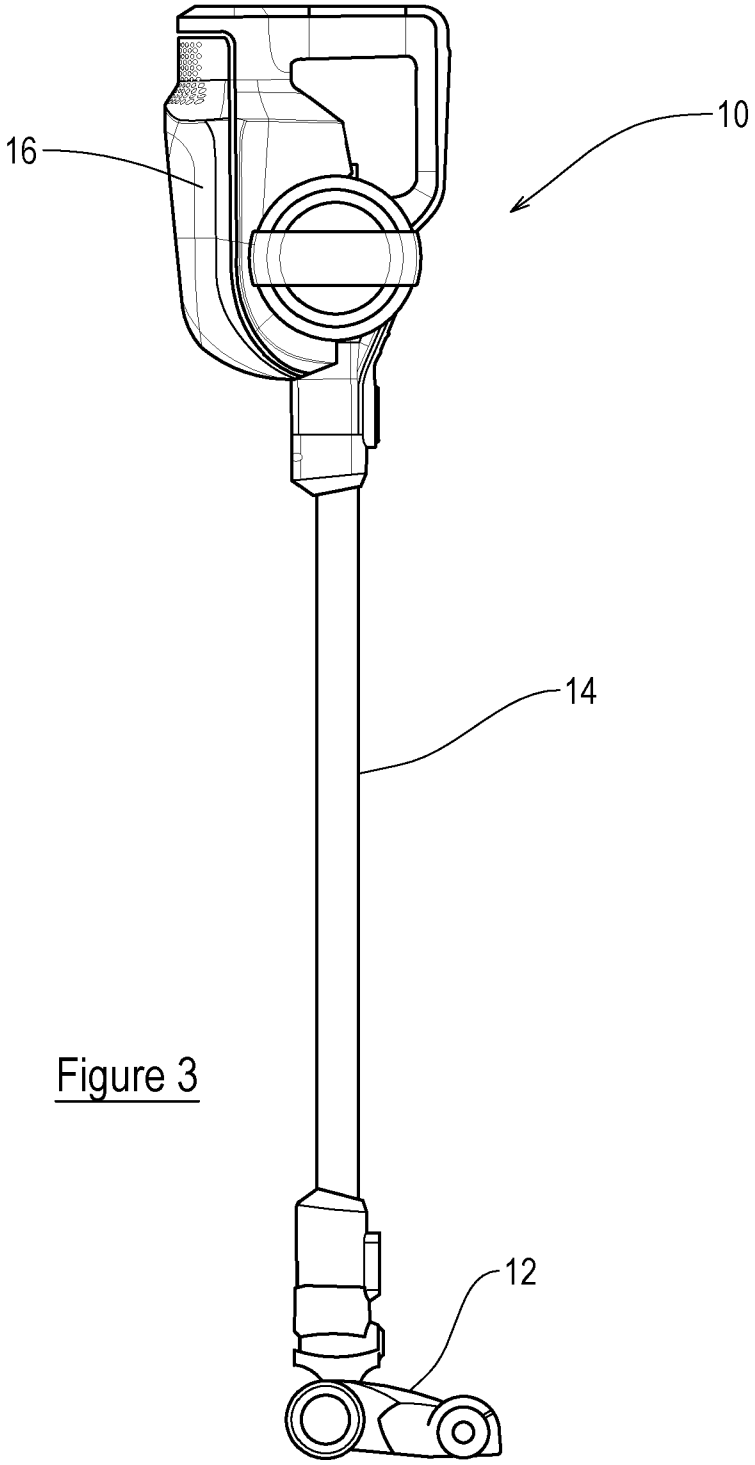


Figure 3

14 11 17

