

**Reeling device for a cable of an electrical appliance**

The invention relates to a reeling device for a cable of an electrical appliance, in particular for a vacuum cleaner, having a plug and a first reeling axis.

Electrical appliances, for example vacuum cleaners, sometimes have reeling devices for the cable for supplying power to the appliance. This is the case, for example, for domestic vacuum cleaners in the form of mobile floor-supported appliances. A reeling device of the type in question is known, for example, from DE 34 40 548 A1, in the case of which a drawn-out cable is wound up automatically onto the cable drum again by spring retraction. The cable drum here rotates about a central drum axis. Such a reeling device is also known from DE 34 48 046 C2. In this document, a device of the type in question is disposed on a vacuum cleaner configured as an upright unit, specifically in the region of the guiding handle at the end of the shaft of the vacuum cleaner. This reeling device is also formed in the manner of a cable drum, with a central axis around which the electric cable is reeled. If the electric cable is relatively long, as is provided for conventional domestic vacuum cleaners, this gives rise to handling-related disadvantages in particular in respect of the diameter and/or of the thickness of the device as measured in the axial direction. The diameter and/or thickness of the device are/is disproportionately large in comparison with the shaft or handle, at least in the situation where the electric cable has been reeled-in to the full extent or more or less to the full extent. There are also handling-related disadvantages in respect of the weight distribution and of the associated leverages in particular if such a device is disposed in the region of a vacuum-cleaner shaft, as is described in the previously mentioned DE 34 48 046 C2.



In respect of the prior art described above, a technical problem of the invention is seen as further improving a reeling device of the type in question, in particular in handling terms.

5

This problem is solved first and foremost by the subject matter of claim 1, this being based on a second reeling axis being provided, and the cable being reeled around both reeling axes in the form of elongate loops.

10 Accordingly, it is no longer the case that the reeled-up cable, as is known from the prior art, is concentrated around one reeling axis, for example as in the case of a cable drum. The addition of a second reeling axis gives rise to an elongate reeling shape,
15 which helps reduce the reeling width as measured in the radial direction in relation to the respective reeling axis. It is no longer the case that the entire length of the cable is concentrated directly on the reeling axis. Rather, in particular if a correspondingly large
20 spacing is selected between the reeling axes, much of the length of the cable is positioned in the portion which spans the region between the reeling axes. Correspondingly, the abovementioned radial reeling thickness also depends on the spacing between the
25 reeling axes. Selecting a larger spacing makes it possible, correspondingly, for the radial reeling thickness to be further reduced. This gives rise to a narrow construction for the reeling device as a whole, even in a situation in which the cable has been reeled
30 in to the full extent or more or less to the full extent. This also results in improved weight distribution for the device and for the reeled cable, which also leads to improved handling of the electrical appliance provided with this reeling device, and thus,
35 furthermore, in the case of such a reeling device being disposed on a hand-guided vacuum cleaner.

The subjects of the rest of the claims are explained hereinbelow in relation to the subject matter of Claim 1, but may also be important in their independent formulation.

5

Thus, in a preferred configuration, it is provided that the two reeling axes have rotationally symmetrical reeling bodies which interact with a reeling band directed over both reeling bodies. This configuration results in the two spaced-apart reeling bodies being synchronized. The electric cable is directed, by means of the reeling band, over the reeling bodies for reeling and unreeling purposes. A preferred reeling body, in addition, is one which is in the form of a gearwheel, the reeling band, in this context, being in the form of a toothed belt. Accordingly, the reeling bodies and reeling band are in positive engagement with one another. As an alternative, it is also possible to provide a combination comprising a frictional wheel and a conventional belt which is driven by friction. In the simplest configuration, this may also be a cable or the like. Furthermore, a gearwheel/chain combination is also conceivable for the purpose of forming the reeling device. In order further to simplify, in particular, the operation of reeling up the electric cable, it is preferably provided that at least one of the reeling bodies interacts with a drive. This may be an electric drive or the like. However, a mechanical solution in which, for example, the drive is in the form of a spring drive, is preferred. It proves to be further advantageous here if the spring of the spring drive is in the form of a torsion spring which, further preferably, is tensioned by virtue of the cable being drawn out. It is possible here, furthermore, for the drawn-out position of the cable to be secured, in first instance, by a latching means or the like, in order thus to prevent the electric cable from being driven via the tensioned torsion spring during operation of

