

PATENT SPECIFICATION

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(54) IMPROVEMENTS IN OR RELATING TO HUMIDIFYING APPARATUS

(71) We, FISHER & PAYKEL LIMITED, a company duly incorporated under the laws of New Zealand, of 39 Mount Wellington Highway, Mount Wellington, Auckland, New Zealand do hereby declare the invention for which we pray that a patent may be granted to us and the method by which it is to be performed to be particularly described in and by the following statement:—

This invention relates to humidifying apparatus.

In one aspect the invention consists in an intermediate adaptor for connecting a humidifier heater having a heating surface and spaced connection lugs arranged substantially in a plane on the heater with adjacent ends of the lugs defining spaces therebetween and a humidifier element having an annular flange and an intermediate adaptor connecting said heater and said element; said intermediate adaptor comprising a ring and a horse shoe shaped member affixed thereto; said ring having adapting coacting lugs lying substantially in a plane with adjacent ends of said coacting lugs defining spaces therebetween, the dimensions and positioning of said coacting lugs being such that said coacting lugs may in use be passed through the spaces between the connecting lugs and then rotated to a holding position; said horse shoe shaped member comprising a part annulus of a disc and a part hollow cylindrical spacer therefor, said spacer having portions defining a gap and being arranged to engage the flange of the humidifier element so that the humidifier element may be slid to and from a heating contact position by movement of the flange in a plane parallel to the plane containing said part annulus and may be held in a heating disposition relative to the heating surface by engagement of said part annulus and the flange.

In a further aspect the invention provides in combination a humidifier heater

having a heating surface and spaced connection lugs arranged substantially in a plane on the heater with adjacent ends of the lugs defining spaces therebetween; a humidifier element having an annular flange and an intermediate adaptor connecting said heater and said element; said intermediate adaptor comprising a ring and a horse shoe shaped member affixed thereto; said ring having adapting coacting lugs lying substantially in a plane with adjacent ends of said coacting lugs defining spaces therebetween, the dimensions and positioning of the connection lugs and said coacting lugs being such that said coacting lugs may in use be passed through the spaces between the connection lugs and then rotated to a holding position; said horse shoe shaped member comprising a part annulus of a disc and a part hollow cylindrical spacer therefor, said spacer having portions defining a gap and being arranged to engage the flange of the humidifier element may be slid to and from a heating contact position by movement of the flange in a plane parallel to the plane containing said part annulus and may be held in a heating disposition relative to the heating surface by engagement of said part annulus and the humidifier element.

One preferred form of the invention will now be described with reference to the accompanying drawings in which:—

Figures 1 and 2 are respectively plan and side elevational views of a humidifier heater for use in the invention;

Figure 3 is a plan view of an intermediate adaptor for use in connecting the humidifier heater of Figures 1 and 2 with a humidifier element;

Fig. 4 is a side elevation of Fig. 3.

Fig. 5 is a cross section on the line V-V Fig. 3,

Fig. 6 is a side elevation of a humidifying element mounted in position in an

adaptor ring, the adaptor ring in turn being mounted on the humidifier heater,

Fig. 7 is a cross section of the humidifying element shown in Fig. 6 and,

- 5 Fig. 8 is an elevational view partly in cross section of an alternative humidifying element mounted on the humidifier section of Fig. 1

Referring to the drawings the apparatus shown in the drawings is used for the purpose of humidifying gas for inspiration by a patient in, for example, an intensive care section of a hospital and such devices are by now quite well known.

- 15 In the construction shown in the drawings, a base 1 has mounted within it a spring loaded heating plate 2 which carries a sensing device 3 so that the temperature of the base of a humidifying element 4 (Figs. 6 & 7) comes into contact with the element 3. The base 1 carries a plurality of lugs 5 spaced around the plate 2, the lugs also having spaces 6 between the lugs and other parts of the base 1.

- 25 Referring now to Figs. 3 to 5 there is shown in these figures an intermediate adaptor constructed as follows:

The adaptor comprises a ring 10 having in one portion thereof a series of coacting lugs 11 with stops 12 at one end thereof to limit the amount of movement of the lugs 11 and the lugs 11 have spaces 13 therebetween which permit the passage between the lugs 11 of the lugs 5 so that by placing the ring 10 on the base 1 and giving to the ring rotatory motion the adaptor is mountable in relation to the heater 1.

Mounted on the ring 10 is a part 15 of an annulus of a disc associated with a part 16 of a cylinder and these two members are integral with a further member 17 the whole being in the form of a horse shoe but with the cross section of the horse shoe in the form of a channel member as is shown more particularly in Figs. 4 & 5. The member 15 is fixed to the ring 10 in any convenient manner, for example, by rivetting or may be made integral therewith.

- 50 Referring now to Figs. 6 & 7, in Fig. 7 there is shown a humidifier element 20 having walls 21, a top 22 carrying an air inlet 23 and an air outlet 24, the element being fitted with a scroll 25 on which an absorbent material such as blotting paper is fixed and the element being completed by a bottom member 26 having a flat portion 27 which in use engages the heat plate 2. The bottom part 26 is of a metal while the walls 21 and top 22 are of a suitable plastics material such as polycarbonate. There is a seal 28 between the walls 21 and the bottom member 26 and a flange or shoulder 30 is provided on an upper part of the junction between the walls and

bottom. As will be seen in Fig. 6 the flange 30 engages with the annular member 15 and the dimensions are arranged so that when in this position the flat part 27 is in a heating disposition e.g. in contact with the heater 2. It is to be noted that the humidifier element is moved into its engaged position as shown in Fig. 6 by a sideways movement in the direction of the arrow 40 Fig. 3.