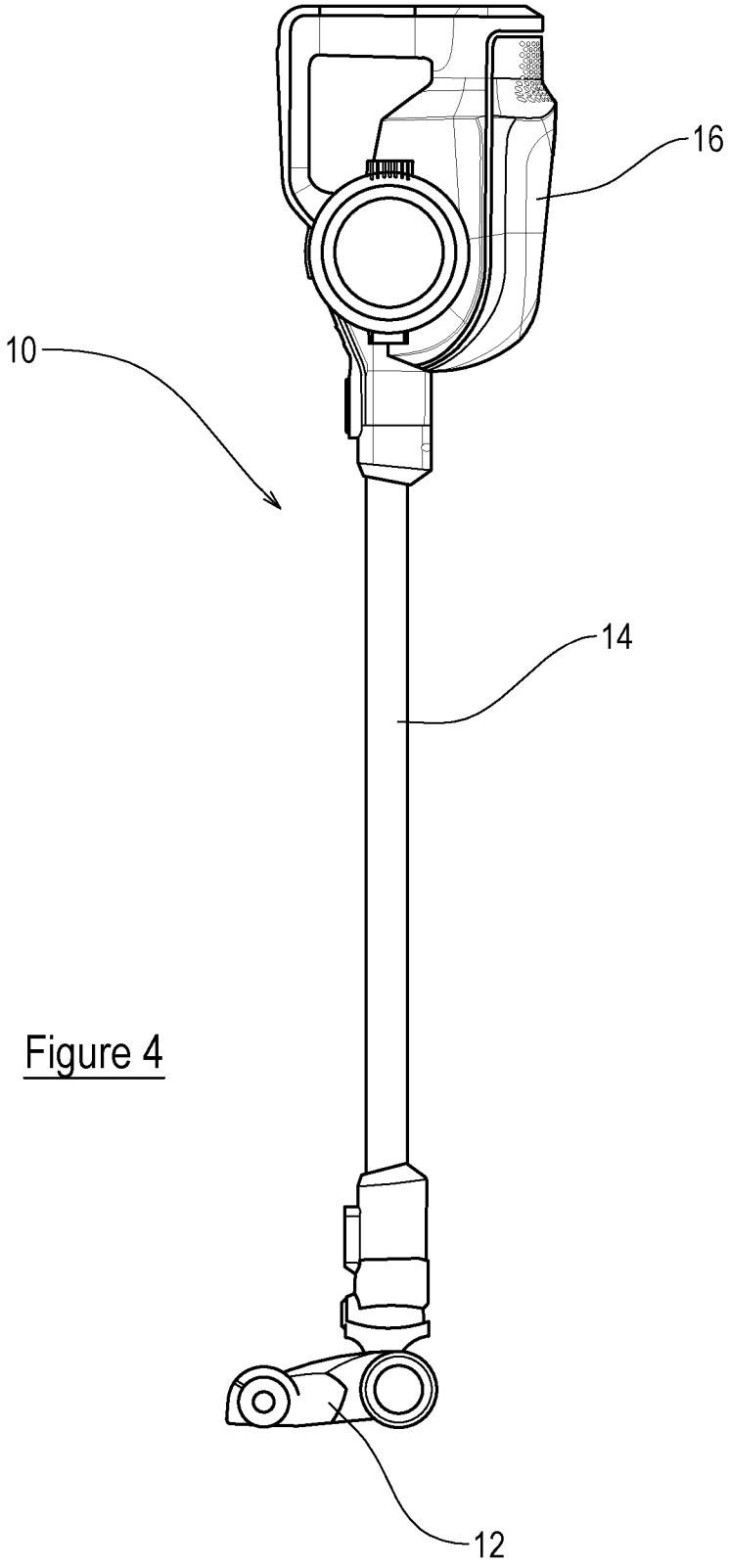


Figure 4

14 11 17

