

Aug. 24, 1965

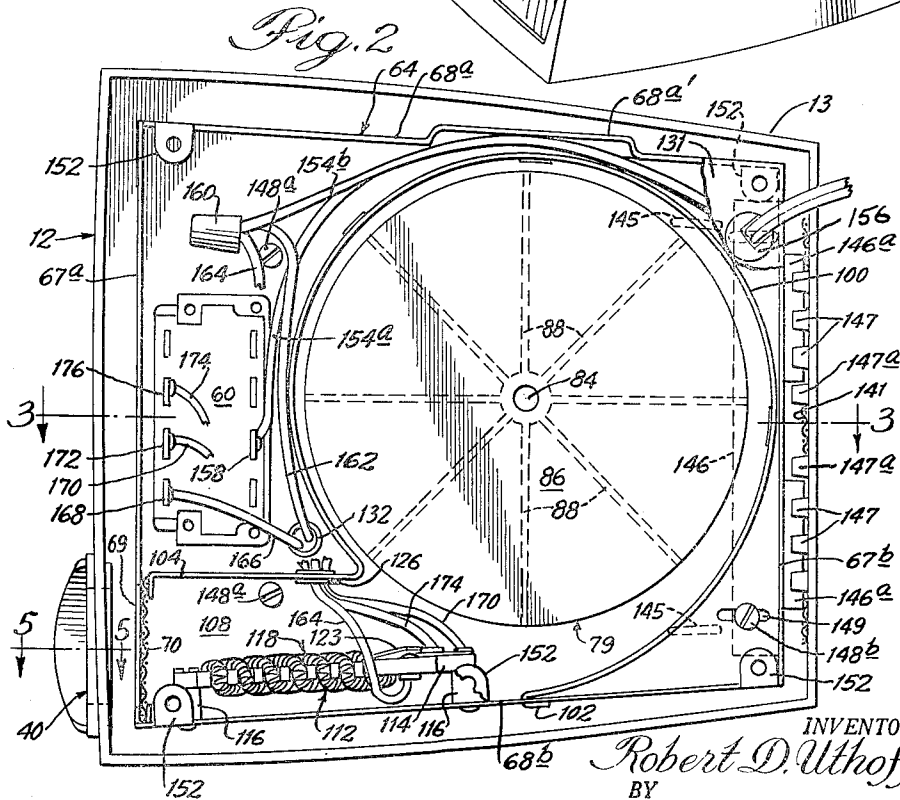
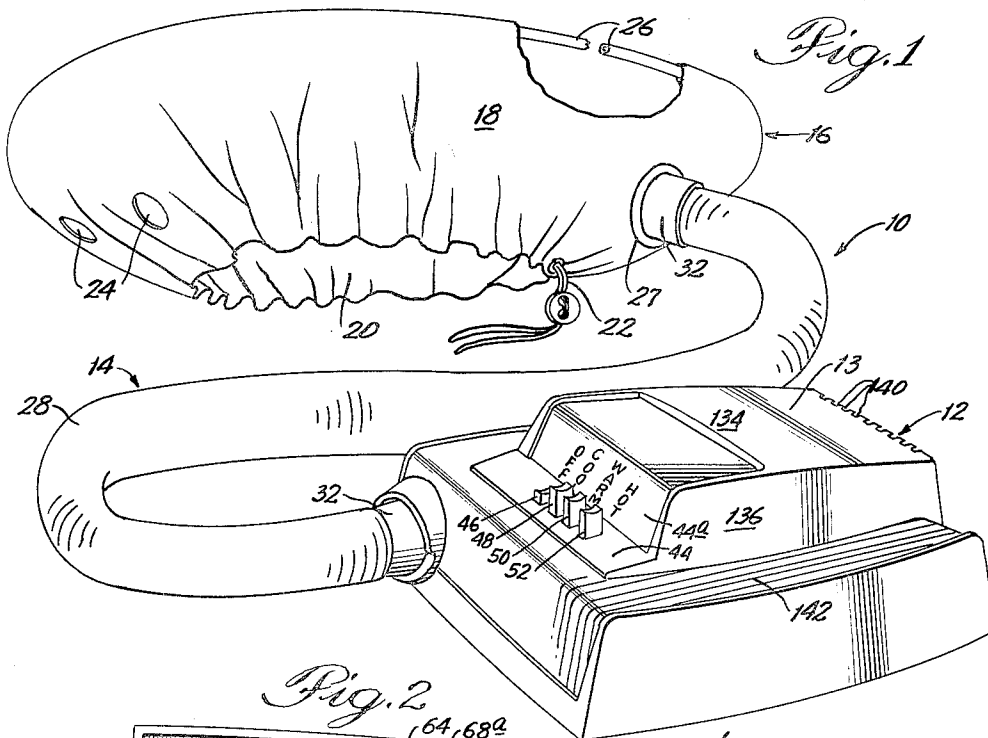
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3,202,797

