

Candidate's Answer Paper

CLAIMS

1. A dry shaver comprising a motor (2) having a rotor (3), a reciprocating cutter (23) and a drive mechanism connecting the rotor to the reciprocating cutter and converting rotary motion to reciprocating motion,

whereby the drive mechanism comprises a cam (9; 59; 69) having a cam surface (10; 60; 70) coupled to the rotor and a cam follower (11; 41) cooperating with the cam surface and coupled to the reciprocating cutter

wherein the cam follower comprises a pivotable lever having a first arm (14;42) mounting a wheel (12;45) in contact with the cam surface, and a second arm (15;43) coupled to the reciprocating cutter,

characterised in that the pivotable lever further comprises a third arm (44), the first and third arm each mounting a wheel (45,46), such that each wheel in each position of the cam prevents the other wheel from losing contact with the cam surface.
2. A dry shaver as claimed in claim 1, wherein the motor is a single phase synchronous electric motor.
3. A dry shaver as claimed in either of claims 1 and 2, wherein the cam surface is substantially elliptical.
4. A dry shaver as claimed in any of claims 1 to 3, wherein the surface of each wheel which is in contact with the cam surface is made of an elastic material (26).
5. A dry shaver as claimed in any of claims 1 to 4, wherein at least the first arm is elastic.
6. A dry shaver as claimed in any of claims 1 to 5, wherein the or each wheel is elastically mounted on the respective arm.
7. A dry shaver as claimed in any of claims 1,2 and 4-6, wherein the cam surface is substantially triangular.
8. A dry shaver as claimed in any of claims 1, 2 and 4-6, wherein the cam surface is substantially square-shaped.

Accompanying Letter

Following your communication, we file a new set of claims 1-8, in order to overcome objections raised therein.

Article 123(2)

New claim 1 is based on a combination of previous claims 1, 4 and 7. A further statement of function has been added to claim 1, which can be found clearly in the description as originally filed at page 4, lines 19-21.

New claims 2, 3, 4, 5 and 6 correspond to original claims 2, 3, 8, 9 and 10. Claims 5 and 6 have been deleted, as the embodiment to which they refer is no longer within the scope of new claim 1.

New claims 7 and 8 have been added. These are clearly based upon the description, at page 4, lines 16-21 and 23-26 respectively. See also figures 3 and 4 as originally filed.

It is submitted that the requirements of Rule 86(4) EPC are complied with, in that, on the one hand all of the features of original claim 1 are maintained in the new claim 1, thus ensuring unity with regard to the original and new claim 1. On the other hand, the application was searched under Article 92(1) EPC and a report drawn up on the basis of both the claims, the description and the drawings. New claim 1 is therefore fully based in the original disclosure.

Article 84 EPC

The claims are considered to be clear in their present form. The contention of the examiner, at point 3 of the communication is disputed. Claim 1 solves the problem of noise in dry shavers in general. Whether or not the shaver has a slowly rotating motor is of immediate no concern to this problem. In the case where a faster motor is provided, noise reduction can be achieved by providing a cam with a higher transmission ratio than 1:2. However, it is clear from the description, that transmission ratios can be selected which more than double the oscillating frequency of the cutter relative to the motor frequency. Nevertheless, the skilled person would be well aware of the possibility, in theory, of using transmission means having, say, a 1:1 ratio, in as already stated, for example, a shaver with a sufficiently fast motor. This possibility is provided for under the scope of original claim 1. It is submitted that it would be unreasonable to limit the scope of the present invention to such embodiments. A skilled person would not be required to be inventive in order to provide the desired and appropriate transmission ratio, for proper functioning of the shaver.

Novelty: Art. 52(1) & 54 EPC

Claim 1 has been delimited (Rule 29(1) EPC) according to DII, which is now considered to represent the closest prior art.

DII discloses a dry shaver in which the mechanism for converting rotational to reciprocal motion comprises a cam and follower coupled to reciprocating cutter means. The follower wheel is mounted upon one arm of a lever, a second arm being coupled to the cutter. The two arms are in a rigid relationship to one another, and are pivotable about a single pivot.

The features of claim 1 differ from the mechanism of DII in that a third arm is provided, which arm

supports a further wheel which contacts the cam. Claim 1 is therefore novel over DII.

Document D1 on the other hand, discloses no cam means. D1 relies on a mechanism in which two toothed wheels are in rotational engagement, the second of which is coupled to the cutter via a lever and a pin. Claim 1 is thus manifestly novel over DI.

DIII discloses a shaver mechanism in which a cam is provided with follower means in the form of two wheels mounted each upon a projection of a reciprocating plate. A further portion of the said plate is coupled to the reciprocating cutter. This device does not disclose a pivotable lever however. There can be no question of considering the pivoting lever of the invention to be a technical equivalent to the plate of DIII, since the latter is in translation, whilst the former pivots. Novelty therefore is not anticipated by the disclosures of DIII.

Inventive step: Art. 52(1) and 56 EPC

As previously mentioned above, the preamble of claim 1 is based upon DII.

Claim 1 differs from DII in that the pivotable lever comprises a third arm being a further wheel, such that contact is ensured at all times between the cam and the wheels.

The problem posed with regard to DII is that of providing an improved alternative to the spring means (13) disclosed therein. The spring means act to maintain the cam follower in contact with the cam, to ensure proper reciprocation of the cutter. These means require adjustment however, and this in turn represents a burden at the manufacturing stage, not to mention the additional work involved in setting up the spring means (13).