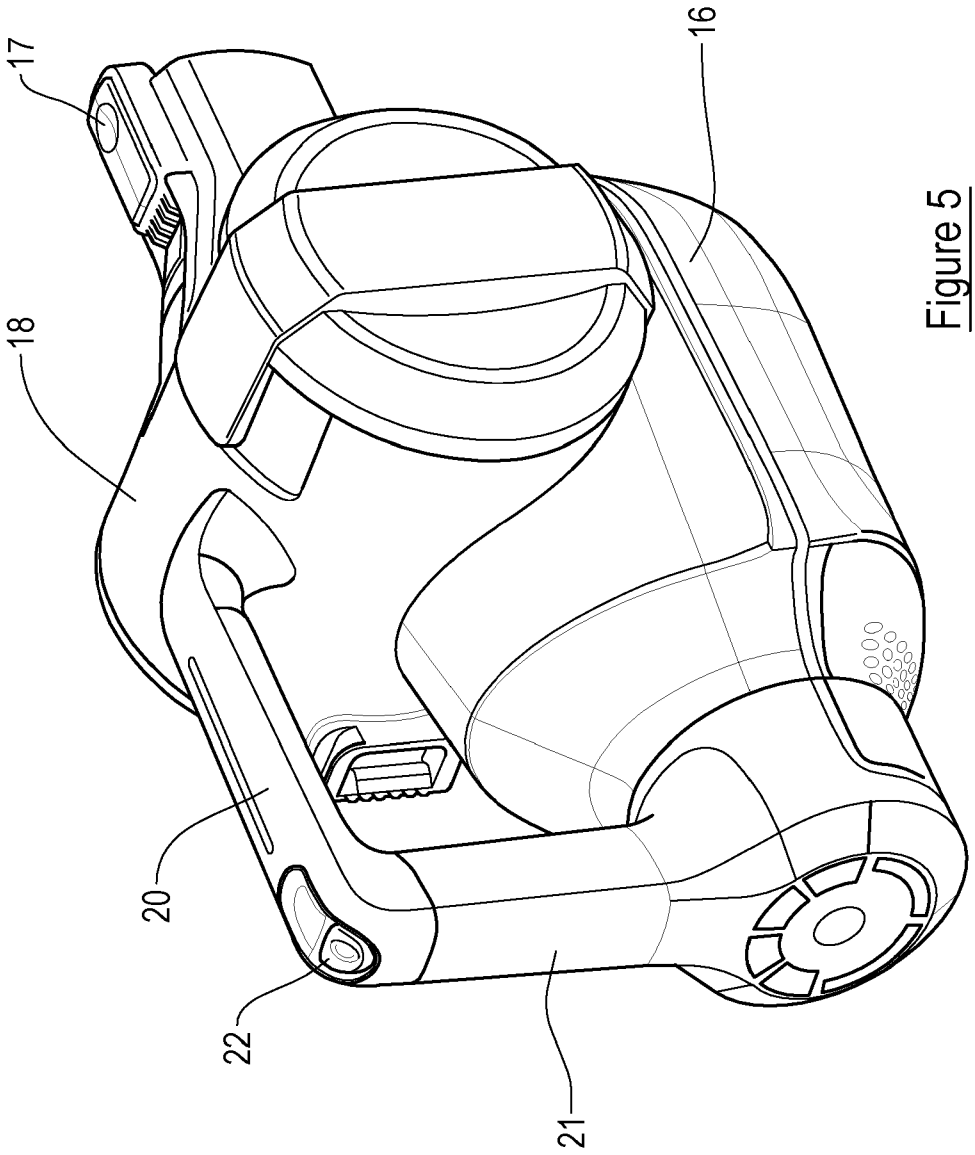


Figure 5

14 11 17

