July 28, 1964 L. MARESCALCHI 3,142,118

DRY SHAVER WITH OSCILLATING COMB HEAD AND A ROTATING INNER CUTTER

Filed Oct. 9, 1961

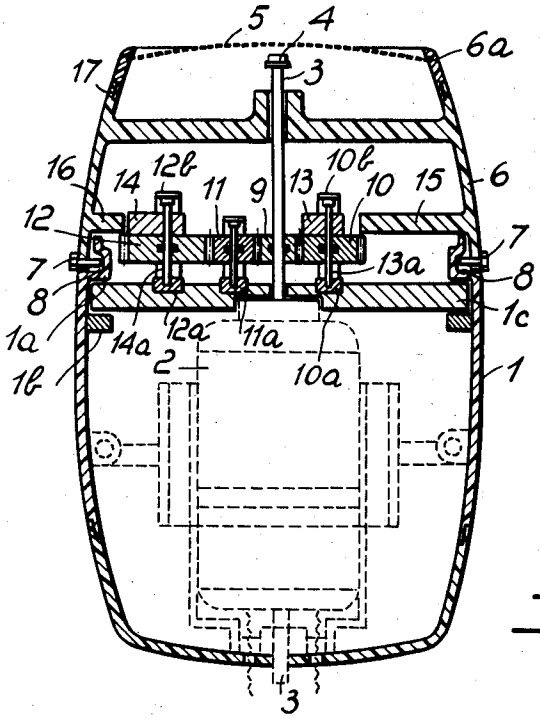

Fig. 1

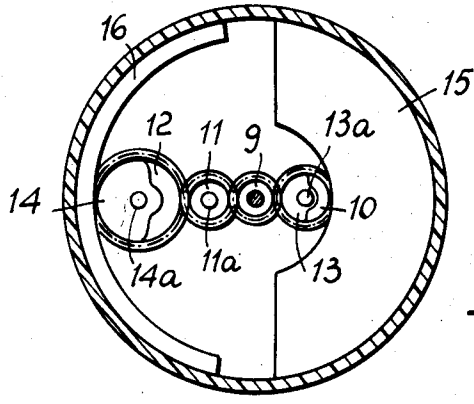

Fig. 2

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DRY SHAVER WITH OSCILLATING COMB HEAD AND A ROTATING INNER CUTTER

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1 Claim. (Cl. 30—43)

This invention relates to dry shavers which are powered by an electric motor and which are provided with a shearing head, said electric motor driving a cutting means within a comb which forms a part of said shearing head. More particularly, this invention relates to dry shavers in which the shearing head performs oscillatable movements around an axis which is perpendicular to the shaving surface and to the skin to be shaved, as disclosed in U.S. Patent No. 2,920,387, issued to Luciano Marescalchi.

The main object of the present invention is to provide driving means for causing the shearing head to oscillate, which driving means give raise to a soft engagement, along large radius curved surfaces between the driving and the driven elements respectively of said driving means, so as to ensure a smoother working and higher speeds of the dry shaver itself.

A further object is to provide driving and driven elements which are simple to manufacture, in assembling and in operation, thus enhancing the constructive performances and the efficiency of the dry shaver.

Further objects, features and advantages will be more apparent from the description of a preferred embodiment, which is illustrated, by way of example only, in the accompanying drawing, wherein:

FIG. 1 is a side sectional view of a dry shaver according to the invention, wherein the relevant parts are markedly shown, whilst some conventional parts are either represented by dotted lines or omitted at all for clarity's sake.

FIG. 2 is a horizontal sectional view along lines II—II of FIG. 1.

Referring now more particularly to the drawing, the dry shaver comprises a casing **1** housing a driving means in the form of an electrical motor **2**, the driving shaft **3** of which has an end **4** carrying the cutting means (not shown), arranged below and adjacent the comb or shaving net **5**, which forms the surface in contact with the skin to be shaved, the comb and the cutting means forming an oscillatable head, as will be seen. The comb **5** is carried by the cap or head **6**, which is mounted on the casing **1** so as to be capable of rotating on the same. Screws **7** or any other slidable means, which cross the cap or head **6** and engage within the circumferential slot **8** of the casing **1**, provide for said cap or head being rotatable on the casing **1**, but being prevented from being axially removed from said casing. A pinion **9** is keyed on shaft **3**, said pinion meshing with the two toothed wheels **10** and **11**, which are symmetrically arranged with respect to said pinion along a diameter included in a vertical section of the shaver casing **1**. Wheel **11** meshes in turn with a toothed wheel **12** arranged on the same diameter as that hereinabove mentioned.

