(19) Europäisches Patentamt
European Patent Office
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(11) EP 1 166 704 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
02.01.2002 Bulletin 2002/01

(51) Int Cl.[7]: **A47K 10/48**

(21) Application number: **01305528.0**

(22) Date of filing: **26.06.2001**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE TR
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **27.06.2000 GB 0015597**

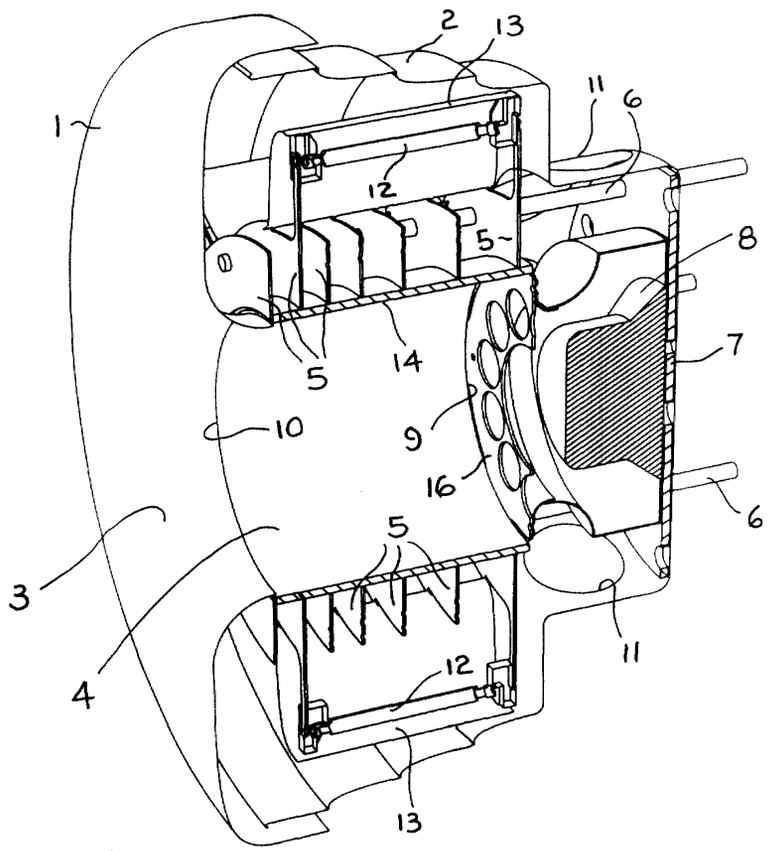
(71) Applicant: **White, Matthew Edward Thomas**
Haywards Heath, West Sussex RH16 3PP (GB)

(72) Inventor: **White, Matthew Edward Thomas**
Haywards Heath, West Sussex RH16 3PP (GB)

(74) Representative: **Coles, Graham Frederick**
Graham Coles & Co. 24 Seeleys Road
Beaconsfield Buckinghamshire HP9 1SZ (GB)

(54) Hand-driers

(57) A hand-drier has an open mouth (3) for entry of hands into a glass tube (4) to be warmed by infra-red radiation from tungsten-halogen lamps (12) distributed round the outside of the tube (4). A fan (8) draws air into the tube (4) through the mouth (3) to pass over the warmed hands and be vented via openings (11). The tube (4) is mounted on rings (5) that also serve as baffles to block radiation from the lamps (12) passing out through the mouth (3).



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Description

[0001] This invention relates to hand-driers.

[0002] According to the present invention there is provided a hand-drier wherein one or more sources of radiant energy are located to warm hands inserted in the drier, and wherein means is provided for causing air to pass over the warmed hands.

[0003] The radiant energy may be infra-red radiation.

[0004] The sources of the radiant energy may be located outside a partially-enclosed cavity for radiating heat through a wall of the cavity to warm hands inserted in the cavity. In these circumstances, the means for causing air to pass over the warmed hands may comprise a fan or other means for drawing air through the cavity. More especially, the cavity may be defined by a glass or other tube having an opening at one end for receiving the hands to be dried, and the means for drawing air through the cavity may in these circumstances be located at the other end of the tube for drawing air into the tube through the opening. One or more baffles may be located around the outside of the tube for blocking radiation from the lamps passing out through the opening.

[0005] A hand-drier in accordance with the present invention will now be described, by way of example, with reference to the accompanying drawing which shows the hand-drier in sectional-perspective view.