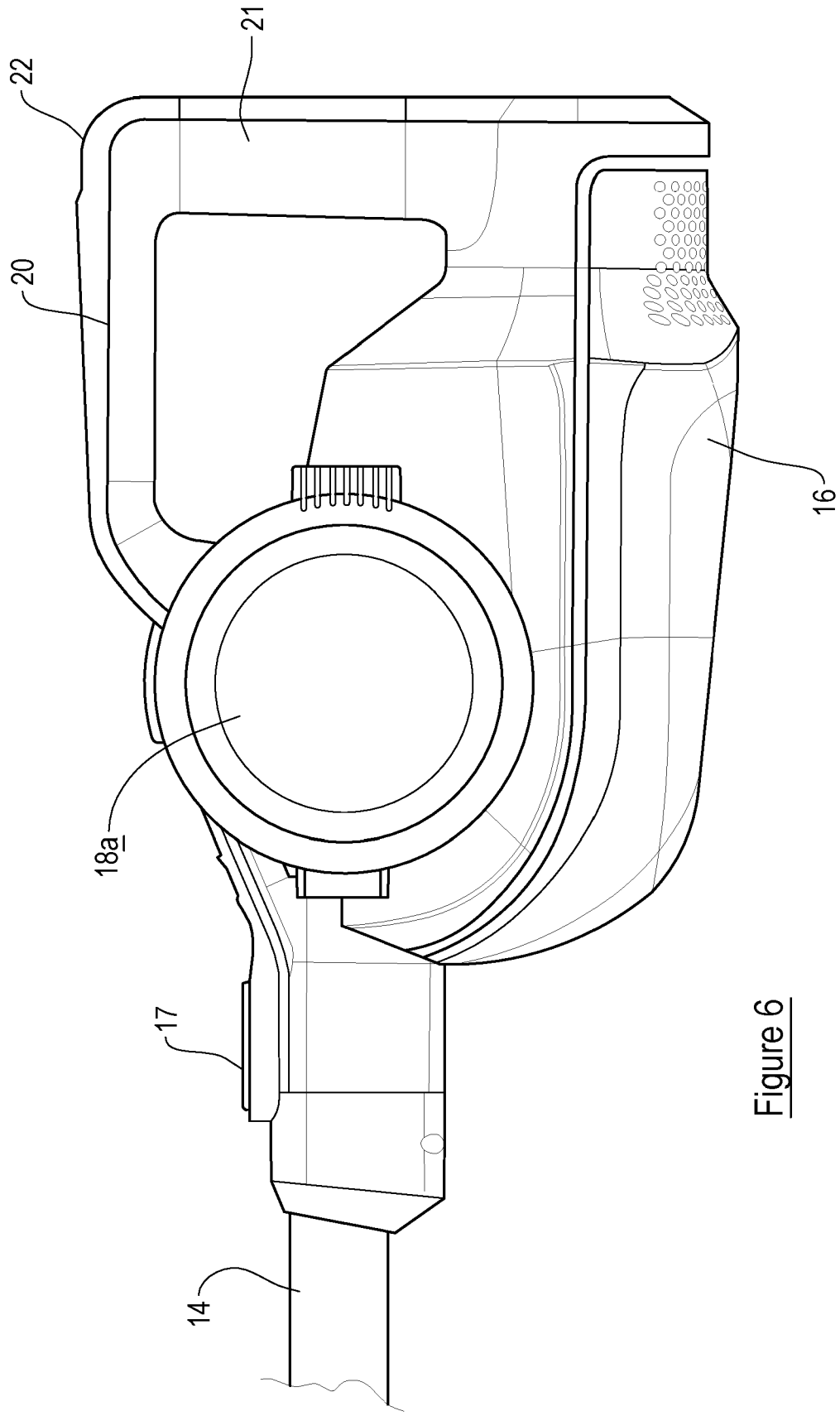


Figure 6

14 11 17