HAIR DRIER WITH FAN AND HEATER

Filed June 19, 1961

3 Sheets-Sheet 1



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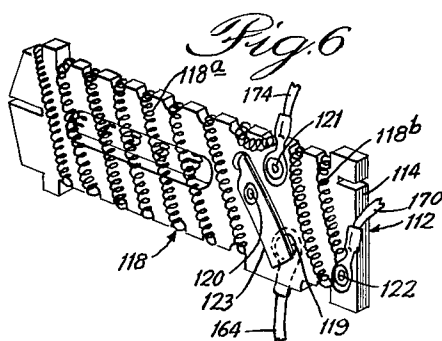
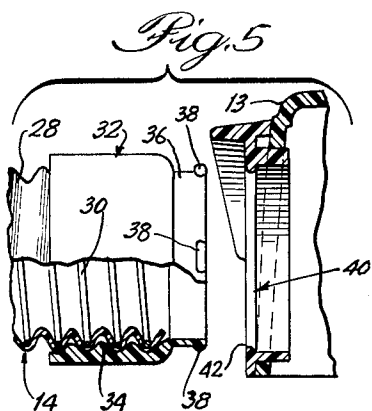
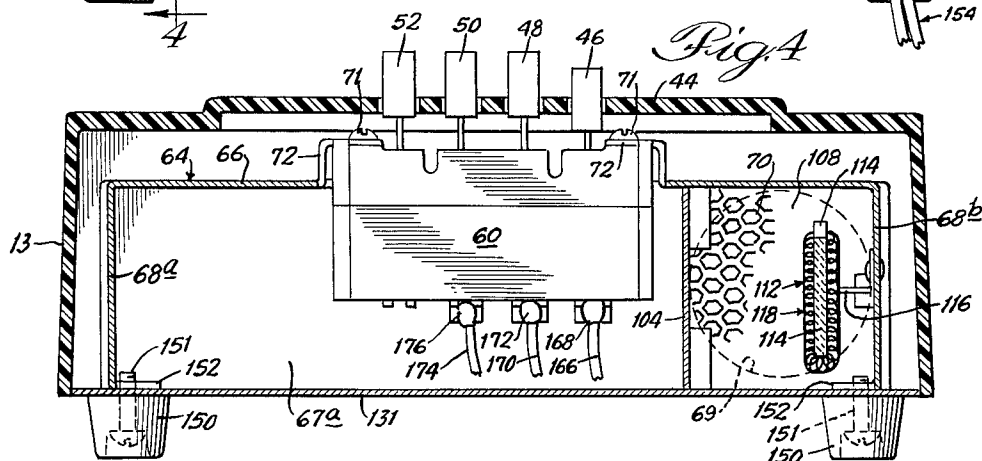
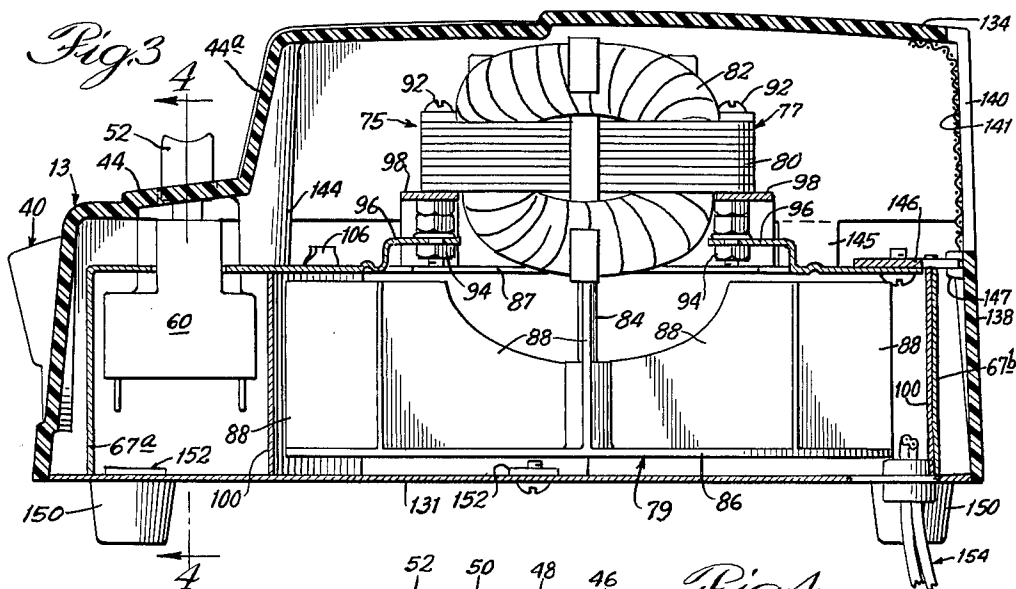
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HAIR DRIER WITH FAN AND HEATER

