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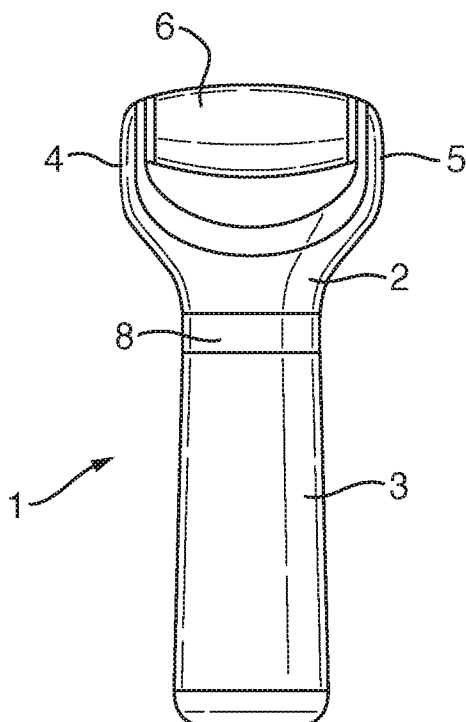
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[Continued on next page]

(54) Title: DERMABRASION DEVICE

Fig. 1



(57) Abstract: The present invention is directed to a dermabrasion device (1) comprising a handle portion (3), a head portion (2) having two arms (4, 5) arranged to receive and hold a drum (6) having an abrasive surface wherein the abrasive surface is in the form of a convex curve such that the diameter at the centre of the drum (6) is greater than the diameter of the ends of the drum (6).



SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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- with international search report (*Art. 21(3)*)
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A NOVEL DERMABRASION DEVICE

The present invention relates to a dermabrasion device; and, more particularly, to an electrical dermabrasion device for removing a hard, dry skin layer on a surface of the foot, for example, the heel, the sole or the toes.

Calluses and/or areas of hard skin occur on feet and can be caused by persistent rubbing or uneven pressure, for example from ill-fitting shoes. They are most commonly found at the heel, the ball of the foot and the sides of the toes. Calluses are often unsightly, and the thicker they are the more yellow they can look. With time, particularly thick calluses can become cracked and painful.

There are a number of known methods for reducing or removing calluses and hard skin, generally based upon rubbing, scraping or cutting the hardened skin away. In many cases this may include a first step of softening the skin by soaking the feet or hands in water or by applying some form of softening lotion to the hard skin. The hard skin can be reduced or removed using a device with an abrasive surface, such as a pumice stone, emery board or a device with carborundum paper attached to it. These devices can be manual or electrically operated and in the latter case, an abrasive head can be vibrated and rotated over the hard skin. Examples of such devices are described in WO03/022175, or WO 2012/120373.

The known abrasive devices have a number of drawbacks. In many cases they are unable to conform to the curvature of the parts of the hands or feet where calluses usually occur or are designed in such a way that the surface area available for treatment of the surface of the foot is low/unsatisfactory.

The present application provides a dermabrasion device that provides more optimal efficiency than these devices.

According to a first aspect of the present invention there is
5 provided a dermabrasion device comprising a handle portion, a
head portion having two arms arranged to receive and hold a
drum having an abrasive surface wherein the abrasive surface
is in the form of a convex curve such that the diameter at the
centre of the drum is greater than the diameter of the ends of
10 the drum.

Typically, the surface of the drum is in the form of a
parabolic arc. Typically the length of the drum is between 2
and 4 times greater than the diameter of the drum. More
15 typically the length of the drum is between 2 and 3 times
greater than the diameter of the drum. Most typically, the
length of the drum is 2.5 times greater than the diameter of
the drum. Preferably, the drum is in the shape of a barrel.
A more preferred shape is that of an elongated barrel.

