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2,174,583

HAIR DRIER

Filed March 28, 1935

2 Sheets-Sheet 1

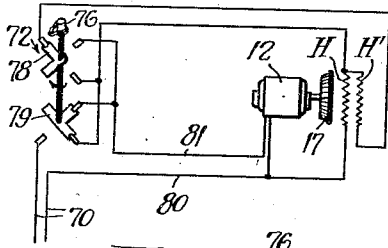


Fig. 7.

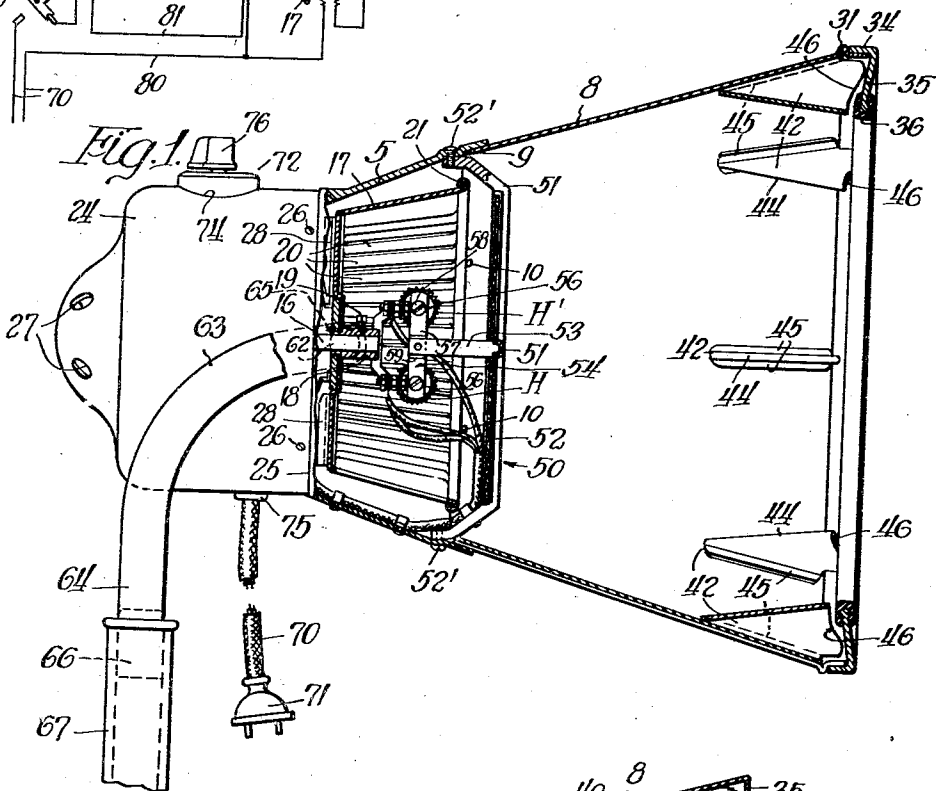


Fig. 2.

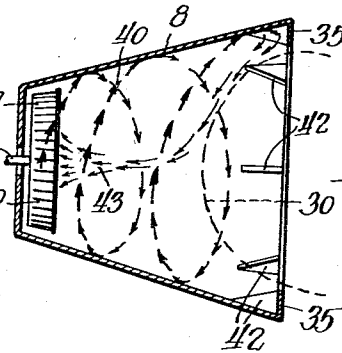
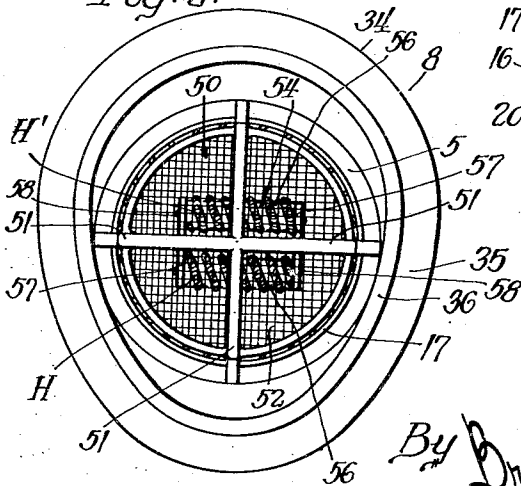


Fig. 3.