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3 Sheets-Sheet 2



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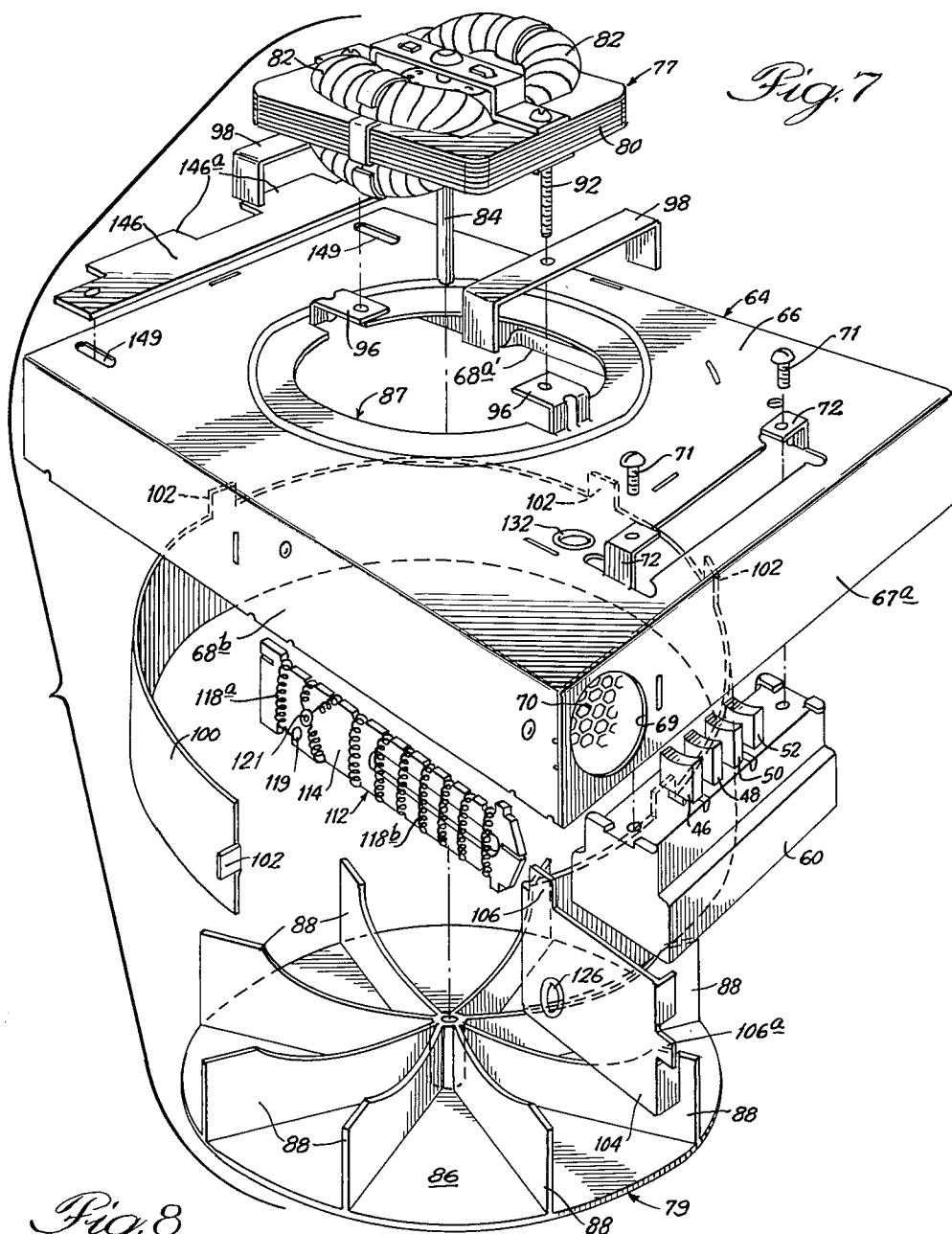
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HAIR DRIER WITH FAN AND HEATER

