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E. E. FALKENTHAL

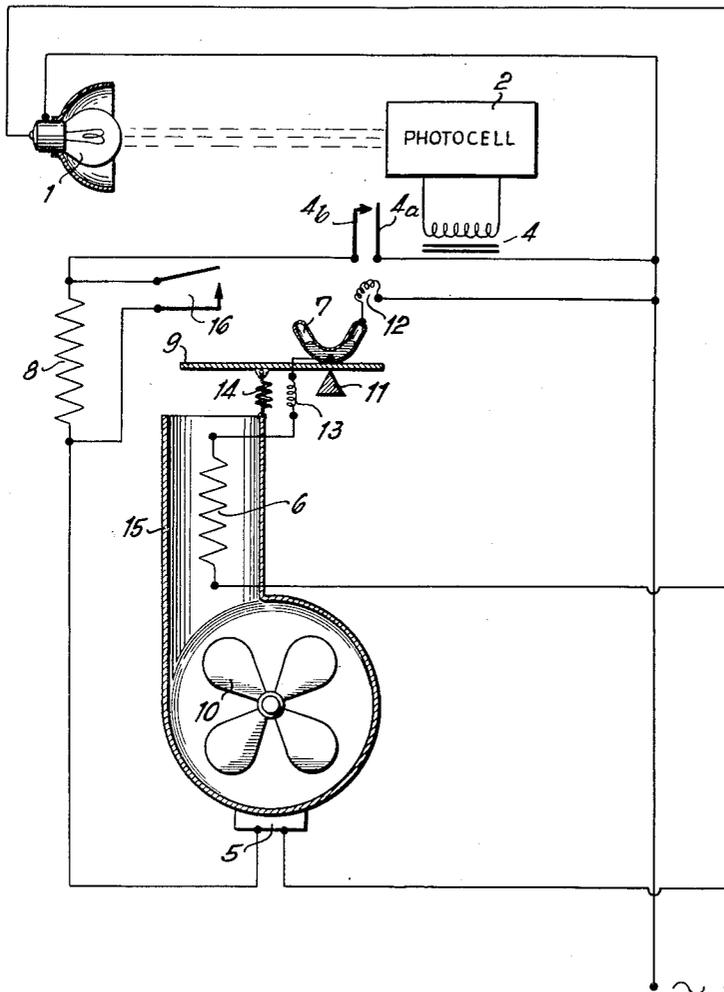
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HOT AIR HEATER

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2 Sheets-Sheet 1

FIG. 1



INVENTOR

Erwin E. FALKENTHAL.

BY:

Michael S. [Signature]

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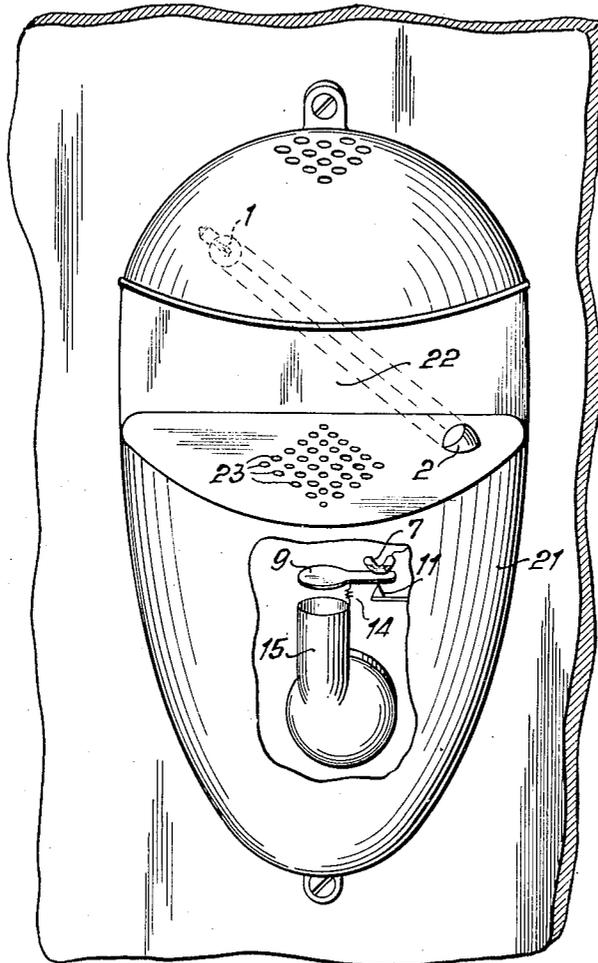
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FIG. 2



INVENTOR

Erwin E. FALKENTHAL.

