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(12) # EUROPEAN PATENT APPLICATION

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(54) **Shaving apparatus.**

(57) In a shaving apparatus comprising a cutting unit which comprises a first cutting member with hair-entry apertures and a second cutting member which is rotatable relative to the first cutting member, the second cutting member is coupled to a drive mechanism by means of a spindle. The spindle comprises two portions which are movable relative to each other in a substantially axial direction, a first spindle portion having a coupling end which engages a recess in a second spindle portion and which is formed with a flange, which is retained in the recess by means of elastically deflexible limbs formed by wall portions of the second spindle portion. The limbs extend substantially tangentially of the spindle and are at least partly directed inwards relative to the wall of the recess.

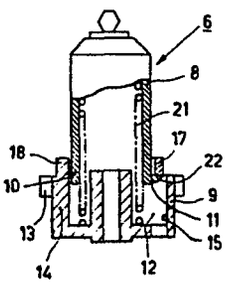



FIG.2

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"Shaving apparatus".

The invention relates to a shaving apparatus comprising a cutting unit which comprises a first cutting member with hair-entry apertures and a second cutting member which is rotatable relative to the first cutting member, which second cutting member is coupled to a drive mechanism by means of a spindle, which spindle comprises two portions which are movable relative to each other in a substantially axial direction, a first spindle portion having a coupling end which is situated in a recess in a second spindle portion and which is formed with a flange which is retained in said recess by means of elastically deflexible limbs formed by wall portions of the second spindle portion. Such a shaving apparatus is disclosed in, for example, US-PS 4,257,161 (PHN 8940).

The invention aims at providing a coupling of minimal dimensions between the cutting unit and the drive mechanism and is characterized in that the elastically deflexible limbs extend substantially tagentially of the spindle and are directed at least partly inwards relative to the wall of the recess.

A special embodiment is characterized in that the elastically deflexible limbs are formed on the ends of axial ridges in the recess of the second spindle portion.

A embodiment of the invention will now be described in more detail, by way of example, with reference to the Figures.

Figure 1 shows a shaving apparatus having three cutting units in a side elevation and partly in cross-section.

Figure 2 is a sectional view of the spindle.

Figure 3 is a plan view of the spindle shown in Fig. 2.

Figure 4 is a side elevation of a spindle portion of the spindle shown in Figs. 2 and 3.

The shaving apparatus shown in Figure 1 comprises a housing 1 and cutting units 2, a cutting unit comprising a first cutting member 3 with hair-entry apertures 4 and a second cutting member 5 which is rotatable relative to the first cutting member 3. For this purpose the second cutting member 5 is coupled to the drive mechanism 7 by means of a

spindle 6.

The spindle 6 (see Figures, 2, 3 and 4) comprises two spindle portions 8 and 9 which are movable relative to each other in a substantially axial direction. The first spindle portion 8 a coupling end 10 with a flange 11. This flange 11 engages a recess 12 of the second spindle portion 9. The spindle portion 9 is provided with a gear ring 13 for the coupling to the drive mechanism 7. In the recess 12 three ridges 14 are formed which extend in the axial direction and which are integral with the wall 15 of the recess 12. The ridges 14 engage in three recesses 16 in the flange 11, thereby imparting the rotation of the spindle portion 9 to the spindle portion 8. The flange 11 is retained in the recess 12 by means of elastically deflexible limbs 17. These limbs 17 extend from the ends 18 of the ridges 15 in a substantially tangential direction relative to the spindle, enabling the overall length of the spindle 6 to the minimized. In the assembled condition at least the ends 19 of the limbs 17 are situated above the portions 20 of the flange 11 which are spaced by the recesses 16, so that they effectively retain the flange. The portions 20 of the flange 11 are urged against said elastically deflexible limbs by the compression spring 21 which is enclosed within the spindle portions 8 and 9. When the spindle portion 8 is fitted into the spindle portion 9 the ends 19 of the limbs are pressed radially outwards to allow the portions 20 of the flange 11 to move past these end 19. The portions 20 of the flange may be formed with oblique guide faces 20 to facilitate the passage of these end. The elastically deflexible limbs 17 extend in the circumferential direction from an end 18 of a ridge 15 to a point near the end 18 of an adjacent ridge. The portions 20 of the flange 11 should only cover a small circumferential or tangential distance, for example 1/6 of the circumference.

CLAIMS :

1. A shaving apparatus comprising a cutting unit which comprises a first cutting member with hair-entry apertures and a second cutting member which is rotatable relative to the first cutting member, which second cutting member is coupled to a drive mechanism by means of a spindle, which spindle comprises two portions which are movable relative to each other in a substantially axial direction, a first spindle portion having a coupling end which is situated in a recess in a second spindle portion and which is formed with a flange which is retained in said recess by means of elastically deflexible limbs formed by wall portions of the second spindle portion, characterized in that the elastically deflexible limbs extend substantially tangentially of the spindle and are directed at least partly inwards relative to the wall of the recess.