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3 Sheets-Sheet 3



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3,202,797

HAIR DRIER WITH FAN AND HEATER

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4 Claims. (Cl. 219—370)

This invention relates in general to hair drier appliances and more particularly to a hair drier having improved detachable or separable components and arranged so as to reduce the danger of either electrical shock or heat or fire damage while providing a more efficient electrical circuitry.

Hair drier appliances basically comprise an arrangement for blowing heated air over hair. While at first blush it would seem that a hair drier should involve no more than the provision of a heating element and a fan arrangement for blowing a heated air stream in the desired direction, nevertheless, such an over simplification is erroneous because the said basic requirement must be modified to meet a number of other existing conditions to provide a desirable commercial product. Thus, a fan and its motor occupy considerable space and are of noticeable weight, especially if they must be manually supported while directing the air stream. On the other hand, it is desirable to leave the hands free and, therefore, the fan and attendant circuitry must be capable of being positioned at a remote location, and the heated air must be fed to the hair through some coupling means which may be simply positioned on the head. The latter requisite necessitates a simple economical headdress, or hood, which may be positioned on the head together with a simple, efficient and economical means for quickly and easily detaching or engaging an air feed hose with both the hood and the air supply from the fan.

As the heated air must be fed over some distance before reaching the hair, it must be quite hot at the time it is projected from the heater. However, for economical production it is desirable that the housing for the fan and motor be of a light moldable plastic or similar material that may be subject to heat damage, and, therefore, an arrangement must be provided for protecting the housing from the heat while at the same time the electrical circuitry and moving parts of the drier must be so disposed as not to be susceptible of inadvertent touching in the event the housing is inadvertently ruptured or dismantled.

In addition, the heated air must be supplied in a variety of temperatures which normally necessitates various circuit arrangements and utilization of elements that must be economically adjusted and selectively operable for performing their required functions.

It is therefore an object of the present invention to provide a hair drier having improved means for overcoming the above and other difficulties. Basically, this is done by mounting the motor and fan on a sheet metal chassis and projecting, or exporting, the heated air through a duct formed in the metal chassis and its housing to a flexible hose or coupling which extends to the hood or headdress. The housing is thus carried by the chassis so as to be substantially completely separated and isolated from the heated air, with the exception of a small connection aperture which serves as the coupling means to the hose that connects to the housing. The elongated hose is provided with identical coupling elements on either end interchangeably mating with a coupling rim around the apertures provided both in the headdress and in the housing. The electrical circuitry of the drier is arranged to provide air of different temperatures with but

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a single bi-metal, or thermostatic, element which is pre-set, or calibrated, so as to avoid adjustment problems. The electrical circuitry for heating the air is completely enclosed within the chassis so that accidental rupture or dismantling of the housing, which surrounds the chassis, does not expose said circuitry, thereby reducing hazards.

The arrangement for accomplishing the above described purposes together with other objectives and purposes of the present invention, will become apparent on examination of the following specification, claims and drawings wherein:

FIGURE 1 is a perspective view of a hair drier embodying my invention;

FIGURE 2 is a bottom view of the air supply chassis and housing assembly with the bottom closure panel removed;

FIGURE 3 is a cross-sectional view taken substantially along the line 3—3 of FIGURE 2;

FIGURE 4 is a cross-sectional view taken substantially along the line 4—4 of FIGURE 3;

FIGURE 5 is a partial cross-sectional view illustrating the mating coupling elements of the hose and air supply duct on the housing;

FIGURE 6 is a perspective view of the heating coil assembly;

FIGURE 7 is an exploded perspective view of the basic components of the air supply; and

FIGURE 8 is a diagram of the electrical circuitry of the hair drier.

Referring now to the figures, the hair drier is indicated generally by the reference character 10. It comprises an air supply assembly, indicated at 12, that includes a housing 13, a hose 14 for transporting the air from housing 13, and an appropriate hood, or confining headdress, 16 through which the air is fed to the hair.