10

15

20

25

30

35

the electrical appliance. The drive action for reeling up the cable, accordingly, is preferably triggered deliberately, for example by virtue of a catch being disengaged, this releasing the spring force for reeling-up purposes. The reeling device may be part of an upright electrical appliance, for example a mobile domestic appliance. It is also possible for such a reeling device to be used even in floor-supported traveling domestic vacuum cleaners. In the case of an upright vacuum cleaner, the reeling device may be secured, if appropriate in a non-releasable manner, to the basic unit, so that, following possible removal of the guide shaft, which is preferably kept in an electric-power-free state, the advantages of the reeling device are still maintained. In a further-proposed application, the reeling device is part of a vacuum-cleaner shaft which can be secured to the vacuum cleaner such that it can be unplugged therefrom. Handling-related advantages are achieved particularly in the case of such an application since elongate reeling-up over the two spaced-apart reeling axes, along with a narrow construction and correspondingly improved weight distribution, gives rise to improved handling capability as a result of lever properties which are further improved in relation to the known prior art. The reeling bodies are thus preferably spaced apart from one another in the longitudinal direction of the shaft, for example with one reeling body in that end region of the shaft which is directed towards the handle and one reeling body in that end portion of the shaft which can be plugged into the vacuum cleaner. The cable end which is remote from the plug is connected to the reeling band and, accordingly, runs around both reeling bodies during reeling-in and unreeling, in which case it follows the course of an elongate loop. In order to supply power to the vacuum cleaner, the cable end makes contact with an electrical power pick-up which, further preferably, is formed

within the reeling device. In one configuration, this electrical power pick-up has sliding contacts which allow the cable end connected to the reeling band to rotate. Such a sliding contact may also be provided, 5 for example, in the region of a reeling body of the reeling device. As an alternative, the electrical power pick-up is effected in a rotary component having pick-up shoes, the component being of bell-like form. Extending from this component is a cable which moves 10 around with the reeling band and merges there into the rest of the electric cable. The bell here is suspended in a rotatable manner, sliding contacts being formed between the bell and bell mount. Finally, it is proposed that the rotary part be disposed between the 15 reeling bodies as seen in the longitudinal direction of the shaft, that is to say, further preferably, centrally between the reeling bodies.

The invention is explained in more detail hereinbelow 20 with reference to the accompanying drawing, which illustrates just one exemplary embodiment and in which:

figure 1 shows a perspective illustration of a domestic vacuum cleaner in the form of an upright appliance and having a reeling device 25 according to the invention;

figure 2 shows a perspective illustration solely of the reeling device, the housing which 30 accommodates this device having been left out;

figure 3 shows a partially exploded perspective illustration of the view according to 35 figure 2;

figure 4 shows a further exploded perspective illustration of an end region of the reeling

- 6 -

device with a spring drive associated with a reeling body;

5 Figure 5 shows the reeling device illustrated in a side view, with the housing and vacuum-cleaner shaft represented by chain-dotted lines; and

10 Figure 6 shows a schematic illustration of the reeling device in plan view.

An electrical appliance in the form of a domestic vacuum cleaner 1 which is formed as a handle-guided unit, will be illustrated and described, in first
15 instance with reference to figure 1. The vacuum cleaner 1, in first instance, has a basic unit 2 which has a suction/fan unit (not illustrated) and carries a dust-filter bag (not illustrated) in a pivotable filter cassette 3.

20 An attachment unit 4 is connected, in terms of both flow and electric current, to the foot of the basic unit 2. By means of this attachment unit 4, the floor in question is treated by suction, and possibly
25 brushing, action.

A swan-neck-like continuation 5 starts from the basic unit 2 and extends over the region of the filter cassette 3. In the region of the free end, this
30 continuation 5 forms a plug-in socket for a shaft 6 of the vacuum cleaner 1. The associated ends of the shaft 6 and of the socket of the continuation are formed, in a known manner, as mechanical plug-in connecting elements.