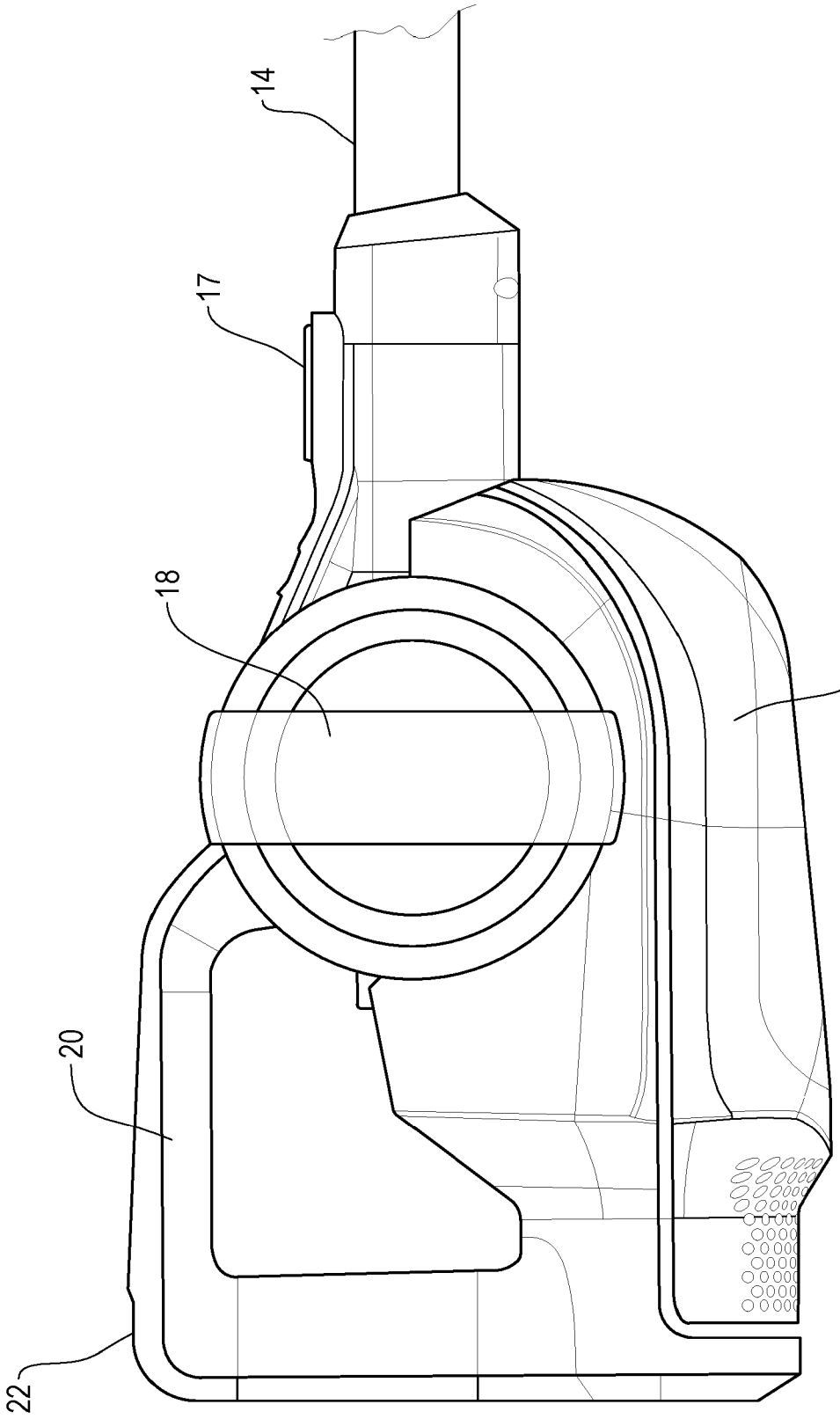


Figure 7

14 11 17