The hood 16 comprises a flexible plastic bag 18 having an opening 20 which permits of positioning the hood onto a person's head. A drawstring 22 is provided adjacent the opening 20 for adjusting its size so that the hood 16 fits snugly about the head. Suitable spaced apart discharge apertures 24 are provided in the hood for enabling the air to be properly exhausted, while a wire band 26 within bag 18 acts to maintain the hood in a desired configuration. The hood is supplied with air from the hose 14, which is detachably engaged with a grommet 27 disposed opposite apertures 24. It will be noted that air entering hood 16 must travel the complete length of the hood before being exhausted through apertures 24. This provides the maximum of contact between the warm air and the hair to considerably accelerate the drying time.

The hose 14 comprises a flexible, cylindrically shaped, corrugated, plastic element 28 in which a form-sustaining wire coil 30 is embedded, as perhaps best seen in FIGURE 5. Each end of the hose 14 terminates in an identical light plastic coupling element 32, which is provided with female threads or corrugations 34 to provide for positive engagement with the hose corrugations. Each coupling element 32 is also provided with an integrally formed male coupling element in the form of a tubular stud 36 of reduced dimension relative to body portion 32, having formed thereon a plurality of spaced apart lock projections 38.

Both the hood 16 and the housing 13 are provided with suitable bead coupling elements surrounding the aperture therein for releasably receiving the lock projections 38. In FIGURE 5, the aperture 40 in the housing is illustrated surrounded by a coupling bead, or rim, 42 past which the projections 38 may be snapped to provide for releasable coupling. The body portion of the coupling element 32 being larger than the tubular stud

36 prevents the hose and coupling element from being inserted into the aperture 40 beyond the length of stud 36. A similar arrangement is provided for engaging the grommet 27 in the hood.

The air supply assembly 12 comprises the mentioned housing 13 which is appropriately designed to provide a desired aesthetic appearance and for shielding the apparatus assembly therein. The housing 13 provides a suitably apertured forward horizontal wall 44 through which project various control buttons 46, 48, 50 and 52 which enable selections to be made in the desired functions to be performed by the drier. Suitable control legends are provided on upright wall 44a of housing 13 adjacent the respective control buttons.

The control buttons are suitably supported on a molded switch block 60 having appropriate terminals, as seen in FIGURES 2-4, to which electrical connections may be extended. The switch block 60 is of any well known selector type wherein the depression of any one of the buttons 46-52 releases any other depressed button while causing the selected operation to then take place. Both the switch block 60 and housing 13 are carried upon a sheet metal chassis 64 hereinafter described.

The chassis 64 includes a generally rectangular top wall 66 and depending front and back walls 67a and 67b and side walls 68a and 68b. The front wall 67a is provided with an aperture 69, seen in FIGURES 2 and 7, which is in spaced register with the aperture 40 in the housing 13 through which the air is directed. A metal grillwork, or mesh, 70 is fastened across the aperture 69 to permit air flow therethrough while preventing insertion of articles therethrough.

As seen in FIGURE 4, the switch block 60 is fastened to the top wall 66 by means of a plurality of screws 71 extending through appropriate apertures defined in brackets 72 that are formed integral with the top wall 66.

The sheet metal chassis 64 also carries a fan assembly 75 as best seen in FIGURES 3 and 7. This fan assembly comprises a motor 77 that drives a centrifugal impeller 79. The motor comprises the stacked iron laminations 80 and the field coil 82 located above the impeller 79 and which serve to rotate the shaft 84 in a conventional manner. The impeller 79 is molded from plastic and comprises a bottom disc 86 from which a plurality of radial fan blades 88 project upwardly at right angles.

The motor 77 is assembled onto the top wall 66 of chassis 64 with drive shaft 84 projecting downwardly through an enlarged aperture 87 in the top wall. Apertures are provided in opposite sides of the plate stack 80 for enabling bolts 92 to be inserted therethrough for engagement with nuts 94 for mounting the motor onto brackets 96 integrally formed on the top wall 66. In addition, a pair of rigidifying U-shaped brackets 98 are interposed between the plate stack 80 and the top wall 66, and their legs serve as stops for accurately positioning the motor 77 with respect to the chassis. The impeller 79 is connected to the shaft 84 with the blades 88 thereof located below chassis top wall 66. A portion of field coil 82 is located centrally of aperture 87 but is spaced from the edge thereof to provide space for flow of air therethrough from outside chassis 64 to the interior of chassis 64 where the air is acted upon by the impeller 79.

