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(71) Applicant(s):
**Electrolux Outdoor Products Limited
(Incorporated in the United Kingdom)
Preston Road, Aycliffe Industrial Park,
NEWTON AYCLIFFE, Co Durham, DL5 6UP,
United Kingdom**

(72) Inventor(s):
Ian Zetterstrom Smith

(74) Agent and/or Address for Service:
**Withers & Rogers LLP
Goldings House, 2 Hays Lane, LONDON,
SE1 2HW, United Kingdom**

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US 4194287 A **US 4185381 A**

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(54) Abstract Title: **Grass trimmer cutting head**

(57) A grass trimmer cutting head comprises a main body (1 figure 1), a spool 4 mounted within the main body, and a cutting line 7a, 7b coiled around the spool. The main body (1) is formed with an aperture (8a, 8b) through which the free end of the cutting line (7a, 7b) passes, and a ferrule 9, 10 is positioned within the main body adjacent to the aperture. The ferrule is constituted by a pair of guide members 9, 10 defining a tortuous path for the cutting line therebetween, the guide members each having a shank 9a, 10a and an enlarged end cap 9b, 10b, the cutting line 7a, 7b being positioned, in use, between the two shanks. There may also be a cap (2 figure 1) which covers the spool area.

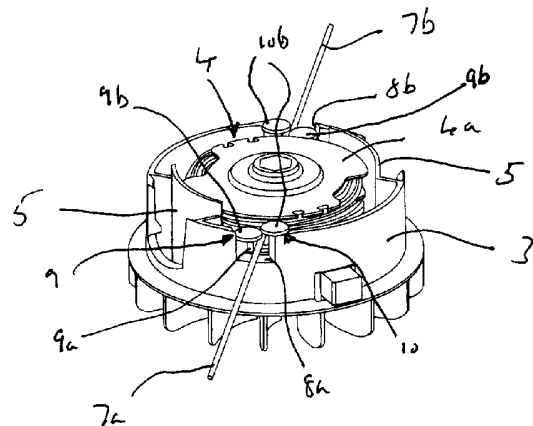


Fig 2

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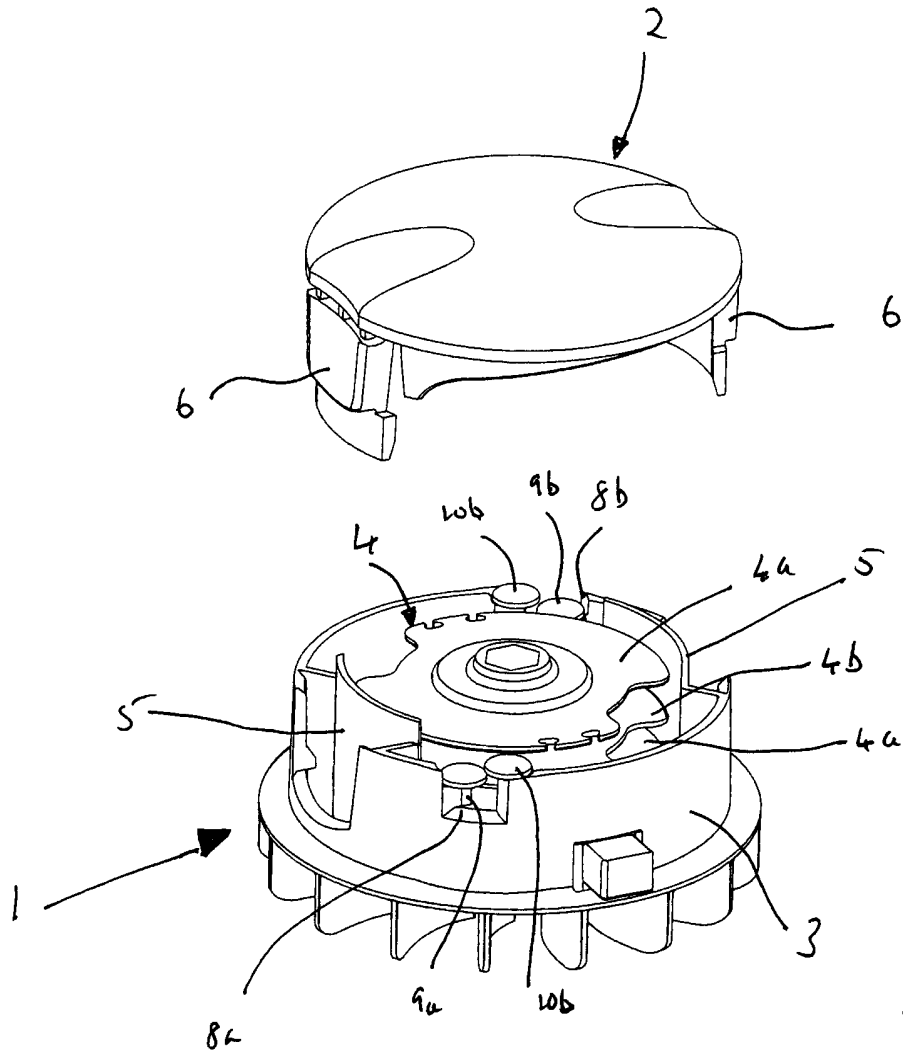