The above construction is such that by use of the adaptor ring a slide on "throw away" humidifier element such as that shown in Figs. 6 & 7 is quickly and easily placed in position on the humidifier heater before or after being filled with water, for example, through either of the openings 23 or 24 and then put into use by connecting the appropriate tubes to openings 23 and 24. The intermediate adaptor provided on indirect holding means comprising firstly coaction of lugs 11 and 5 and secondly flange 30 and part annulus 15.

Furthermore the humidifier heater shown in Figs. 1 & 2 and in the lower part of Fig. 6 has been designed to accept a further humidifying element 40 formed in two parts 41 and 42 and having two clamping rings 43 and 44 similar to clamping ring reference 10. One clamping ring 43 holds humidifier element part 41 on the heating plate of base 1 by engagement of lugs 45 with ring 43 with lugs 5 on base 1 and lugs 46 on ring 43 with flange 47 on part 44, the lugs and flange being as above described with reference to ring 10 and similarly ring 44 holds part 42 on part 41. This construction is dismantled by freeing ring 44 and removing part 42 from part 41 of humidifier element 40, breaking seal 48 which is an O ring seal and then freeing ring 43 from base 1. This construction enables a "take apart" humidifying element to be held directly to base 1 by use of direct coacting holding means comprising ring 43 and lugs 5, 45 and 46 and flange 47. Thus by using either ring 10 or ring 43 with the appropriate humidifying element a "take apart" or a "throw away" slide on humidifier element herein described may be chosen at will. There are considerable advantages in this, in that a user may make a selection as to whether he will use the "take apart" type of humidifier chamber or the new "throw away" type and the adapter ring has been specifically designed for this purpose.

WHAT WE CLAIM IS:—

1. An intermediate adaptor for connecting a humidifier heater having a heating surface and spaced connection lugs arranged substantially in a plane on the heater with adjacent ends of the lugs defining spaces therebetween and a humidifier

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adaptor ring, the adaptor ring in turn being mounted on the humidifier heater.

Fig. 7 is a cross section of the humidifying element shown in Fig. 6 and.

- 5 Fig. 8 is an elevational view partly in cross section of an alternative humidifying element mounted on the humidifier section of Fig. 1

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Mounted on the ring 10 is a part 15 of an annulus of a disc associated with a part 16 of a cylinder and these two members are integral with a further member 17 the whole being in the form of a horse shoe but with the cross section of the horse shoe in the form of a channel member as is shown more particularly in Figs. 4 & 5. The member 15 is fixed to the ring 10 in any convenient manner, for example, by rivetting or may be made integral therewith.

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bottom. As will be seen in Fig. 6 the flange 30 engages with the annular member 15 and the dimensions are arranged so that when in this position the flat part 27 is in a heating disposition e.g. in contact with the heater 2. It is to be noted that the humidifier element is moved into its engaged position as shown in Fig. 6 by a sideways movement in the direction of the arrow 40 Fig. 3.

The above construction is such that by use of the adaptor ring a slide on "throw away" humidifier element such as that shown in Figs. 6 & 7 is quickly and easily placed in position on the humidifier heater before or after being filled with water, for example, through either of the openings 23 or 24 and then put into use by connecting the appropriate tubes to openings 23 and 24. The intermediate adaptor provided on indirect holding means comprising firstly coaction of lugs 11 and 5 and secondly flange 30 and part annulus 15.

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WHAT WE CLAIM IS:—

1. An intermediate adaptor for connecting a humidifier heater having a heating surface and spaced connection lugs arranged substantially in a plane on the heater with adjacent ends of the lugs defining spaces therebetween and a humidifier



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element having an annular flange, said
adaptor comprising a ring and a horse shoe
shaped member affixed thereto; said ring
having adapting coacting lugs lying sub-
stantially in a plane with adjacent ends of
said coacting lugs defining spaces therebe-
tween, the dimensions and positioning of
said coacting lugs being such that said
coacting lugs may in use be passed through
the spaces between the connecting lugs and
then rotated to a holding position; said
horse shoe shaped member comprising a
part annulus of a disc and a part hollow
cylindrical spacer therefor, said spacer hav-
ing portions defining a gap and being ar-
ranged to engage the flange of the humidi-
fier element so that the humidifier element
may be slid to and from a heating contact
position by movement of the flange in a
plane parallel to the plane containing said
part annulus and may be held in a heating
disposition relative to the heating surface
by engagement of said part annulus and
the flange.
25 2. An intermediate adaptor when con-
structed, arranged and operable substan-
tially as herein described with reference
to and as illustrated in the accompanying
drawings.
30 3. In combination a humidifier heater
having a heating surface and spaced con-
nection lugs arranged substantially in a
plane on the heater with adjacent ends of
the lugs defining spaces therebetween; a
35 humidifier element having an annular
flange and an intermediate adaptor con-

necting said heater and said element; said
intermediate adaptor comprising a ring
and a horse shoe shaped member affixed
thereto; said ring having adapting coacting
lugs lying substantially in a plane with
adjacent ends of said coacting lugs defin-
ing spaces therebetween, the dimensions
and positioning of the connection lugs and
said coacting lugs being such that said
coacting lugs may in use be passed through
the spaces between the connection lugs
and then rotated to a holding position;
said horse shoe shaped member compris-
ing a part annulus of a disc and a part
hollow cylindrical spacer therefor, said
spacer having portions defining a gap and
being arranged to engage the flange of the
humidifier element so that the humidifier
element may be slid to and from a heating
contact position by movement of the
flange in a plane parallel to the plane
containing said part annulus and may be
held in a heating disposition relative to the
heating surface by engagement of said
part annulus and the humidifier element.
4. The combination of a humidifier
heater and a humidifier element when con-
structed, arranged and operable substan-
tially as herein described with reference to
and as illustrated in the accompanying
drawings.

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