BY:

[Handwritten signature]
[Handwritten signature]

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HOT AIR HEATER

Erwin E. Falkenthal, Berlin-Dahlem, Germany

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Claims priority, application Germany November 14, 1953

11 Claims. (Cl. 219—39)

This invention relates to a hot air heater and more particularly to an improved arrangement for drying the hands by a stream of hot air.

Devices for drying the hands by means of a stream of hot air are well known in the art. Such devices are normally found in the wash rooms of theatres, industrial establishments and the like. These driers usually include a photocell arrangement in which a beam of light is directed at a photocell. When this beam is interrupted by placing one's wet hands between the source of light and the photocell, the latter actuates a micro relay which in turn actuates a relay arrangement suitable for a heavy load current. The latter is connected in circuit with the blower motor and the heating coil arrangement which require about 500 to 2000 watts or more for operation.

An object of the present invention is to provide a device suitable for drying hands by a means of a stream of hot air which is much simpler than those on the market today.

It is a further object of the present invention to provide a hot-air hand drying arrangement which requires only a single relay coil.

It is still another object of the invention to provide a hot air heater in which a delay is automatically introduced between the starting of the blower motor and the energization of the heating means so that possibility of damage to the heating means is avoided.

It is yet another object of the invention to provide an arrangement in which a delay is introduced between the actuation of a blower circuit and a second circuit.

In its broad aspect, the invention mainly consists of an arrangement including an air blower adapted to create an airstream and a drive means for the air blower for driving the same. Switch means are connected to the drive means for actuating the drive means and thereby causing the blower to produce a stream of air. Means arranged at least partly in the stream of air so as to be actuated by the stream of air are operatively coupled to the load it is desired to drive, whereby the switch means actuates the blower and load in sequence.

The invention is especially applicable to an arrangement for drying the hands by means of a stream of hot air. When embodied in such equipment, the invention includes an air blower and means for driving the air blower, and a photocell arrangement including a source directing light at the photocell so as to actuate the same. A switch means responsive to the output of the photocell is connected to the means for driving the air blower so as to actuate the latter when the light directed at the photocell is interrupted. A heater is mounted in the path of the air stream created by the blower and heater operating means are arranged at least partly in the path of the air stream so as to be actuated by the air stream. The heater operating means is operatively connected with the air heater and operates the same when actuated by said air stream.

In a preferred embodiment of the invention, the switch means in circuit with the photocell comprise relay con-

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tacts and a dropping resistor is connected in series between the switch means and the means for driving the blower. The heater operating means includes a mercury switch which is mounted on a vane so that when the blower creates a stream of air the mercury switch closes and the heater is energized. If desired, means may also be provided for shorting out the dropping resistor when the vane is rotated, in order to increase the energy supplied to the blower.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

Fig. 1 is a schematic diagram of an arrangement in accordance with the invention; and

Fig. 2 is a partially cut away perspective view of the arrangement illustrated schematically in Fig. 1.

In the figures like numerals designate like elements.

Referring now to Fig. 1, there is shown a source of alternating current connected to light bulb 1 which directs a beam of light at photocell 2. When the light strikes the photocell, relay 4 is actuated and contacts 4a and 4b are open as shown in the figure. When the beam of light is interrupted as, for example, when hands are placed between the beam of light and the photocell in order to dry the hands, relay 4 is de-energized and contacts 4a and 4b close thereby placing motor 5 of blower 15 and resistor 8 in series with the line. This causes the blower fan 10 to turn and the stream of air thus created causes vane 9 to rotate about knife edge 11 against the spring tension of spring 14. When this occurs, mercury tube 7 tilts and closes the circuit leading to the heating coil 6. Turns of wire 12 and 13 are provided in order to allow the switch to rotate freely without damage to the wires. When the vane 9 reaches the upper limit of its motion, it contacts switch 16 which shorts out resistor 8.