[0006] Referring to the drawing, the hand-drier has an external metal-housing that is formed by a front fascia 1 and a rear main-casing 2. The fascia 1 provides an open mouth 3 for easy entry of the hands to be dried into a glass tube 4 of the drier. The tube 4 is mounted coaxially within rings 5 that are retained within the casing 2 spaced from one another on six rods 6. The rods 6 are secured to a base-plate 7 and extend through it to project rearwardly from the casing 2 for use in attaching the drier to a structural wall (for example, a washroom-wall).

[0007] An electrically-powered centrifugal fan 8 mounted on the plate 7 is coupled to the inner end 9 of the tube 4 for drawing air through the mouth 3 into the tube 4 at its outer end 10. The mouth 3 is of venturi shape, not only to facilitate insertion of the hands into the tube 4, but more especially to promote stream-flow of air into and along the inside of the tube 4. After passing over the hands, the air drawn in is vented from the fan 8 radially through openings 11 at the rear of the casing 2.

[0008] Six tungsten-halogen lamps 12 (only some shown) are mounted equidistant from one another around the outside of the glass tube 4. The lamps 12 are shrouded by individual elliptical reflectors 13 (only some shown) that direct the emitted light radially inwards through the wall 14 of the tube 4. The tube 4 is of a borosilicate glass to resist thermal shock and to have good transparency to the infra-red radiations from the lamps 12, so that the hands inserted in the tube 4 are warmed. The rings 5 in combination form a louvre structure that blocks radiation from the lamps 12 exiting through the mouth 3, without limiting to any substantial extent the radiation path to the hands. As a further safety feature, a perforated disc 16 is mounted on the rods 6 across the inner end 9 of the tube 4 as a finger-guard to the fan 8.

[0009] Insertion of hands through the mouth 3 into the tube 4 is detected by a passive infra-red sensor (not shown) for activating the fan 8 and energising the lamps 12 while the hands remain entered (other forms of motion and proximity sensing may be used). Radiation from the lamps 12 warms the wet hands to evaporate the water, and the air sucked over the hands by the fan 8 quickly draws off the water vapour and vents it into the ambient atmosphere from the drier via the openings 11; the drier may be modified to incorporate filtering of the air and/or condensation of the water from it, before venting. The efficient and comfortable warming of the hands is facilitated by the reflectors 13 in focusing the radiation through the wall 14 onto the hands with an even distribution around the whole circumference of the tube 4. The lamps 12 provide instant heat when energised, and cool rapidly afterwards. Moreover, they provide visible light which passes through the wall 14 to provide a 'comfort' effect within the tube 4 for the user while the hands are being dried.

[0010] The drying process is efficiently and quickly achieved with the drier described above. In particular, heat energy is directed to the wet hands for evaporating the water on them, and is not used primarily for heating the air. Furthermore, the air surrounding the hands, namely that into which evaporation takes place, is replaced continuously by fresh, unsaturated air from the ambient atmosphere so as to ensure that the evaporation process proceeds unhampered.

[0011] The location of the hands within the partially-enclosed cavity formed by the tube 4 facilitates the rapid drawing off of water vapour without the necessity for movement of large volumes of air, and therefore enables a low-power, quiet fan to be used. Moreover, the possibility of bacterial infection of the hands during the drying process within the drier, is significantly reduced since the air contacting the hands is directly from the ambient atmosphere. It is notable in this respect that the air contacting the hands passes through the fan 8 and other enclosed parts of the drier where bacteria might lurk, only following such contact.

Claims

1. A hand-drier wherein one or more sources of radiant energy are located to warm hands inserted in the drier, and wherein means is provided for causing air to pass over the warmed hands.

2. A hand-drier according to Claim 1 wherein the one

or more sources,of radiant energy are one or more sources of infra-red radiation.

3. A hand-drier according to Claim 1 or Claim 2 wherein the one or more sources of radiant energy are located outside a partially-enclosed cavity for radiating heat through a wall of the cavity to warm hands inserted in the cavity.

4. A hand-drier according to Claim 3 wherein the means for causing air to pass over the warmed hands comprises means for drawing air through the cavity.