The radial outer edges of fan blades 88 and the periphery of the disc 86 are partially enclosed by a circular sheet metal member 100, as best seen in FIGURES 2 and 7, and which serves to confine the air flow. The bracket 100 is provided with a series of ears 102 which are inserted in respective openings in the chassis top wall 66 and side wall 68b respectively. The ears are then bent over or twisted to secure the bracket 100 in position. At one end, the bracket 100 terminates in a straight portion 104 having suitable ears 106 and 106a which likewise permit the portion 104 to be fastened to the top wall 66 and to the wall 67a adjacent the opening 69. The straight portion 104 and the spaced parallel portion of

wall 68b define therebetween a duct 108 through which the air is directed to the opening 69 in the chassis for passage into aperture 40 in the housing and to the hose 14 attached thereto.

A heating coil assembly 112, best seen in FIGURES 2, 4 and 6, is mounted in the duct 108 spaced between walls 68b and 104 for the purpose of heating the air passing through the duct. The assembly 112 comprises a flat core member 114, of ceramic or other insulating material, mounted on a pair of ears 116 carried by the chassis side wall 68b. A heating coil 118 is wrapped around the ceramic core element 114 and extends through suitably located indentations in the ceramic.

The heating coil 118 is composed of two segments 118a and 118b. The ceramic core carries four eyelets 119, 120, 121 and 122. A bimetal 123 that is normally in closed circuit condition interconnects eyelets 119 and 120. Segment 118a is the longest segment of coil 118 and extends between eyelet 120 and 121. Segment 118b extends between eyelet 121 and 122. The common lead 164 connects to eyelet 119, so that when the controls call for "HOT" air, current passes from eyelet 119, through bimetal 123 to eyelet 120, and through segment 118a to eyelet 121 which is connected by a wire 174 to the appropriate control switch. When the controls call for "WARM" air, the switch connection to eyelet 121 is disconnected and heating segment 118b acting as a dropping resistor is connected in series with heating segment 118a so that a reduced current then passes from eyelet 121 through segment 118b to eyelet 122 which is connected by a wire 170 to its appropriate control switch.

The bimetal 123 is fixedly secured at one end by eyelet 120. The thickness and length of bimetal 123 is so selected that it has sufficient pre-tension on its deflective end such that due to the height of the head of eyelet 119, the bimetal 123 deflects and opens contact at a temperature of about 200° F., which protects against over heating of any part of the appliance in the event of failure of the fan motor. The bimetal is also arranged so that its free end is spaced further from the closest portion of heating segment 118a than from the closest portion of heating segment 118b. This arrangement makes it possible to utilize the single bimetal 123 to effect control regardless of whether the "HOT" section 118a of the heating element is energized, or whether the entire element, 118a and 118b, is energized to provide a "WARM" operation. The heating element and bimetal may be easily calibrated at a fixed position since all parts are securely carried on the rigid ceramic framework element 114.

The electrical wire connections between the heating coil assembly 112 and the switch block 60 are extended through an opening 126 defined in the wall portion 104. The power supply leads 154a and 154b, seen in FIGURE 8, are brought in through a suitable opening in a sheet metal bottom panel 131, which closes off the interior of chassis 64. The power leads then pass between the wall 68a and curved sheet metal member 100 to the switch block 60. The wall 68a is bulged outwardly at 68a' to accommodate disposing the power leads between bulge 68a' and member 100. The leads from the switch block 60 to the motor 77 are extended through a grommet 132 in the top wall 66 of the chassis.

Until now the discussion has pertained primarily to the components mounted on the chassis 64 and the manner in which the air supply is coupled with the hood 16. It will be appreciated that the air supply assembly or unit 12 without the housing 13 is a completely operative unit in which the electrical and moving elements are arranged and disposed so as to prevent manual contact therewith. The stylized housing 13 formed of plastic may be assembled onto the chassis, and, if for any reason, the housing is subjected to damage, undesirable manual contact with the heating coil circuit, or the exposed connections to the switch block 60, or with the fan blades is still almost impossible.