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2 Sheets-Sheet 2

Fig. 4.

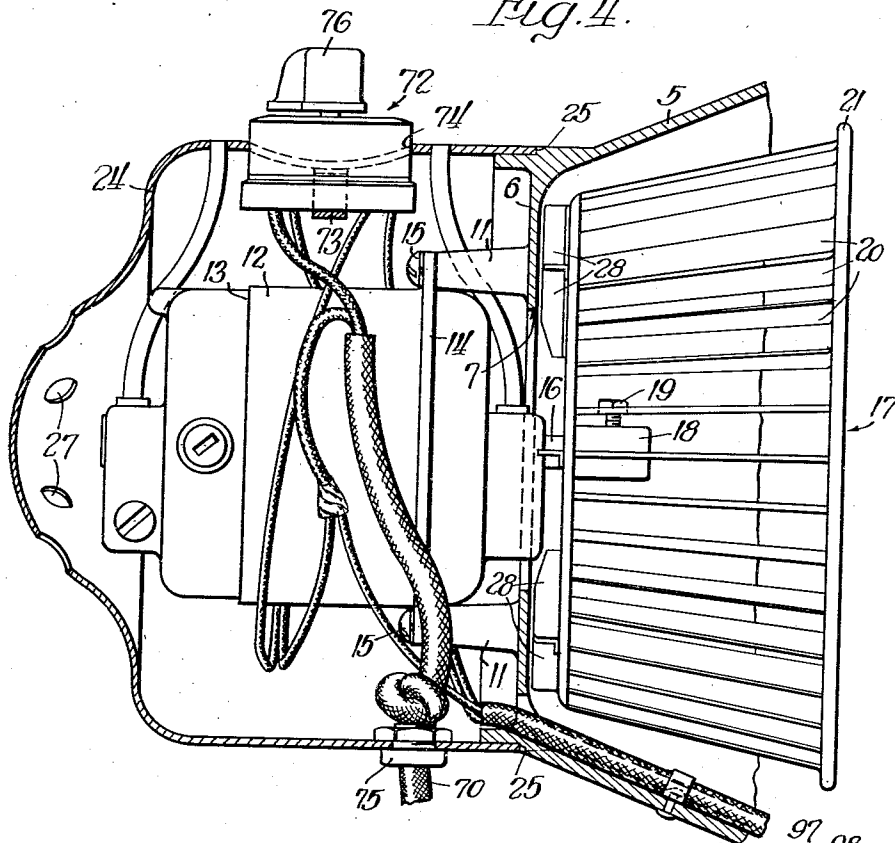


Fig. 5.

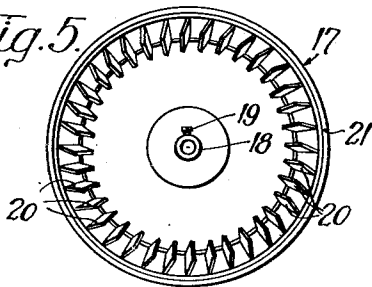


Fig. 6.

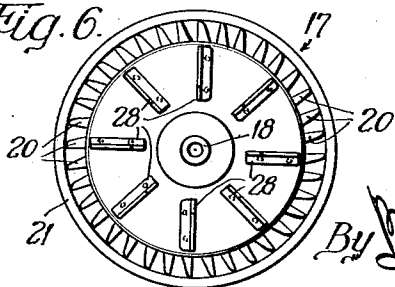
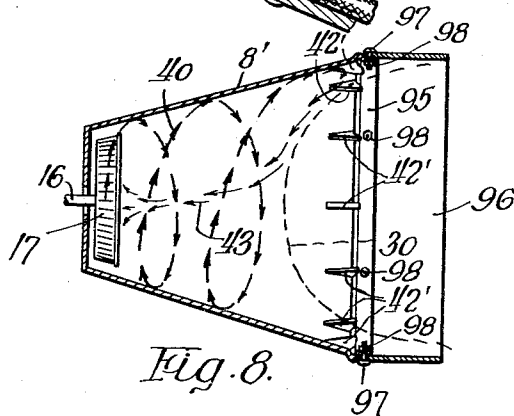


Fig. 8.