In order to solve this problem, a device is hereby proposed in which the pivoting lever is provided with an additional arm supporting a further wheel means in contact with the cam. This guarantees good contact of the follower with the cam in both directions of oscillation, while avoiding the need for any adjustment, and allowing a simpler assembly of the device.

Document DII does not suggest a solution to this problem: DII provides for contact between cam and follower using spring means, as already discussed. It would not be obvious for the skilled man to incorporate an additional arm onto the lever of DII, because this would serve no practical purpose, there already being a spring provided fulfilling the same function.

Document DIII, as pointed out under point 6 of examiner's communication, discloses the use of two wheels engaging cam means and each being provided on a separate arm of a translating plate. It is submitted that a skilled person, given the problem posed, would be led away from the solution claimed in the present claim 1 upon reading document DIII. Applicant cannot agree with examiner's point of view, that perusal of DIII would lead a skilled person to the subject-matter of original claim 7. It is pointed out that DIII discloses a cam follower in translation with regard to the mechanism of the shaver. Thus, it is conceded that DIII would solve the problem of obviating the need for a spring means, but it is clear for the skilled men, that the translation motion of the plate (8) of the DIII device is grossly inefficient compared with the lever of DII. The skilled person will readily appreciate that losses due to friction in the slide member and guide (15, 21, 14, 13) make the solution of DIII unfavorable with regard to both noise and energy inefficiency. Furthermore, the rollers of DIII (12, 11) are in an extremely disadvantageous relationship to the axis 4), with a low mechanical advantage, thus posing an unnecessary burden on the motor. A skilled person would thus be led away

from employing a second wheel and arm for the follower, by the disadvantages associated with and discussed above.

A combination of the teaching of DII and DI can also not jeopardise the inventiveness of present claim 1. Document 1 neither teaches the use of second follower means on the cam, nor the use of a three armed lever. The problem to be solved with regard to DII is irrelevant to D1, since D1 provides for a positive toothed drive, obviating the need for additional means to maintain a drive relationship. Besides, the device of D1 does not ensure low-noise operation.

It is therefore submitted that the subject-matter of claim 1 is inventive having regard to DII and either combination of DIII or DI.

Should the examiner consider it more appropriate to take DIII as a starting point for evaluation of inventive step, then it is also submitted that this would not lead to the subject-matter of claim 1 lacking an inventive step.

Claim 1 differs from DIII in that a three-armed pivoting lever is used instead of the translating plate (8) upon which the wheels (11, 12) are mounted.

The problem solved by this feature is that of simplifying the mechanism of DIII with regard in particular to improving efficiency.

A skilled person seeking to improve the device of DIII, and knowing the device of DII, might arguably be taught to use a pivoting lever in place of the plate (8). However, there is no reason to presume that the skilled person would arrive at the features of claim 1 by this route, since it still remains for the wheels (11, 12) and arms (9, 10) to be configured such that they are in contact with the cam at all positions. DII teaches the skilled person to provide a single lever arm and wheel coupled to the cam, and a further arm coupled to the cutter in conjunction with spring-biasing means. It is apparent, in studying DIII, that the plate (8) is not suitable to be used as a pivot in the form in which it appears on figure 1 of DIII. A single pivoting of the plate (8) would not guarantee that the rollers (11, 12) remained in contact with the respective cams (5, 6) since the said rollers are positioned diametrically opposite one another in relation to the centre of rotation of the cams. Thus, the geometry of the plate is unsuitable for ensuring contact between rollers and the cams. Given this situation, the skilled man is left with the alternative of configuring the device according to the single-roller with spring embodiment of DII, or of finding an alternative configuration to solve the problem. No other alternative is taught in this case however, since DI plainly does not address embodiments using cam means with cam follower of any description.

Thus, it is further submitted that claim 1 embodies an inventive step having regard to the disclosures of DIII taken respectively in combination with DII and DI.

Claim I differs from DI in that cam means are employed, along with a follower means comprising a three-armed lever with two wheels connected to the cam.

The problem solved by these features is that of reducing noise on the one hand, while ensuring a positive drive between drive means and the oscillating shaft coupled to the cutter.

Document DII teaches the skilled person to use cam means to overcome the noise, and to include spring bias means in order to guarantee a positive drive in both directions. This is plainly a different solution to that claimed in claim 1. DII, as already discussed above, does not suggest the use of a

further arm on the pivoting lever, which would obviate the need for the spring. A further look at would not solve this problem either, again, as discussed above.

Document DIII teaches the skilled person to provide cam means in conjunction with a translating plate. It is doubtful whether the skilled person would consider DIII an improvement over DI with regard to noise abatement, since the energy losses in the DIII device would be large, as discussed above. Since DIII in fact neither addresses the problem of noise reduction, and since the device of DI does not have the problem of maintaining a positive drive, then there could be no question of combining the teaching of DIII with that of DI in order to arrive at the solution according to the invention.

In conclusion, therefore, it is respectfully submitted that the features of claim 1 as presently filed are inventive over the prior art DI, DII + DIII, and thereby satisfies the requirements of Articles 52(1) and 56 EPC.

It is furthermore submitted, in view of all of the above, that the application meets the requirements of the EPC, and grant of the application is therefore requested.