2. A shaving apparatus as claimed in Claim 1, characterized in that the elastically deflexible limbs are formed on the ends of axial ridges in the recess of the second spindle portion.

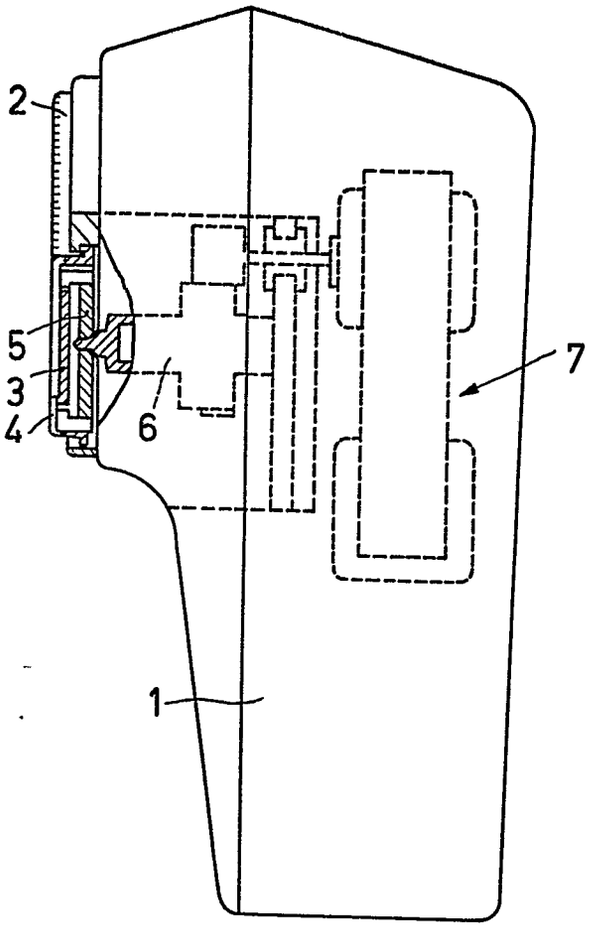



FIG.1

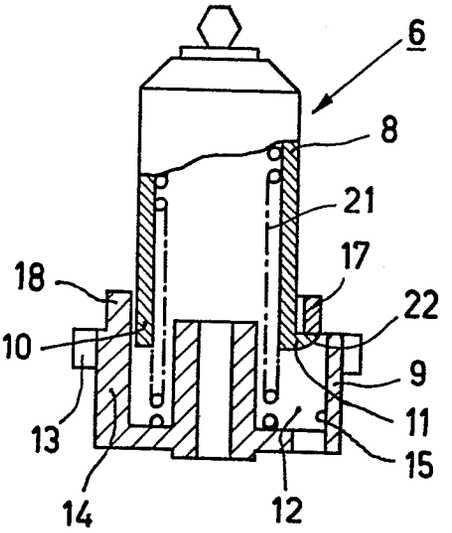



FIG.2

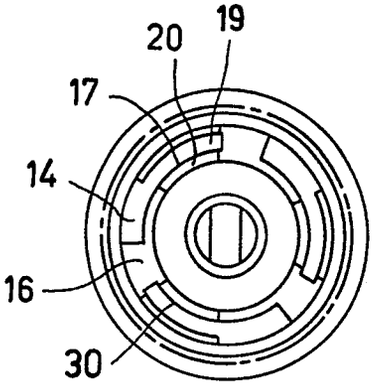



FIG.3

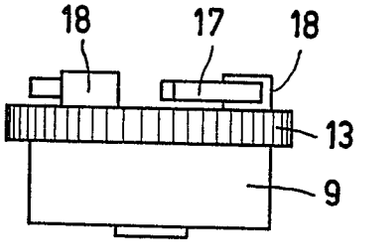



FIG.4

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# EUROPEAN SEARCH REPORT

0102667
Application number

EP 83201222.3

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (Int. Cl. ³) |
|---|---|---|---|
| D,A | US - A - 4 257 161 (HENDRIK A.C. BIJL; WIJTES BERGSMA)<br>* Fig. 3,5 *<br>-- | | B 26 B 19/14<br>B 26 B 19/28 |
| A | FR - A1 - 2 454 879 (NV PHILIPS' GLOEILAMPEN-FABRIEKEN)<br>* Fig. 7 *<br>-- | | |
| A | FR - A - 1 141 155 (GARNIER)<br>* Totality *<br>-- | | |
| A | US - A - 3 602 535 (BEHNING)<br>* Fig. 4 *<br>---- | | |

TECHNICAL FIELDS SEARCHED (Int. Cl. ³)

B 26 B 1/00
B 26 B 2/00
B 26 B 3/00
F 16 D 1/00
F 16 D 3/00

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| VIENNA | 17-11-1983 | MANLIK |

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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