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UNITED STATES PATENT OFFICE

2,174,583

HAIR DRIER

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7 Claims. (Cl. 34—26)

This invention relates to hair driers and has especial reference to improvements in hair driers of the recirculating type wherein the air is recirculated in a substantially closed path within a hood having an open end adapted to admit the head of the user.

Recirculating hair driers of the type above outlined are old in the art. However, the prior devices of this sort have been complicated and expensive.

The present invention has for one of its objects the provision of an improved, less complicated and less expensive drier and method for drying the hair by recirculation of the air in a substantially closed path within the hood of the drier and including the head.

According to the present invention, the air is moved in a helical stream along the inner periphery of the hood toward the open end thereof. Internal longitudinal ribs at the open end of the hood and in the path of the helical stream of air interrupt the same and change the velocity pressure thereof to a static pressure. The fan for producing the helical stream has an inlet for drawing the air back from substantially the zone of static pressure, thereby to set up a substantially closed recirculation of air within the hood and in a path including the head.

Further objects and the advantages and details of the illustrated embodiment of the invention will appear from the following detailed description taken in connection with the accompanying drawings, in which:

Figure 1 is a longitudinal vertical section, partially in elevation, through a drier embodying the present invention;

Figure 2 is a front elevational view looking into the open end of the hood;

Figure 3 is a diagram showing the recirculating path within the hood;

Figure 4 is a fragmentary longitudinal vertical section through the fan enclosing shell and motor housing at the rear end of the drier;

Figure 5 is a front elevational view of the fan;

Figure 6 is a rear elevational view of the fan;

Figure 7 is a circuit or wiring diagram; and

Figure 8 is a view similar to Figure 3 showing a modified form of device embodying the invention.

Referring to the drawings, the device shown comprises a relatively thin shell 5 which may be in the form of a casting and finished externally as desired. This shell 5 has a rear wall 6 extending inwardly and provided centrally with an opening 7. The diameter of the shell 5 increases

to its front end which is open to receive the rear end of the hood 8 which fits therein against an annular shoulder 9, and is secured to the shell by screws 10.

The rear side of the wall 6 has four circumferentially spaced posts 11 formed integral therewith and projecting rearwardly therefrom. The electric motor 12 is enclosed within and carried by a shell 13 which may be in the form of a casting, and has an outwardly extending annular flange 14 integral therewith. The flange 14 seats upon the rear ends of the posts 11 and is secured thereto by screws 15. The motor shaft 16 extends forwardly through the opening 7 and into the shell 5 axially thereof, and fixed upon this shaft in position within the shell 5 and entirely rearwardly of the hood 8 is the fan 17.

The fan 17, which is pressed from thin sheet metal, such as aluminum, tin, or the like, has a radial wall at the rear, which wall is thickened at the center and provided with a tubular hub 18. This hub 18 has pressed fit upon the motor shaft 16, and is additionally fixed thereto by a set screw 19. Pressed forwardly from the outer periphery of the rear wall of the fan is an integral rim, the diameter of which increases forwardly. The blades 20 are cut out of this rim by a series of generally U-shaped cuts and are pressed inwardly to position short of radial position. The end of the rim forwardly of the blades 20 forms a connecting ring for the forward ends of the blades, and this ring is folded or rolled over upon itself at 21 to provide adequate strength and rigidity.

The motor 12 and shell 13, as well as the mounting of the same, are enclosed within a motor housing 24 which may be of sheet metal, and at its forward end fits telescopically over the rear end of the shell 5 against an annular shoulder 25 and is secured to the ring by screws 26. At its rear end, the housing 24 has openings 27, and the rear side of the rear wall of the fan 17 has blades 28 secured thereto. The blades 28 act to draw air in through the openings 27 and around the motor to prevent overheating of the same. They may be in the form of angular blade members positioned generally radially upon the rear side of the rear wall of the fan 17, with one flange of each spot-welded or otherwise suitably secured to this rear wall.