Fig. 1

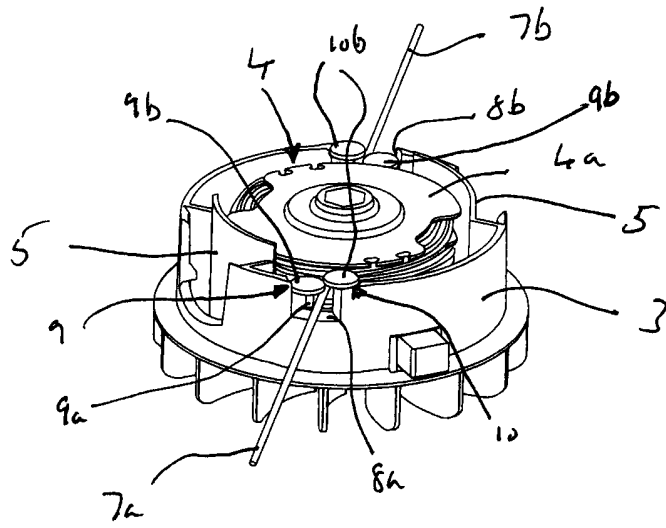


Fig. 2

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Grass Trimmer Cutting Head

This invention relates to a cutting head for a trimmer for cutting grass or like vegetation.

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A known grass trimmer has a rotatable cutting head which houses a spool onto which is wound a length of cutting line typically made of a plastics material. The free end of the cutting line is fed out of the cutting head via an aperture so that, as the cutting head is rotated, the cutting line can act to cut grass or other vegetation.

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In one known trimmer of this type, the spool is arranged within the cutting head for automatically feeding the cutting line outwardly so that it extends from the cutting head over a predetermined length. The spool is rotatable relative to the cutting head for feeding out the cutting line as it wears, thereby ensuring that a predetermined length of cutting line always extends radially beyond the cutting head. A cutting element can also be provided on a guard associated with the cutting head for trimming the cutting line to a desired length.

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In order to prevent damage to the cutting line where it exits the cutting head, it is known to provide a cutting head ferrule at the aperture in the cutting head, the ferrule being provided with curved guide surfaces for engagement with the cutting line.

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A known ferrule is a die-cast metal device formed with a generally T-shaped slot which is open at the base of the T to permit the cutting line to be positioned within the slot. This open end of the slot is closed, in use, when a cap is positioned over the cutting head. The disadvantage of a ferrule of this type is that it is relatively expensive to manufacture, and is difficult to fit within the moulding from which the cutting head is made. Moreover, where, as is normal in a modified form of known trimmer cutting head, the spool contains two separate lengths of cutting line, each of which exits the cutting head via a respective aperture provided with a ferrule, die-cast ferrules can result in imbalance of the cutting head as it rotates, this imbalance being caused by

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slightly different ferrule masses which can result from manufacturing tolerances such as different porosities. This type of ferrule also has the disadvantage that it is a press fit within its aperture, and so has a tendency to fly out when the cutting head is rotated at high speed. Because of manufacturing tolerances, it is also difficult to fit such a ferrule
5 into its aperture.

In another known trimmer, the ferrule is generally cylindrical, so has no edge opening through which the cutting line can be inserted. As a result, the cutting line must be threaded through the centre of the ferrule, and this is difficult to accomplish in practice.
10 Where the cutting head has two cutting lines, this threading difficulty is compounded.

The present invention provides a grass trimmer cutting head comprising a spool carrier, a spool mounted within the spool carrier, a cutting line coiled around the spool, the spool carrier being formed with an aperture through which the free end of the cutting
15 line passes, and a ferrule positioned within the spool carrier adjacent to the aperture, wherein the ferrule is constituted by a pair of guide members defining a tortuous path for the cutting line therebetween, the guide members each having a shank and an enlarged end cap, the cutting line being positioned, in use, between the two shanks.