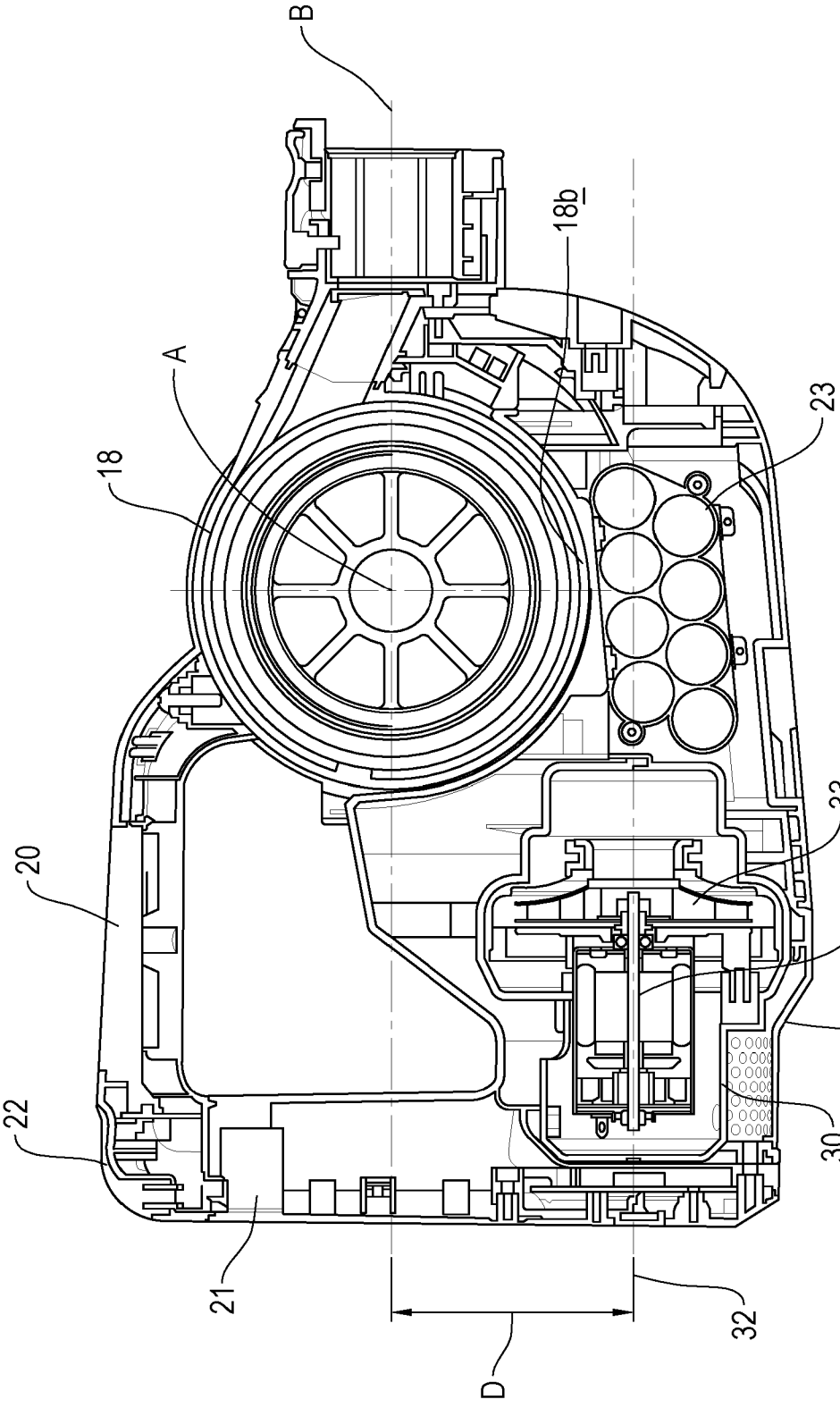
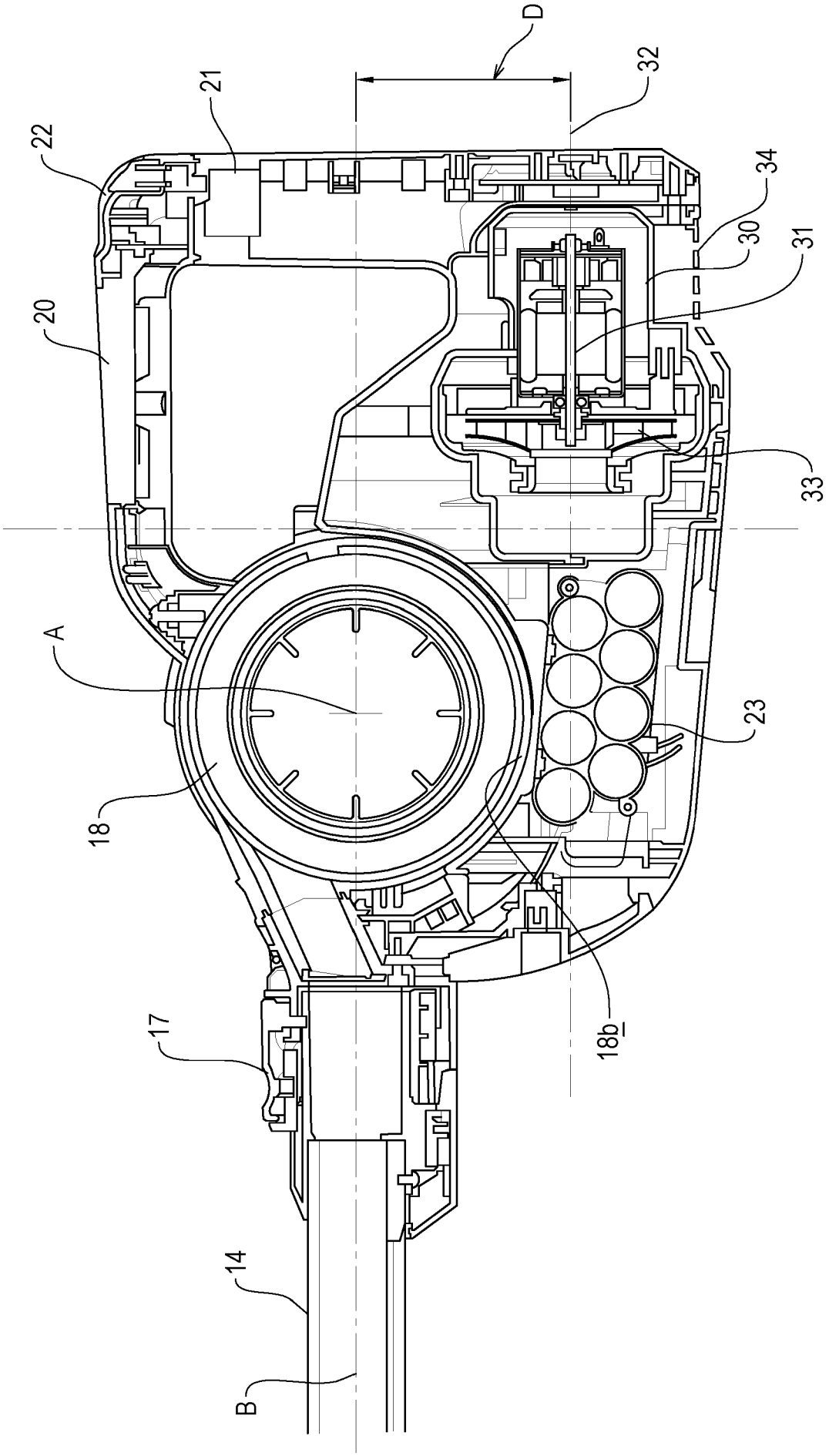