In operation, when the relay means is manually actuated, that is, when the light beam is interrupted by the hand, the circuit to motor 5 is completed through resistor 8 and the blower fan 10 begins to turn. The dropping resistor 8 causes a reduction in the normal operating current so that there is little danger of damaging the relay contacts. The stream of air created by the blower causes the leaf 9 to rotate and the mercury switch 7 to complete the circuit to heater coil 6. This circuit carries a heavy load since the heater normally operates in the 500-2000 watt range. Simultaneously, the mechanical movement of the switch causes the contacts 16 to close and the resistor 8 to be shorted out and this permits the full load current to be applied to the blower motor 5.

When the hands are removed from between the light source 1 and photocell 2, contacts 4a and 4b are opened and the blower motor 5 thereby stops. As soon as a stream of air created by the blower stops, spring 14 causes the leaf 9 to return to its original position and the circuit leading to the heating coil is opened.

Although for purposes of illustration, the vane 9 is shown outside of the blower it is to be understood that the vane may be mounted inside of the blower. It is also to be understood that the vane may be arranged to open and close in a manner similar to a stove damper so that when the vane is rotated it interferes very little with the stream of air produced by the blower. It is also to be understood that the type of mercury switch illustrated may be replaced by other types of mercury switches or by switches other than mercury switches provided they are able to carry a heavy load and can be operated by

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means of the mechanical movement of a vane. Finally, it should be appreciated that the invention is not limited to the specific type of knife edge arrangement illustrated.

Referring now to Fig. 2, there is shown a partially cut-away perspective view of a hand drying machine including a metal shell 21 with a light source 1 mounted in the upper part thereof and a photocell 2 mounted in the lower part thereof. The machine may either be mounted on a wall as shown or, if desired, may be mounted on a base. When the hands are inserted in the opening 22 the blower 15 is automatically energized and hot air is blown through the openings 23. When the hands are removed, the hot air is automatically cut-off.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of machines in which it is desired to introduce two components of a machine in sequence by means of a single relay, differing from the types described above.

While the invention has been illustrated and described as embodied in an arrangement especially suitable for drying the hands by means of a stream of hot air, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. A hot air drying arrangement comprising, in combination, an air blower; electric operating means for driving said air blower; a photocell arrangement including a source directing light at a photocell so as to actuate the same; relay means in electric circuit with said photocell and said electric operating means and responsive to the output of said photocell for actuating said electric operating means when said light is blocked from said photocell; an air heater mounted in the path of the air stream created by said blower; and movable heater operating means arranged at least partly in the path of the air stream created by the blower so as to be moved by the same, said heater operating means being operatively connected with said air heater for operating the same when actuated by the air stream created by the blower.

2. A hot air drying arrangement, comprising, in combination, an air blower; manually actuatable electric operating means for driving said air blower when desired; heating means arranged in the path of the air stream created by said air blower; and movable operating means arranged at least partly in the path of the air stream created by the blower so as to be moved by said air stream, said operating means being operatively connected with said heating means for operating the same when moved by the air stream created by the blower.

3. For use in an arrangement of the type described, a delay switching arrangement comprising, in combination, a switch; electrically actuatable means for creating an air stream connected to said switch and creating an air stream when said switch is in operative position; a second switch; and movable operating means arranged at least partly in the path of said air stream created by said means for creating an air stream so as to be moved by said air stream, said operating means being operatively connected with said second switch for closing said second switch when moved by said air stream.

4. A hot air drying arrangement comprising, in combination, an air blower; electric motor means for driving

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said air blower; a photocell arrangement including a source directing light at a photocell so as to actuate the same; relay means in electric circuit with said photocell and said electric motor means and responsive to the output of said photocell for actuating said electric motor means when said light is blocked from said photocell; an air heater mounted in the path of the air stream created by said blower; and movable heater operating means arranged at least partly in the path of the air stream created by the blower so as to be moved by the same, said heater operating means being operatively connected with said air heater for operating the same when moved by the air stream created by the blower.

5. A hot air drying arrangement comprising, in combination, an air blower; electric operating means for driving said air blower; a photocell arrangement including a source directing light at a photocell so as to actuate the same; relay means in electric circuit with said photocell and said electric operating means and responsive to the output of said photocell for actuating said electric operating means when said light is blocked from said photocell; a heater element mounted in the path of the air stream created by said blower; and movable heater element operating means at least partly arranged in the path of the air stream created by the blower so as to be moved by the same, said heater element operating means including a mercury switch which is connected with said heater element for operating the same when moved by the air stream created by the blower.