In a preferred embodiment, the cutting head further comprises an additional component detachably fixed to the spool carrier so as to overlie the spool and the end caps of the guide members. Advantageously, the spool carrier is constituted by a main body of the cutting head, and a cap constitutes the additional component. Alternatively, the additional component is constituted by a main body of the cutting head, and a cap
25 constitutes the spool carrier. Preferably, the additional component is a snap fit onto the spool carrier.

In a preferred embodiment, the end caps are positioned apart by such a distance that the cutting line can just be threaded therebetween.
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The guide members may be made of a material, such as aluminium, or of a plastics material.

Preferably, the shank of each guide member is fixed to the spool carrier within a respective complementary hole formed in the spool carrier.

- 5 Advantageously, the depth of each hole is substantially larger than the length of the exposed shank of the associated guide member when the shank of that guide member is fully inserted into that hole, and preferably, the depth of each hole is substantially twice the length of said exposed shank.
- 10 Conveniently, each shank is fitted into the associated hole by overmoulding, an interference fit, welding, or by displacing the material thereof to form a riveted connection.

15 In a preferred embodiment, the spool carrier is formed with a pair of diametrically-opposed apertures, the spool defines two regions for cutting line storage, a respective cutting line is coiled around the spool in each of said regions, and a respective ferrule is formed within the spool carrier adjacent to each of the apertures, wherein each of the ferrules has the features defined above.

- 20 The invention will now be described in greater detail, by way of example, with reference to the drawings, in which: -

Figure 1 is an exploded perspective view of a trimmer cutting head constructed in accordance with the invention; and

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Figure 2 is a perspective view of part of the cutting head of Figure 1.

Referring to the drawings, Figure 1 shows a trimmer cutting head having a main body 1 and a cap 2. The main body 1 has a cylindrical outer wall 3 which houses a spool 4. The wall 2 is formed with a pair of diametrically-opposed indented portions 5, and the cap 2 is provided with a pair of diametrically-opposed, downwardly-depending flanges 6 integrally formed therewith. The main body 1 and the cap 2 are made of a

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thermoplastics material such as ABS, and the flanges 6 are connected to the cap 2 in such a manner that they are resiliently deformable so as to be snap-engageable with the indented portions 5 of the main body 1.

5 As shown in Figure 1 the spool 4 is formed with a pair of spaced end plates 4a and a central flange 4b which extends radially from a central core (not shown). The central flange 4b divides the spool into two regions, each of which houses a respective coiled trimmer line 7a, 7b (see Figure 2) made of nylon.

10 The cylindrical outer wall 3 of the main body 1 of the trimmer cutting head is formed with a pair of diametrically-opposed apertures 8a, 8b, through which the free end of a respective one of the cutting lines 7a, 7b passes.

A respective ferrule, constituted by a respective pair of guide members 9, 10, is
15 provided inside the cylindrical outer wall 3 in alignment with each of the apertures 8a, 8b. Each of the guide members 9, 10 has a main, cylindrical body portion (shank) 9a, 10a which terminates in an upper cap 9b, 10b whose diameter is greater than that of the respective shank. Each pair of guide members 9, 10 defines a tortuous path through
20 which the free end of the respective cutting line 7a, 7b can be threaded prior to exiting the cutting head via the associated aperture 8a, 8b. Each of the cutting lines 7a, 7b is threaded between the associated guide members 9, 10, prior to the cap 2 being fixed to the main body 1, by threading that cutting line past the upper caps 9b, 10b so as to lie loosely between the shanks 9a, 10a. The caps 9b, 10b subsequently act to prevent the cutting lines 7a, 8a escaping from between the shanks 9a, 10a. Once the cap 2 is
25 snapped into position on the main body 1, it substantially overlies the upper caps 9b, 10b, thereby providing an additional safeguard against the possibility of the cutting lines 7a, 8a escaping.

The guide members 9, 10 are made of aluminium, and are formed by turning or
30 cropping and forging. Alternatively, the guide members 9, 10 are made of a plastics material such as acetal by plastic moulding. These methods of manufacturing the guide

members 9, 10 result in a very repeatable component weight, thereby overcoming the problem of varying imbalances which was the case with die-cast ferrules.