35 An actuating handle 7 is formed in the region of the free end of the shaft 6. This handle has an ergonomically positioned thumb-actuable control unit 8

- 7 -

in the form of a sliding switch, via which it is possible to adjust the power of the electric motor accommodated in the basic unit 2.

5 Power is supplied to the basic unit 2, and optionally to the attachment unit 4, via an electric cable 9 which runs substantially into the shaft 6, the plug-in connection between the shaft 6 and continuation 5 of the basic unit 2 also having electrical plug-in
10 connections for electrically coupling the shaft 6 and basic unit 2.

The shaft 6 is mounted on the vacuum cleaner 1 or basic unit 2 such that it can be unplugged therefrom.

15

A reeling device A for an electric cable is secured to the shaft 6. This reeling device is integrated in a device housing 10 and is plug-mounted in a releasable manner, together with the shaft 6, on the basic unit 2
20 of the vacuum cleaner. As an alternative, it is also possible for the reeling device to be secured directly to the basic unit 2, for example in the region of the continuation 5.

25 The reeling device A, in first instance, has two reeling bodies 11, 12 which are spaced apart from one another in the longitudinal direction of the shaft 6. These reeling bodies 11, 12 are mounted such that they can be rotated about reeling axes x, y oriented
30 perpendicularly to the longitudinal extent of the shaft 6, which reeling axes x, y are formed by axial bodies 13 which are rooted in a carrying part 20 of the reeling device A.

35 The reeling bodies 11 and 12 are in the form of gearwheels. On the upper side and lower side, each reeling body 11, 12, or each gearwheel, is flanked by axially spaced-apart covering disks 14, 15, and this

gives rise to a U-shaped accommodating region, as seen in cross-section, the legs of the U being formed by the covering disks 14 and 15 and the cross-piece of the U being formed by the reeling body 11 or 12.

5

The two rotationally symmetrical reeling bodies 11 and 12 interact with a reeling band 16 in the form of a toothed belt, which is directed over both reeling bodies 11 and 12. This reeling band carries the cable end which is remote from the power plug 17 of the electric cable 9; accordingly, this cable end moves, during winding, over an elongate circulatory path.

The cable end is mounted on the reeling band 16 in the region of a possibly clip-like securing point 19. Starting from the latter, the electrical connection may be formed such that the electric conductors are connected to conductors which are integrated in the reeling band 16 and, in turn, by making contact with sliding contacts provided, make the electrical connection to the shaft-mounted cables.

As an alternative, the end cable portion which is secured to the reeling band 16, is, according to the illustrations in figures 5 and 6, continued into a region which is located between the reeling bodies 11 and 12 and in which, likewise secured to the basic carrier 20, a rotary component 18 with integrated electrical power pick-up in the form of sliding contacts is provided. The axis of rotation of the rotary component 18 runs parallel to the reeling axes x and y. As can be seen in particular from the schematic illustration in figure 6, the rotary component is a bell-like component into which the associated end of the electric cable 9 runs centrally. The electric cable 9 is disposed between this connection and the securing point 19 for the electric cable 9 to the reeling band 16 by way of a length supply which is adapted to the

greatest possible distance between the rotary component 18 and the securing point 19 on the reeling band 16. The length of this electric-cable portion, with the rotary component 18 disposed centrally between the reeling bodies 11 and 12, thus corresponds at least to the spacing between the axis of rotation z of the rotary component 18, this axis being oriented parallel to the reeling axes x, y, and the point of reversal of the reeling band 16 on the reeling body 11 or 12.

The electric cable 9 makes electrical contact with the electric conductors provided in the shaft 6 via the sliding contacts (not illustrated) provided in the rotary component 18.

The covering disks associated with the securing point 19 on the reeling band 16, and also the axial bodies of the reeling bodies 11 and 12, are dimensioned and positioned such that a through-gap remains for the through-passage of the cable portion leading to the centrally disposed rotary component 18.

The housing 10, which accommodates the reeling device A, has, in the direction of a reeling body 11, a window 21 for the through-passage of the electric cable 9.