20 Preferably, the diameter at the centre of the drum is between
10% and 30% larger than the diameter at the ends of the drum.
More preferably, the diameter at the centre of the drum is
between 15% and 25% larger than the diameter at the ends of
25 the drum. More preferably, the diameter at the centre of the
drum is between 20% and 22% larger than the diameter at the
ends of the drum.

Typically, at least 80% of the surface area of the drum is
30 used in the dermabrasion process. More typically, at least
85% of the surface area of the drum is used in the
dermabrasion process. Even more typically, at least 90% of
the surface area of the drum is used in the dermabrasion
process.

Typically the abrasive surface of the drum is not provided with an antimicrobial agent.

- 5 The material which forms the abrasive surface of the drum can be selected to provide the desired level of abrasiveness. For example, the abrasive surface can be made of a coarse material if a high level of abrasiveness is required, or can be made of a fine material if a low level of abrasiveness is required.

10

The material which forms the abrasive surface can be provided with additional abrasive materials such as diamond fragments or pumice.

- 15 According to a second aspect of the present invention there is provided a dermabrasion device comprising a handle portion, a head portion having two arms arranged to receive and hold a drum having an abrasive surface wherein the abrasive surface is in the form of a concave curve such that the diameter at
20 the centre of the drum is smaller than the diameter of the ends of the drum.

- Typically, the surface of the drum is in the form of a parabolic concave arc. Typically the length of the drum is
25 between 2 and 3 times greater than the diameter of the drum. More typically, the length of the drum is 2.7 - 2.8 times greater than the diameter of the drum. A preferred shape is that of a concave barrel.

- 30 Preferably, the diameter at the centre of the drum is between 10% and 30% smaller than the diameter at the ends of the drum. More preferably, the diameter at the centre of the drum is between 15% and 25% smaller than the diameter at the ends of the drum. More preferably, the diameter at the centre of the

drum is between 17% and 20% smaller than the diameter at the ends of the drum.

Typically, at least 80% of the surface area of the drum is used in the dermabrasion process. More typically, at least 85% of the surface area of the drum is used in the dermabrasion process. Even more typically, at least 90% of the surface area of the drum is used in the dermabrasion process.

Typically the abrasive surface of the drum is not provided with an antimicrobial agent.

The material which forms the abrasive surface of the drum can be selected to provide the desired level of abrasiveness. For example, the abrasive surface can be made of a coarse material if a high level of abrasiveness is required, or can be made of a fine material if a low level of abrasiveness is required.

The material which forms the abrasive surface can be provided with additional abrasive materials such as diamond fragments or pumice.

In alternative embodiments of the device of the first and second aspects of the present invention the drum can be provided with a material such as corrugated rubber which provides a massaging effect instead of an abrasive surface. The corrugated rubber can be made of a silicone rubber or thermoplastic elastomer (TPE). Alternatively, the massaging material can be made of a sponge.

An example embodiment of the present invention will now be described in more detail with reference to the accompanying Figures, in which:

Figure 1 illustrates a front view of a dermabrasion device in accordance with the present invention;

5 Figure 2 illustrates a side view of a dermabrasion device in accordance with the present invention; and

Figure 3 illustrates a dermabrasion device in accordance with the present invention with the abrasion drum
10 removed.

In the Figures there is generally depicted a dermabrasion device at 1. The device 1 comprises a head 2 and a handle 3. The head 2 is provided with arms 4 and 5. A drum 6 is
15 attached to and held by the arms 4 and 5 in such a way that the drum 6 can rotate along its longitudinal axis at a sufficient rate to achieve dermabrasion. The ends of drum 6 are provided with an axis or shaft (not shown). The axis or shaft at each end of drum 6 connects with an aperture 7 in
20 each arm 4 and 5. The drum 6 is driven by an electro-mechanical mechanism (not shown), such as an electric motor, which are well-known to the man skilled in the art. The electro-mechanical mechanism is activated by a switch 8.

25 From Figure 2 it can be seen that in one embodiment the head 2 is angled in such a way as to make it easier to position the drum 6 against the skin to achieve dermabrasion.