5 The guide members 9, 10 are secured within the cutting head main body 1 by plastic deformation, overmoulding, welding or by interference fit within holes, not shown, formed in the cutting head body 1 to take the shanks 9a, 10a of the guide members 9, 10, these holes being positioned in the line of draw of the cutting head main body. This is advantageous, in that it leads to tooling that is both less expensive to manufacture, and is more reliable in production. Moreover, the portion of each shank 9a, 10a that is received within its respective hole can be large compared with the exposed portion of that shank. Typically, the portion of each shank 9a, 10a housed within its hole has twice the length of the exposed portion thereof. This results in a structure that is very strong, so that the guide members 9, 10 cannot be displaced from the cutting head when the cap 2 is in place, even if the mechanical fixing between the guide members and the cutting head main body 1 breaks down.

15 The main advantage of the cutting head described above is that the ferrules 9, 10 each defines a tortuous path for the respective cutting line 7a, 8a, thereby substantially preventing the possibility of that cutting line escaping. Moreover, as the guide members 9, 10 are repeatable components, the cutting head does not suffer from imbalance problems.

25 It will be apparent that modifications could be made to the cutting head described above. Thus, the spool 4 and the ferrules 9, 10 could be positioned within the cap 2 instead of in the main body 1. It would also be possible for each ferrule to be constituted by a single, separate guide member fixed within a hole in the main body 1 or the cap 2, and to form the second guide member of that ferrule by a guide projection formed integrally with the main body or the cap.

Claims

1. A grass trimmer cutting head comprising a spool carrier, a spool mounted within the spool carrier, a cutting line coiled around the spool, the spool carrier being formed with an aperture through which the free end of the cutting line passes, and a ferrule positioned within the spool carrier adjacent to the aperture, wherein the ferrule is constituted by a pair of guide members defining a tortuous path for the cutting line therebetween, the guide members each having a shank and an enlarged end cap, the cutting line being positioned, in use, between the two shanks.

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2. A cutting head as claimed in claim 1, further comprising an additional component detachably fixed to the spool carrier so as to overlie the spool and the end caps of the guide members.

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3. A cutting head as claimed in claim 2, wherein the spool carrier is constituted by a main body of the cutting head, and a cap constitutes the additional component.

4. A cutting head as claimed in claim 2, wherein the additional component is constituted by a main body of the cutting head, and a cap constitutes the spool carrier.

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5. A cutting head as claimed in any one of claims 2 to 4, wherein the additional component is a snap fit onto the spool carrier.

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6. A cutting head as claimed in any one of claims 1 to 5, wherein the end caps are positioned apart by such a distance that the cutting line can just be threaded therebetween.

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7. A cutting head as claimed in any one of claims 1 to 6, wherein the guide members are made of a metal.

8. A cutting head as claimed in claim 5, wherein the guide members are made of aluminium.

5 9. A cutting head as claimed in any one of claims 1 to 4, wherein the guide members are made of a plastics material.

10 10. A cutting head as claimed in any one of claims 1 to 9, wherein the shank of each guide member is fixed to the spool carrier within a respective complementary hole formed in the spool carrier.

11. A cutting head as claimed in claim 10, wherein the depth of each hole is substantially larger than the length of the exposed shank of the associated guide member when the shank of that guide member is fully inserted into that hole.

15 12. A cutting head as claimed in claim 9, wherein the depth of each hole is substantially twice the length of said exposed shank.

20 13. A cutting head as claimed in any one of claims 10 to 12, wherein each shank is fitted into the associated hole by overmoulding, an interference fit, welding, or by displacing the material thereof to form a riveted connection.

25 14. A cutting head as claimed in any one of claims 1 to 11, wherein the spool carrier is formed with a pair of diametrically-opposed apertures, the spool defines two regions for cutting line storage, a respective cutting line is coiled around the spool in each of said regions, and a respective ferrule is formed within the spool carrier adjacent to each of the apertures, wherein each of the ferrules has the features defined in any one of claims 1 to 13.



INVESTOR IN PEOPLE

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Claims searched: 1-14

Date of search: 14 December 2004

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
A	-	US 4194287 A (PALMIERI) Note guide rollers 51.
A	-	US 4185381 A (PALMIERI) Note guide rollers 51.

Categories:

X Document indicating lack of novelty or inventive step	A Document indicating technological background and/or state of the art.
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& Member of the same patent family	E Patent document published on or after, but with priority date earlier than, the filing date of this application

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^W:

A1F

Worldwide search of patent documents classified in the following areas of the IPC⁰⁷

A01D

The following online and other databases have been used in the preparation of this search report

WPI, EPODOC, JAPIO