The reeling body 12 interacts with a drive 22. The latter is in the form of a spring drive, for which purpose a torsion spring 23 is provided (cf. figure 4).

This torsion spring 23 is tensioned during unreeling and the associated winding-up action by the reeling band 16, this being further assisted by the positive interaction between the reeling band 16 and reeling bodies 11 and 12.

The electric cable 9 drawn out to a selected length is secured in position by a catch, with the spring force

- 10 -

which has built up being stored. The latching is produced by virtue of the electric cable 9 being subjected to two pulls in quick succession.

- 5 A single, quick pull on the electric cable disengages the catch. The spring force of the drive 22 is released, which results in the associated reeling body 12 and, via the latter, the reeling band 16 and the reeling body 11 rotating in the rewinding direction.
- 10 The electric cable 9 here is reeled onto the periphery of the reeling band 16, the covering disks 14, 15 preventing the electric cable 9 from deviating in the direction in which the reeling axes x and y extend.
- 15 The selected configuration provides an overall narrow construction of a reeling device A, which proves to be advantageous in terms of handling in particular if disposed on a vacuum-cleaner shaft 6. In the exemplary embodiment illustrated, the spacing selected between
- 20 the reeling axes x and y corresponds to approximately 5 to 10 times, preferably approximately 7 or 8 times, the diameter of a reeling body 11 or 12.

All features disclosed are (in themselves) pertinent to

25 the invention. The disclosure content of the associated/attached priority documents (copy of the prior application) is hereby also included in full in the disclosure of the application, also for the purpose of incorporating features of these documents in claims

30 of the present application.

CLAIMS

1. Reeling device (A) for a cable (9) of an electrical appliance, in particular for a vacuum cleaner (1), having a plug (17) and a first reeling axis (x), characterized in that a second reeling axis (y) is provided, and in that the cable is reeled around both reeling axes (x, y) in the form of elongate loops.
2. Reeling device according to Claim 1 or in particular according thereto, characterized in that the two reeling axes (x, y) have rotationally symmetrical reeling bodies (11, 12) which interact with a reeling band (16) directed over both reeling bodies (11, 12).
3. Reeling device according to one or more of the preceding claims or in particular according thereto, characterized in that a reeling body (11, 12) is in the form of a gearwheel, and in that the reeling band (16) is in the form of a toothed belt.
4. Reeling device according to one or more of the preceding claims or in particular according thereto, characterized in that at least one of the reeling bodies (11, 12) interacts with a drive (22).
5. Reeling device according to one or more of the preceding claims or in particular according thereto, characterized in that the drive (22) is in the form of a spring drive.
6. Reeling device according to one or more of the preceding claims or in particular according thereto, characterized in that the spring of the

- 12 -

spring device is in the form of a torsion spring (23).

7. Reeling device according to one or more of the preceding claims or in particular according thereto, characterized in that the spring is tensioned by virtue of the cable (9) being drawn out.
8. Reeling device according to one or more of the preceding claims or in particular according thereto, characterized in that the reeling device (A) is part of a vacuum-cleaner shaft (6) which can be secured to the vacuum cleaner (1) such that it can be unplugged therefrom.
9. Reeling device according to one or more of the preceding claims or in particular according thereto, characterized in that the reeling bodies (11, 12) are spaced apart from one another in the longitudinal direction of the shaft (6).
10. Reeling device according to one or more of the preceding claims or in particular according thereto, characterized in that the cable end which is remote from the plug (17) is connected to the reeling band (16).
11. Reeling device according to one or more of the preceding claims or in particular according thereto, characterized in that, in order to supply power to the vacuum cleaner (1), the cable end makes contact with an electrical power pick-up.
12. Reeling device according to one or more of the preceding claims or in particular according thereto, characterized in that the electrical power pick-up has sliding contacts.

13. Reeling device according to one or more of the preceding claims or in particular according thereto, characterized in that the electrical power pick-up is effected in a rotary component (18) having pick-up shoes.
14. Reeling device according to one or more of the preceding claims or in particular according thereto, characterized in that the rotary component (18) is disposed between the reeling bodies (11, 12) as seen in the longitudinal direction of the shaft (6).