The drum 6 can be released from the head 2 using a switch (not
30 shown) suitably located in one of the arms 4 and 5.

In use, the device is activated by switch 8 which causes the drum 6 to rotate. The surface of the drum 6 is provided with an abrasive material. The abrasive material causes the hard

skin or callus to be removed efficiently. The curvature of the surface of the drum 6 allows a user greater freedom in abrading the skin by providing a greater surface area for contact and also improved conformance/connectivity with
5 different areas of the skin.

An advantage of the present invention is that there is provided a dermabrasion device which has a working surface area, i.e. a surface area available for contact with the skin,
10 that is significantly greater than the working surface area of devices that are currently available.

A further advantage of the shape of the dermabrasion drum is that any stress on the drum is more evenly distributed across
15 its surface. This removes the need for any additional supporting structures which increase the complexity of the device and reduce the working surface area.

Further modifications and developments can be made without
20 departing from the scope of the invention described herein.

Claims:

1. A dermabrasion device comprising a handle portion, a head portion having two arms arranged to receive and hold a drum having an abrasive surface wherein the abrasive surface is in the form of a convex curve such that the diameter at the centre of the drum is greater than the diameter of the ends of the drum.
5
2. A dermabrasion device as claimed in Claim 1 wherein the surface of the drum is in the form of a parabolic arc.
10
3. A dermabrasion device as claimed in Claim 1 or Claim 2 wherein the length of the drum is between 2 and 3 times greater than the diameter of the drum.
15
4. A dermabrasion device as claimed in Claim 3 wherein the length of the drum is 2.5 times greater than the diameter of the drum.
- 20 5. A dermabrasion device as claimed in any of the preceding Claims wherein the drum is in the shape of a barrel.
6. A dermabrasion device as claimed in Claim 5 wherein the drum is in the shape of an elongated barrel.
25
7. A dermabrasion device as claimed in any of the preceding Claims wherein the diameter at the centre of the drum is between 10% and 30% larger than the diameter at the ends of the drum.
30
8. A dermabrasion device as claimed in Claim 7 wherein the diameter at the centre of the drum is between 15% and 25% larger than the diameter at the ends of the drum.

9. A dermabrasion device as claimed in Claim 7 or Claim 8 wherein the diameter at the centre of the drum is between 20% and 22% larger than the diameter at the ends of the drum.

5

10. A dermabrasion device comprising a handle portion, a head portion having two arms arranged to receive and hold a drum having an abrasive surface wherein the abrasive surface is in the form of a concave curve such that the diameter at the centre of the drum is smaller than the diameter of the ends of the drum.

10

11. A dermabrasion device as claimed in Claim 10 wherein the surface of the drum is in the form of a parabolic concave arc.

15

12. A dermabrasion device as claimed in Claim 10 or Claim 11 wherein the length of the drum is between 2 and 3 times greater than the diameter of the drum.

20

13. A dermabrasion device as claimed in Claim 12 wherein the length of the drum is 2.7 - 2.8 times greater than the diameter of the drum.

25

14. A dermabrasion device as claimed in any of Claims 10 - 13 wherein the shape of the drum is that of a concave barrel.

30

15. A dermabrasion device as claimed in any of Claims 10 - 14 wherein the diameter at the centre of the drum is between 10% and 30% smaller than the diameter at the ends of the drum.