The hood which may be of sheet metal is open at the front end to admit the head, substantially as shown by the dotted lines 30 in Figure 3. It flares forwardly from circular form at the rear to enlarged size of generally oval form at the

front as shown in Figure 2, substantially to conform to the head. Short of its open end, the hood 8 has an encircling bead 31. The end of the hood forwardly of the bead 31 is secured by pressed fit, or in any other suitable or preferred manner, in one flange 34 of a generally oval shaped separate member which may be formed of sheet metal and which has an inwardly extending flange 35 at the open end of the hood. The inner edge of the flange 35 is covered by a strip 36 of rubber or other suitable material, which strip is grooved as shown in Figure 1 to receive the edge of the flange 35.

In the operation of the device, the blades 29 form a centrifugal fan which moves the air within the hood 8 in a helical path along the inner periphery of the hood and toward the open end thereof as indicated at 49 in Figure 3. The hood 8 is provided at its open end with a plurality of circumferentially spaced internal longitudinal ribs 42, which ribs are disposed to interrupt the helical stream of air moving outwardly along the inner periphery of the hood and prevent same from emerging swirling from the open end of the hood. The interrupting of the helical movement of the air at the open end of the hood by the ribs 42 which, by their longitudinal disposition, cross the path of helical movement of the air, changes the velocity pressure of the helical stream outwardly along the inner periphery of the hood to a static pressure at the open end of the hood. The central portion of the fan formed by the blades 29 acts to draw the air contained within the hood 8 back from the open end of the hood to the fan as indicated at 43 in Figure 3. The velocity pressure of the helical stream along the inner periphery of the hood being interrupted and changed to a static pressure at the open end of the hood by the ribs 42, the fan acts to set up a substantially closed recirculation of the air within the hood. This substantially closed recirculation of the air within the hood is in a path which includes the helical stream and the portion of the head of the user admitted into the open end of the hood.

Where the flange 35 is employed at the open end of the hood, it covers the outer ends of the ribs 42 and gives the open end of the device a finished appearance as well as providing an opening with a covered edge for admission of the head. This flange 35 also acts with the ribs 42 further to prevent any substantial amount of the air from emerging from the outer end of the hood swirling or substantially at all, and with the ribs 42 and the inlet portion of the fan further to stop outward movement of the air from the open end of the hood and to compel the air to move in a closed recirculating path within the hood. Any slight escape of air as may occur around the head when in place in the open front end of the hood may be compensated for by the air drawn in through the openings 27 at the rear.

The structural details of the ribs 42 may vary widely within the scope of the present invention. The particular ribs shown are formed of sheet metal folded at 44 to generally triangular form, with the flanges 45 welded, soldered, or otherwise suitably secured to the inner surface of the hood 8 at the open end thereof. The outer ends of these ribs 42 are shaped at 46 to conform substantially to the inner side of the flange 35 and the strip 36 covering the edge thereof.

A guard 50 is provided forwardly of the fan 17 to prevent the hair of the user from being drawn into the fan. This guard comprises an

opening ring which may be in the form of a casting and which has formed integral therewith a pair of diametrical arms 51 at right angles to each other. The rear side of the ring is covered by a screen 52 which is soldered peripherally or otherwise suitably secured to the ring. The opposite ends of the arms 51 project from the ring and are secured to the tapered shell 5 by screws 52'. One of the arms 51 also has a pair of integral arms 53 which extend rearwardly therefrom and support the heater 54 at the axis of the fan 17 and, in the illustrated embodiment, within the portion of the fan defined by the blades 20 where it is in the path of the stream of air 43 drawn back to the fan from the zone of static pressure at the open end of the hood.

The heater 54 comprises two units, one or both of which are adapted to be rendered operative, or the blower may be operated "cold" without heat from either coil as will hereinafter appear. Each coil consists of a helical wire of suitable resistance wound helically in the helical groove of a porcelain spool 56. Bars 57 extend across the opposite ends of the spools 56, and screws 58 are threaded through these bars and project into axial openings in the ends of the spools to mount the same between the bars 57. These bars 57 are, in turn, fastened by channel members and screws 59 to the rearward ends of the arms 53, and the heater is thereby supported as a unitary part of the guard ring 50.