6. A hot air drying arrangement comprising, in combination, an air blower; electric operating means for driving said air blower; a photocell arrangement including a source directing light at a photocell so as to actuate the same; relay means in electric circuit with said photocell and said electric operating means and responsive to the output of said photocell for actuating said electric operating means when said light is blocked from said photocell; a heater element mounted in the path of the air stream created by said blower; a vane arranged at least partly in the path of the air stream created by the blower so as to be rotatable by said air stream, a switch mounted on said vane so as to be closed when said vane is rotated by said air stream, said switch being operatively connected with said heater element for operating the same when closed by the rotation of said vane.

7. A hot air drying arrangement comprising, in combination, an air blower; electric operating means for driving said air blower; a photocell arrangement including a source directing light at a photocell so as to actuate the same; relay means in electric circuit with said photocell and said electric operating means and responsive to the output of said photocell for actuating said electric operating means when said light is blocked from said photocell; a heater element mounted in the path of the air stream created by said blower; a vane arranged at least partly in the path of the air stream created by the blower so as to be rotatable by said air stream, a mercury switch mounted on said vane so as to be closed when said vane is rotated by said air stream, said switch being operatively connected with said heater element for operating the same when closed by the rotation of said vane.

8. A hot air drying arrangement comprising, in combination, an air blower; a source of power; electric motor means for driving said air blower; a dropping resistor; a photocell arrangement including a source directing light at a photocell so as to actuate the same; relay means in electrical circuit with said photocell, said source of power, said dropping resistor and said electric motor means and responsive to the output of said photocell for connecting in series said source of power, said dropping resistor and said electric motor means thereby actuating said electric motor means and causing it to drive said air blower, said series connection being made in response to the light being blocked from said photo-

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cell; a heating element mounted in the path of the air stream created by said blower; a vane arranged at least partly in the path of said air stream and positioned so as to be rotatable by said air stream; means connected to said dropping resistor and operatively associated with said vane so as to short out said resistor when the vane is rotated past a given limit by said air stream; and mercury switch means arranged on said vane so as to be closed when the vane is rotated a given amount by said air stream, said switch being operatively connected with said heating element for energizing the same when closed by the rotation of said vane.

9. An arrangement for actuating a blower and a load in the sequence named comprising, in combination, an air blower adapted to create an air stream; operating means for said air blower for driving the same; light responsive means connected to said operating means for actuating the latter and thereby causing said blower to create an air stream; air pressure actuated mercury switch means arranged at least partly in the path of said air stream so as to be actuated by said air stream; and a heating element arranged in the path of said air stream operatively connected to said air pressure actuated switch means and adapted to be actuated thereby.

10. An arrangement for actuating a blower and a load in the sequence named comprising, in combination, an air blower adapted to create an air stream; an impedance element; operating means for said air blower for driving the same; relay means for connecting in series electrical circuit said impedance element and said operating means thereby causing said blower to create an air stream; air pressure actuated mercury switch means arranged at least partly in the path of said air stream so as to be actuated by said air stream, said air pressure actuated switch means being operatively associated with said impedance element so as to short out said impedance element when actuated by said air stream; and a heating element operatively connected to said air pressure actu-

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ated switch means and adapted to be actuated thereby.

11. A hot air drying arrangement comprising, in combination, an air blower; a source of power; electric motor means for driving said air blower; a dropping resistor; a photocell arrangement including a source directing light at a photocell so as to actuate the same; relay means in electrical circuit with said photocell, said source of power, said dropping resistor and said electric motor means and responsive to the output of said photocell for connecting in series said source of power, said dropping resistor and said electric motor means thereby actuating said electric motor means and causing it to drive said air blower, said series connection being made in response to the light being blocked from said photocell; a heating element mounted in the path of the air stream created by said blower; a vane arranged at least partly in the path of said air stream and positioned so as to be rotatable by said air stream; means connected to said dropping resistor and operatively associated with said vane so as to short out said resistor when the vane is rotated past a given limit by said air stream; mercury switch means arranged on said vane so as to be closed when the vane is rotated a given amount by said air stream, said switch being operatively connected with said heating element for energizing the same when closed by the rotation of said vane; and means connected to said vane for returning it to its original position after said electric motor means is deactuated and said air stream ceases.

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