16. A dermabrasion device as claimed in Claim 15 wherein the diameter at the centre of the drum is between 15% and 25% smaller than the diameter at the ends of the drum.
- 5 17. A dermabrasion device as claimed in Claim 16 wherein the diameter at the centre of the drum is between 17% and 20% smaller than the diameter at the ends of the drum.
- 10 18. A dermabrasion device as claimed in any of the preceding Claims wherein at least 80% of the surface area of the drum is used in the dermabrasion process.
- 15 19. A dermabrasion device as claimed in Claim 18 wherein at least 85% of the surface area of the drum is used in the dermabrasion process.
- 20 20. A dermabrasion device as claimed in Claim 18 or Claim 19 wherein at least 90% of the surface area of the drum is used in the dermabrasion process.
21. A dermabrasion device as claimed in any of the preceding Claims wherein the abrasive surface of the drum is not provided with an antimicrobial agent.
- 25 22. A dermabrasion device as claimed in any of the preceding Claims wherein the material which forms the abrasive surface is provided with additional abrasive materials such as diamond fragments or pumice.
- 30 23. A dermabrasion device comprising a handle portion, a head portion having two arms arranged to receive and hold a drum having a material which provides a massaging effect wherein the surface is in the form of a convex curve such that the diameter at the centre of the drum is greater

than the diameter of the ends of the drum and wherein the material which provides the massaging effect is a corrugated rubber such as a silicone rubber or a thermoplastic elastomer (TPE), or a sponge material.

5

24. A dermabrasion device comprising a handle portion, a head portion having two arms arranged to receive and hold a drum having a material which provides a massaging effect wherein the surface is in the form of a concave curve such that the diameter at the centre of the drum is smaller than the diameter of the ends of the drum and wherein the material which provides the massaging effect is a corrugated rubber such as a silicone rubber or a thermoplastic elastomer (TPE), or a sponge material.

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Fig. 1

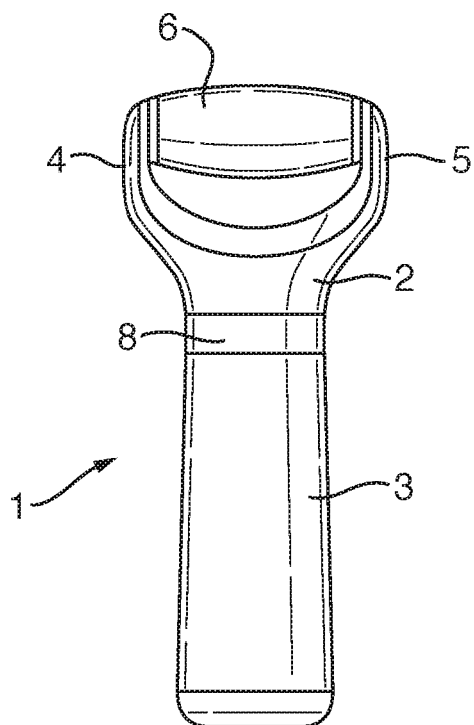


Fig. 2

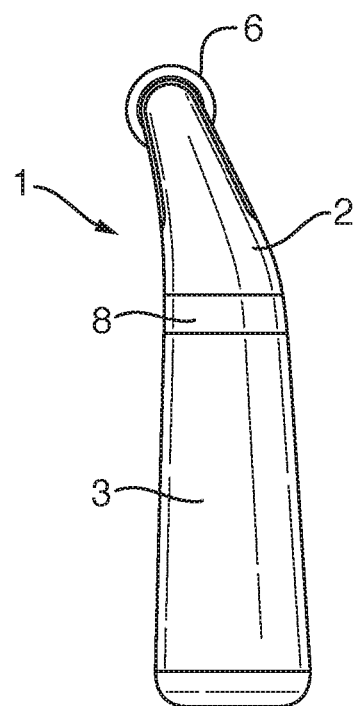
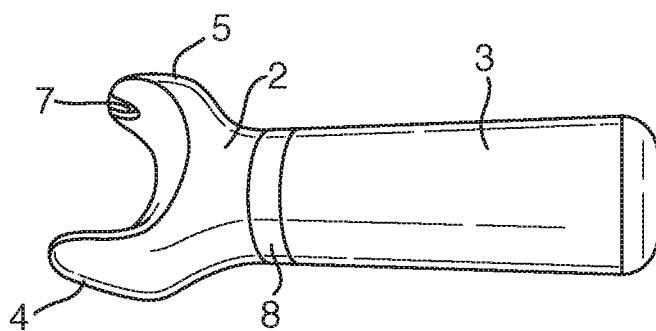