To the toothed wheels **10** and **12**, two semicircular sectors respectively, which are marked by reference numerals **13** and **14** are coaxially secured. The first sector **13** is intended for frictional engagement with a first rim **15**, which is integral with the cap **6**, whilst in turn the second sector **14** is intended for frictionally engaging a second rim **16**, which is also integral with cap or head **6**.

For reasons of movement symmetry, it is preferred that the transmission ratio between sector **13** and rim **15** is equal to the transmission ratio between sector **14** and rim **16**.

To this end it will be necessary that the radius of the sector **14** be larger than the radius of sector **13** since the radius of the rim **16** is for constructive requirements (as is apparent from FIG. 2) larger than that of rim **15**. In the embodiment, in order that the two aforesaid transmission ratios may be equal it will be necessary that the ratio between the radius of sectors **13** and **14** be equal to that of the radius of rims **15** and **16**.

To complete the description with more details, it may be mentioned that between the top portion of casing **1**, which top portion has a smaller cross size and thus forms a shoulder **1***a*, and a ring **1***b* secured to the inner wall of said casing, a plate **1***c* is arranged, in upper recesses of which the frames **10***a*, **10***b* and **12***a*, **12***b* respectively are partially housed. Starting from the upper part of these frames and across themselves, a first driven shaft **13***a* and a second driven shaft **14***a* extend in parallel relationship with the driving shaft **3**. On these shafts **13***a* and **14***a* the units consisting of wheel **10**—sector **13** and wheel **12**—sector **14** are respectively mounted, so that these units may rotate each as a single member.

The top part **6***a* of cap **6** is secured in a removable manner, in **17** to the remaining part of the cap, in order to allow the cutting means to be cleaned.

The working of the shaver is as follows:

Assuming that the rotation direction of the driving shaft **3** and of the pinion **9** is anti-colckwise and assuming that the position of the different transmission members corresponds to that of FIG. 2, it will be observed that wheel **10** will rotate clockwise along with sector **13**, which, in the assumed moment, is not in contact with the rim **15**. The wheel **11**, in turn will rotate clockwise and will drive in anti-cockwise direction the wheel **12** and the sector **14**.

In this moment the sector **14** is in contact with the rim **16** thus compelling this rim to be moved anti-clockwise taking along therewith, in the same direction, also the comb carrying means and consequently the comb **5**.

The motion of the rim **16** will continue as long as there will be a contact with the sector **14** (a quarter of the revolution of the sector if the motion starts from the moment represented in the drawing and if the sectors are of semi-circular shape).

Either in the moment in which (whilst continuing the rotation of the shaft **3**) the contact between the rim **16** and the sector **14** is interrupted or after a more or less long halt, a contact between sector **13** and rim **15** is established.

The sector **13**, which rotates clockwise will compel now the rim **15** to be rotated also clockwise, taking therewith also the cap **6** and the comb **5**. If the sector is semicircular in shape the contact thereof with the rim **15** will have the amplitude of half a revolution of the sector.

In virtue of the alternate sequence in which the sectors are coming into contact with the rims **15** and **16**, the movement of the cap and of the comb **5** will be alternately clockwise and anti-clockwise with an inversion frequency which is proportional to the own rotation frequency of the driving shaft **3**.

It is obvious that the amplitude of rotation of cap **6** will depend exclusively from the transmission ratio between sector and rim and may be changed at will by varying this same transmission ratio. According to an advantageous feature, in order to have a short halt phase between one oscillation and the successive antagonist one, the amplitude of sector **13** and **14** is limited to a portion which is less than the semi-circular one. In this manner when the contact between one of the two sectors and the corresponding rim is interrupted, the other sector does not come immediately into contact with the respective rim, since it has to be still more rotated along a certain angle before the contact is coming into being. In this manner,

the harmful effect is reduced, which is imparted upon the device as a consequence of the abrupt inversion of the rotation.

I wish it to be understood that I do not desire to be limited to the exact details of the exemplification of construction shown and described, for obvious modifications will occur to a person skilled in the art.

I claim:

A dry shaver comprising a casing, a head disposed on said casing and including a comb having a skin contacting shaving surface and inner cutting means disposed in said comb, said head being oscillatable about an axis extending in the longitudinal direction of said casing at right angle to the skin contacting shaving surface of said comb, driving means operating said cutting means including a driving shaft extending in said longitudinal direction of said casing and having an axis coinciding wth said longitudinal axis, a first and a second driven shaft parallel to

and driven by said driving shaft, a first circular sector secured to said first driven shaft and a second circular sector secured to said second driven shaft, a first rim integral with and projecting from said head towards said first sector, to be frictionally engaged thereby and a second rim integral with and projecting from said head towards said second sector to be frictionally engaged thereby, said first sector and said second sector having an angular amplitude of tendentially 180 degrees.

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