The shell 5 has diametrically opposite bosses 62, and the upstanding legs 63 of a mounting yoke 64 straddle these bosses and are pivoted thereto at 65. The pivotal connections 65 are preferably sufficiently tight so that the hood 8, which is swingable about these pivots to direct its open end forwardly, upwardly or downwardly as desired, will remain in any position into which it is swung. At its lower end and intermediate the ends of the legs 63, the yoke 64 is provided with a short post 66 which fits telescopically in the upper end of a tubular standard 67 which may be provided with a suitable base, not shown. The post 66 is adapted to turn in the upper end of the standard 67 for directing the open end of the hood as desired.

The motor 12 and the heater coils are supplied by conductors 70 provided with a connector 71 for connection with the standard "Edison" or any other suitable outlet. The circuit for the motor and heater coils may be controlled by a suitable switch 72 secured in place at 73 in an opening 74 in the motor housing 24. The conductors 70, which may be in the form of the usual two wire insulated cord, enter the housing 24 through an insulating bushing 75, and the switch 72 has the usual finger-piece 76.

By reference to the wiring diagram of Figure 7, it will be seen that the switch 72 has four positions, i. e. "off", "hot", "warm" and "cold" positions. One position closes the circuit for the motor 12 without closing the circuit through either of the heating coils H, H'. Another position closes the circuit through one heating coil H, at the same time closing the motor circuit. Another position closes the circuit through both heating coils and, at the same time, the motor circuit, and the other position opens the motor and heating coil circuits to turn off the device.

The shaft of the switch 72 (Figure 7) is adapted to be turned by the finger piece 76 in the direction indicated by the arrow, and this shaft has two contacts 78, 79 which turn therewith. The shaft and contacts 78, 79 have the four positions above

described. The position shown is the "off" position in which the motor and both heating coil circuits are open. The next position closes a circuit from one of the conductors 70 through the wire 80, motor 12, wire 81 and contact 79 to the other conductor 70 and, simultaneously, from one of the conductors 70 through both coils H and H' to the other conductor 70. The next position closes the circuit through the motor and, simultaneously, the circuit for the coil H only, and the next position closes the motor circuit with both heating coil circuits open.

The embodiment shown in Figure 8 is similar to the embodiment shown in Figures 1 to 7 inclusive, except that the inwardly extending flange at the open end of the hood 8' is omitted. The internal longitudinal ribs 42' are disposed at the open end of the hood 8', and this hood has a short longitudinal extension 95 which fits telescopically into the inner end of a longitudinally extending sheet metal ring 96. This ring 96 is secured to the extension 95 of the hood 8' as by means of screws 97 and engaging nuts 98. The ring 96 and the outer end of the hood 8' admit the head of the user, as shown, and the internal longitudinal ribs 42' interrupt the helical stream of air which is moved outwardly along the inner periphery of the hood. As before, this interrupting of the helical movement of the air at the open end of the hood by the ribs 42', which, by their longitudinal disposition, cross the path of helical movement of the air, changes the velocity pressure of the helical stream outwardly along the inner periphery of the hood to a static pressure at the open end of the hood. The longitudinally extending flange or ring 96 acts with the ribs 42' to prevent the air, and particularly the eddy currents at the outer end of the hood, from slipping or leaking from the open end of the hood. The air, instead of emerging from the open end of the hood, is drawn back from the zone of static pressure at the open end of the hood by the central intake portion of the fan. A substantially closed recirculation of the air within the hood is thus produced substantially as in the previous embodiment and as indicated by the arrows.

I do not intend to be limited to the precise details shown or described.

I claim:

1. In combination, a generally conical shell, a hood secured at one end to one side of said shell and having an open end adapted to admit the head of the user, a motor housing secured to the opposite side of said shell, rearwardly extending posts on the rear end of said shell, a motor secured to said posts and disposed within said motor housing, said motor having a shaft projecting axially into the shell, a centrifugal fan fixed upon said shaft and disposed within said shell for moving the air within the hood in a helical stream along the inner periphery of the hood and toward the open end thereof, a guard disposed forwardly of said fan and secured to the front end of said shell, heater means carried by said guard rearwardly thereof and disposed within the blade area of the rim of said fan and at the axis thereof, and internal longitudinal ribs at the front end of the hood for interrupting the helical stream of air and changing the velocity pressure thereof to a static pressure adjacent the open end of the hood.