Fig. 3



INTERNATIONAL SEARCH REPORT

International application No

PCT/GB2014/050304

A. CLASSIFICATION OF SUBJECT MATTER

INV. A61B17/54 A61H15/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A61B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2 867 214 A (WILSON) 6 January 1959 (1959-01-06)	1-9, 18-21 10-17,22
Y	. column 1, lines 17-22,60-66 column 2, lines 24-27,43,44,64-71 column 3, line 7 column 4, lines 37-39,45-51; claim 1; figures 1,14-16	
Y	----- US 2004/254587 A1 (PARK) 16 December 2004 (2004-12-16) cited in the application paragraphs [0037], [0039], [0044], [0050]; claim 2; figure 7	10-17,22
A	----- DE 297 10 333 U1 (LAUTER) 18 September 1997 (1997-09-18) claim 1; figures	1-9
	----- -/-	



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

31 March 2014

Date of mailing of the international search report

06/06/2014

Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2014/050304

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 7 060 119 B1 (HAIDER) 13 June 2006 (2006-06-13) column 3, lines 40-42,61,62 column 4, lines 18,19,44,45; figures -----	10
A	US 2002/107527 A1 (BURRES) 8 August 2002 (2002-08-08) paragraph [0005], line 3; paragraph [0009], line 20; paragraph [0028], lines 20-22; figure 3 -----	22
A	US 2012/226289 A1 (YIU) 6 September 2012 (2012-09-06) cited in the application the whole document -----	1,10

INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB2014/050304

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-22

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-22

A dermabrasion device comprising a handle portion, a head portion having two arms arranged to receive and hold a drum having a surface in the form of a convex or concave curve, wherein:

- the drum surface is abrasive and is in the form of a concave curve such that the diameter at the centre of the drum is smaller than the diameter of the ends of the drum.

Problem solved :

Providing the abrasive drum with improved area conformance/connectivity with convex areas of the skin

2. claims: 23, 24

A dermabrasion device comprising a handle portion, a head portion having two arms arranged to receive and hold a drum having a surface in the form of a convex or concave curve, wherein:

- the drum has a material which provides a massaging effect, said material being a corrugated rubber such as a silicone rubber or a thermoplastic elastomer (TPE), or a sponge material.

Problem solved :

Providing the drum with a massaging effect instead of an abrasive surface

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/GB2014/050304

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2867214	A	06-01-1959	NONE
US 2004254587	A1	16-12-2004	AU 2002324966 A1 24-03-2003 US 2004254587 A1 16-12-2004 WO 03022175 A2 20-03-2003
DE 29710333	U1	18-09-1997	NONE
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US 2002107527	A1	08-08-2002	AU 9655001 A 15-04-2002 US 2002107527 A1 08-08-2002 WO 0228296 A1 11-04-2002
US 2012226289	A1	06-09-2012	CA 2828671 A1 13-09-2012 CA 2848080 A1 13-09-2012 CN 102958461 A 06-03-2013 DE 202012012850 U1 06-02-2014 EP 2680768 A1 08-01-2014 JP 2014506821 A 20-03-2014 KR 20120127574 A 22-11-2012 KR 20130113460 A 15-10-2013 US 2012226289 A1 06-09-2012 US 2014025091 A1 23-01-2014 WO 2012120373 A1 13-09-2012

摘要

本实用新型涉及一种磨皮装置(1)，该磨皮装置包括手柄部(3)和头部(2)，该头部具有两个臂(4,5)，所述两个臂被布置成用来收纳并保持具有研磨表面的鼓(6)，其中，所述研磨表面采取凸曲线的形式，使得所述鼓(6)的中心处的直径大于所述鼓(6)的端部处的直径。