Figure 8

14 11 17



Title: Surface Cleaning Apparatus

Description of Invention

This invention relates to a surface cleaning apparatus.

According to an aspect of the invention we provide a surface cleaning apparatus including:

a housing supporting:

a suction source including a motor with an axle on an axis, which rotates a fan; and

a dirt collection container,

wherein the motor is positioned rearwardly of the dirt collection container, and lower than the dirt collection container such that in normal use the axis of the axle extends underneath a lowermost wall of the dirt collection container.

Further features of the above aspect of the invention are set out in the appended claims.

Embodiments of the invention will be set out below by way of example only with reference to the accompanying figures, of which:

Figure 1 is a perspective view of a surface cleaning apparatus;

Figure 2 is a front view of the apparatus of figure 1;

Figure 3 is a side view of the apparatus figure 1;

Figure 4 is an opposite side view of the apparatus figure 1;

Figure 5 is a perspective view of a housing of the apparatus of figure 1, which housing is operable as a handheld surface cleaning apparatus;

Figure 6 is a side view of the housing of figure 5;

Figure 7 is an opposite side view of the housing of figure 5;

Figure 8 is a cross-sectional view of the housing from the same side as shown in figure 7; and

Figure 9 is a cross-sectional view of the housing from the same side as shown in figure 6.

Referring to the figures, these show a surface cleaning apparatus 10 in accordance with the present invention. The apparatus 10 includes a floor head 12, a housing 16 and an elongate member 14, having an elongate axis B, connecting the floor head 12 to the housing 16. The housing 16 in this example is operable as a handheld surface cleaning apparatus, commonly known as a hand vac, when the elongate member 14 and floor head 12 are not connected thereto. The housing 16 supports a suction source, a dirt container 18 and a cyclonic separator. In this example the suction source is an electric motor driving a rotatable fan, but any appropriate suction source may be used. All that is necessary is for the suction source to be able to draw air through the floor head 12 and elongate member 14 towards the dirt collection container.

In this example the housing 16 supports or contains a battery 23 to provide electrical power to the suction motor and other components of the apparatus 10. In alternative embodiments, the apparatus 10 may be mains powered.

Whilst in the present embodiment the apparatus 10 includes a cyclonic separator to separate dirt from the air flowing through the apparatus 10, this is not essential. Indeed, embodiments are envisaged where the apparatus 10 includes a filter bag which collects dirt, or any other appropriate device to separate the dirt from the air. The apparatus 10 includes a pivotally moveable door 18a which enables a user to empty dirt collected within the container 18.

The elongate member 14 includes a passage for carrying dirt-laden air from the floor head 12 to the dirt collection container 18. In this example the floor head 12 includes a motor for driving a rotatable floor agitating member or brush, so the elongate member 14 includes a further passage through which electrical cables may extend to provide an electric connection between the housing 16 and the motor in the floor head 12.

The floor head 12 is disconnectable from the elongate member 14, so that, for example, another tool can be connected to the free end of the elongate member 14. The elongate member 14 is also disconnectable from the housing 16, by way of a manually operated switch 17. This enables the housing 16 to be used as handheld surface cleaning apparatus, with the option of being able to connect another tool to the location from where the elongate member 16 is removed.

The housing 16 includes a handle for holding the apparatus 10, said handle including first 20 and second 21 user-graspable portions which are connected to each other substantially at right-angles. A first end of the first user-graspable portion 20 is connected to the housing 16 and extends generally rearwardly away therefrom and from the elongate member 14. A first end of the second user-graspable portion 21 is connected to the housing 16 and extends generally upwardly therefrom. Respective second ends of the first 20 and second 21 user-graspable portions are connected to each other.