2. In a hair drier, a shell having an opening at the outer end, means for circulating air in the shell so that it takes a helical path in travelling lengthwise of the shell toward the opening and

is recirculated from the outer end of the shell inwardly through the helical stream of air, and means for minimizing air leakage at the opening including internal and circumferentially spaced ribs at the outer end only of the shell, said ribs being disposed to stop the helical movement of the air and with the spaces between said ribs substantially completely open inwardly to the head.

3. In a hair drier, a shell having an opening at the outer end, means for circulating air in the shell so that it takes a helical path in travelling lengthwise of the shell toward the opening, means for minimizing air leakage at the opening including internal circumferentially spaced ribs at the outer end only of the shell, said ribs being disposed to stop the helical movement of the air and with the spaces between said ribs substantially completely open inwardly to the head, and said air circulating means having an inlet for drawing the air back to the air circulating means through the helical stream of air and from the inwardly opening spaces between said ribs.

4. In a hair drier, a hood having an unobstructed interior portion devoid of a part that cooperates with the side wall of the hood to form an air circulating passageway, said hood having an opening at the outer end adapted at least partially to receive the head, means for circulating air in the hood so that it takes a helical path in travelling along the inner surface of the unobstructed interior portion of the hood toward said opening, and means for minimizing air leakage at the opening and including circumferentially spaced internal ribs at the outer end only of the hood and disposed across the path of helical movement of the air to stop the helical movement of the air, said air circulating means having an inlet for drawing the air back to the air circulating means through the helical stream of air and from the zone where the helical movement of the air is stopped by said ribs.

5. In a hair drier, a hood having an unobstructed interior portion devoid of a part that cooperates with the side wall of the hood to form an air circulating passageway, said hood having an opening at the outer end adapted at least partially to receive the head, means for circulating air in the hood so that it takes a helical path in travelling along the inner surface of the unobstructed interior portion of the hood toward said opening, means for minimizing air leakage at the opening and including circumferentially spaced internal ribs at the outer end only of the hood and disposed across the path of helical movement of the air to interrupt the helical movement of the air and change the velocity pressure of the helical stream of air to a relatively static pressure at the outer end of the hood, the spaces between said ribs being substantially completely open inwardly and said air circulating means having an inlet for drawing the air back to the air circulating means from the inwardly opening spaces between said ribs.

6. In a hair drier, a shell having an opening at the outer end, means for circulating air in the shell so that it takes a helical path in travelling lengthwise of the shell toward the opening, means for minimizing air leakage at the opening including internal circumferentially spaced ribs at the outer end only of the shell, said ribs being disposed to stop the helical movement of the air and with the spaces between said ribs substantially completely open inwardly to the head, said air circulating means having an inlet for drawing the air back to the air circulating means through

the helical stream of air and from the inwardly opening spaces between said ribs, and an inwardly extending flange disposed at the open end of the shell and covering the adjacent ends of said internal ribs.

5 7. In a hair drier, a hood having an unobstructed interior portion devoid of a part that cooperates with the side wall of the hood to form an air circulating passageway, said hood having
10 an opening at the outer end adapted at least partially to receive the head, means for circulating air in the hood so that it takes a helical path in travelling along the inner surface of the unobstructed portion of the hood toward said
15 opening, means for minimizing air leakage at

the opening and including circumferentially spaced internal ribs at the outer end only of the hood and disposed across the path of helical movement of the air to interrupt the helical movement of the air and change the velocity pressure of the
5 helical stream of air to a relatively static pressure at the outer end of the hood, the spaces between said ribs being substantially completely open inwardly, said air circulating means having
10 an inlet for drawing the air back to the air circulating means from the inwardly opening spaces between said ribs, and an inwardly extending flange disposed at the open end of the hood and covering the adjacent ends of said internal ribs.

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