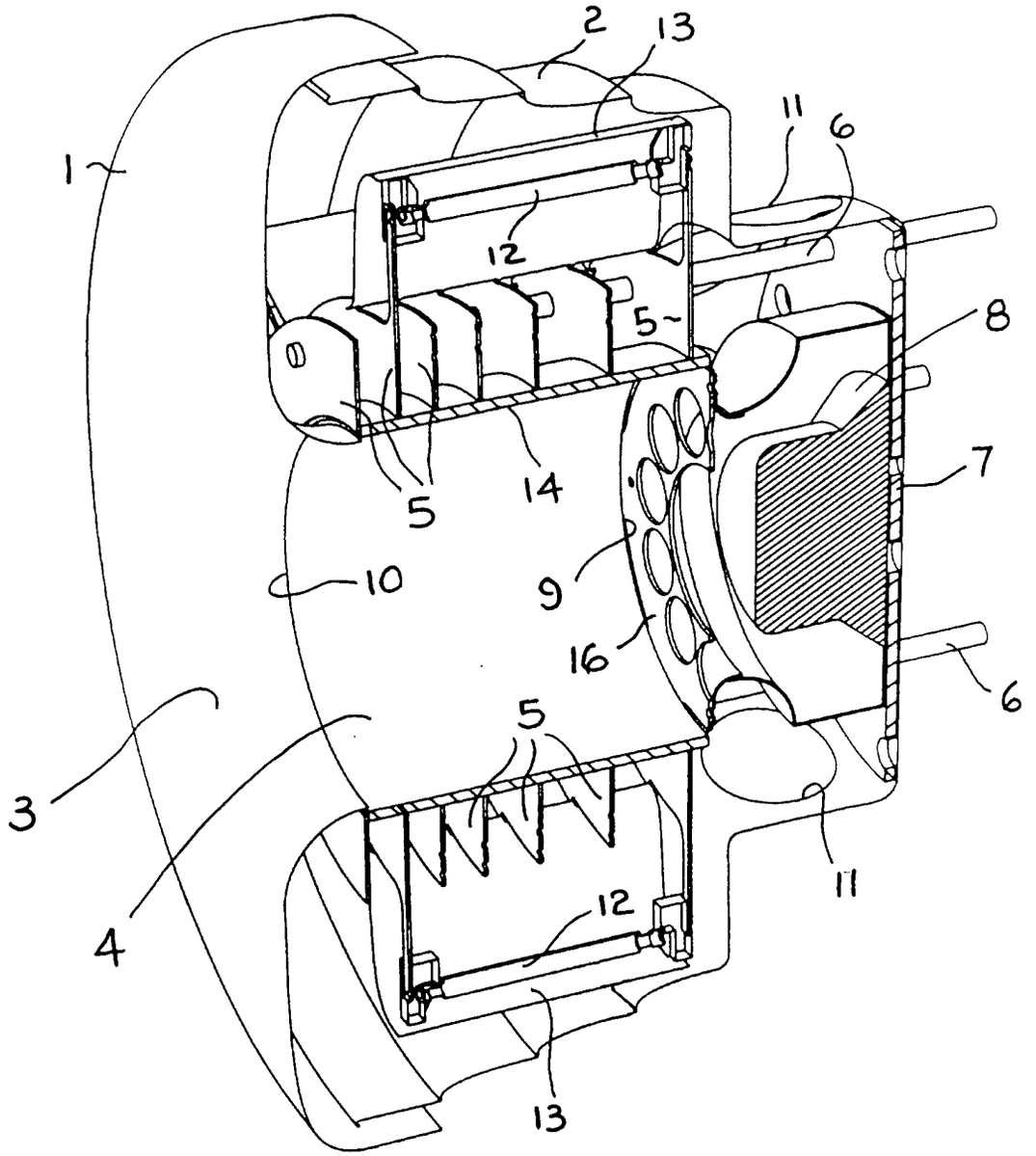
5. A hand-drier according to Claim 4 wherein the cavity is defined by a tube having an opening at one end for receiving the hands to be dried, and wherein the means for drawing air through the cavity is located at the other end of the tube for drawing air into the tube through the opening.

6. A hand-drier according to Claim 5 wherein a plurality of lamps for emitting the radiant-heat energy are located around the outside of the tube for applying heat to the hands by radiation through the wall of the tube.

7. A hand-drier according to Claim 6 wherein the lamps are tungsten-halogen lamps.

8. A hand-drier according to any one of Claims 5 to 7 wherein one or more baffles are located around the outside of the tube for blocking radiation from the lamps passing out through the opening.

9. A hand-drier according to any one of Claims 5 to 8 including means defining an open mouth of venturi form leading into said opening for promoting stream-flow of air into and along the tube.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EUROPEAN SEARCH REPORT

Application Number
EP 01 30 5528

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.7)
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TECHNICAL FIELDS SEARCHED (Int.Cl.7)

A47K

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	27 September 2001	Fordham, A

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 01 30 5528

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82