Essentially, the first 20 and second 21 user-graspable portions form a handle which is L-shaped and which provides two locations each of which is sized such that it can be grasped fully by a hand of a user. A device 22, e.g. a switch, for turning the apparatus "on" is positioned at the connection of the second ends of the first 20 and second 21 user-graspable portions to each other.

As can be seen from figures 8 and 9, the housing 16 supports a suction source in the form of an electric motor 30 with an axle 31 which is connected at one end to a fan 33. The axle 31 and fan 33 rotate about an axis 32. The motor 30 may be any appropriate motor, e.g. DC, AC, brushless. Motor exhaust air apertures 34 are provided in the housing 16.

The motor 30, axle 31 and fan 33 are positioned such that they are central of the housing 16. In more detail, it will be appreciated from figures 8 and 9 that the elongate axis B of the elongate member 14 is substantially parallel with the axis 32 of the axle 31 of the motor 30, when viewed from the side. It will also be appreciated that the axis B and the axis 32 are aligned when viewed from the front (i.e. when viewed as in figure 2). It will also be appreciated that the axis B and axis 32 are offset from each other at a distance D.

In the present embodiment, the dirt collection container 18 is generally cylindrical and has an elongate axis A. Within the dirt collection container 18 is positioned a cyclonic separation device which also has an elongate axis coaxial with the axis A, the axis A being that about which dirt-laden air is caused to rotate as it passes through the apparatus 10. The elongate axis A is substantially horizontal in normal use. The axis A is transverse to the axis 32 of the axle 31 of the motor 30. It will also be appreciated that the axis A and axis 32 are offset from each other at a distance D.

Whilst in this embodiment the elongate axes of the dirt collection container 18 and the cyclonic separation device are coaxial or substantially coaxial, they need not be. They could, for example, be parallel and offset from each other or inclined relative to each other.

In normal use the axis 32 of the axle 31 of the motor 30 is positioned beneath the axis B of the elongate member 14. It will also be noted that the motor 30 is positioned rearwardly of and lower than the dirt collection container 18. This positioning assists in advantageously distributing the weight of the components in the housing 16. It will also be appreciated that the battery 23 is positioned forwardly of the motor 30 but also beneath the axis B.

It will be seen from the figures that in normal use the axis 32 of the axle 31 of the motor 30 extends towards the floor head 12 and underneath the axis A of the dirt collection container (and the cyclonic separation device). More particularly, in normal use the axis 32 of the axle 31 of the motor 30 extends towards the floor head 12 and underneath a lowermost wall 18b of the dirt collection container 18.

It will be appreciated that any appropriate motor could be used in the apparatus 10, and any appropriate handle configuration could be used.

When used in this specification and claims, the terms "comprises" and "comprising" and variations thereof mean that the specified features, steps or integers are included. The terms are not to be interpreted to exclude the presence of other features, steps or components.

CLAIMS

1. A surface cleaning apparatus including:

a housing supporting:

a suction source including a motor with an axle on an axis, which rotates a fan; and

a dirt collection container,

wherein the motor is positioned rearwardly of the dirt collection container, and lower than the dirt collection container such that in normal use the axis of the axle extends underneath a lowermost wall of the dirt collection container.

2. An apparatus according to claim 1 wherein the apparatus includes a floor head and an elongate member connecting the floor head to the housing, said elongate member including a passage for carrying dirt-laden air from the floor head to the dirt collection container.

3. An apparatus according to claim 2 wherein the elongate member is disconnectable from the floor head.

4. An apparatus according to claim 2 or claim 3, wherein the elongate member is disconnectable from the housing.

5. An apparatus according to any one of claims 2 to 4, wherein the housing is operable as a handheld surface cleaning apparatus when the elongate member and floor head are disconnected therefrom.

6. An apparatus according to any preceding claim wherein an elongate axis of the dirt collection container is substantially horizontal in normal use.

7. An apparatus according to any preceding claim wherein an elongate axis of a cyclonic separation device of the apparatus is substantially horizontal in normal use.

8. An apparatus according to claim 7 wherein elongate axes of the dirt collection container and the cyclonic separation device are parallel with each other.

9. An apparatus according to claim 7 wherein elongate axes of the dirt collection container and the cyclonic separation device are coaxial.

10. An apparatus according to any preceding claim wherein the housing includes or is connected to a handle for holding the apparatus.