The housing 13 defines a top wall 134 from which depend side walls 136, a back wall 138, and front wall 44a which merges with apertured wall 44. The back wall 138 is vertically slotted as shown at 140 in FIGURES 2 and 3 so that air may be drawn into the housing 13 for entry through aperture 87 to the enclosure defined by chassis 64 that is closed off at the bottom by wall 131. A suitable screen mesh 141 is provided across slots 140 both for aesthetic reasons and to limit passage of undesirable particles therethrough. Extending laterally from the lower edge of side walls 136 are laterally extending walls 142. A pair of internally threaded elongated bosses 144 formed integrally with the housing 13 depend from the interior of the housing adjacent wall 44a, and a second pair of shorter abutments 145 depend from walls 142 spaced forwardly of the rear wall 138.

The top wall 66 of chassis 64 engages only bosses 144 and abutments 145 to space the chassis from housing 13. An attachment plate 146, positioned above wall 66 of chassis 64, is formed with spaced sections 146a, each of which engages a plurality of tongues 147 molded integral with housing 13 and in line with the lower end of respective air openings 140. A pair of tongues 147a are positioned between the plate sections 146a and in the plane of plate 146, thereby operating to properly position the plate 146 with respect to its attachment to chassis 64. A first pair of screws 148a extend through apertures in top wall 66 to secure to tapped bosses 144. A second pair of screws 148b extend through elongated slots 149 in top wall 66 for connection to attachment plate 146.

The foregoing arrangement rigidly mounts chassis 64 in housing 13 with the side walls of the chassis spaced from the side walls of the housing to provide a heat-insulating air space therebetween, as can best be seen in FIGURE 2. The only engagement of chassis 64 with housing 13 is at bosses 144 and abutments 145, and through engagement of plate 146 with tongues 147.

To close off the bottom of the housing 13 and the chassis 64, there is provided the bottom wall 131 of sheet metal which is secured to chassis 64 by means of a plurality of screws 151 that connect to tapped tabs 152 carried at the lower edge of the chassis. Four of said screws 151 are elongated and are located adjacent the corners of the device, and each carries a support foot 150 of insulating material.

The power cord 154 enters the bottom wall 131 through a grommet 156 and then follows the contour of circular wall 100 to adjacent the switch block 60 where the cord is split so that one lead 154a connects to a terminal 158 and the other lead 154b goes to connector 160 from whence extend parallel leads 162 and 164. Lead 162 extends through grommet 132 to the motor and a return lead 166 from the motor connects to switch block terminal 168. The lead 164 connects to terminal 119 of the heater element. A lead 170 extends from switch block terminal 172 to heater terminal 122. A lead 174 extends from switch block terminal 176 to heater terminal 121.

FIGURE 8 illustrates the control circuit for the drier. The switches are therein represented by different positions to which a schematic wiper may be operated to simplify the circuit representation. It will be seen that with switch 46 depressed, no circuit is completed, and the drier 10 is in the "OFF" condition. Depression of switch 52 completes a circuit for the field coil 82 of the motor 77 and simultaneously completes a circuit through only heating coil portion 118a and through the thermal element 120 to establish the "HOT" condition.

Depression of switch 50 operates to energize the two heating coil segments 118a and 118b in series, to establish a "WARM" condition. Lastly, the depression of switch 48 operates to open the circuit to the heating coil 118 while maintaining the circuit to the field coil 82 closed. The motor 80 therefore operates to continue op-

eration for providing an air flow which remains at normal atmospheric temperature.

While there has been shown and described a particular embodiment of this invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention and, therefore, it is intended in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of the invention.

What I claim as new, and desire to secure by Letters Patent of the United States, is:

1. A hair drier comprising, in combination: metallic chassis means including an apertured top wall and depending upright side wall means which substantially define and enclose below said top wall a fan chamber with an extension thereof which serves as an elongated air flow passageway that terminates at an aperture defined in a side wall of said chassis means, a fan mounted on said chassis means in said chamber and arranged to direct air under pressure through said air flow passageway toward said aperture, heating means supported by said chassis means and positioned in said chamber for heating the air directed from said fan, a control switch assembly carried by said chassis means, circuit means supported by said chassis means below said top wall of the chassis means and inwardly of the side wall means and arranged to be selectively controlled by said switch assembly for effecting operations that include energizing selected portions of said heating element to heat the air being discharged through the air flow passageway to selected temperature levels, said switch assembly simultaneously operating said fan to drive air through said passageway, a housing of non-conductive material surrounding said chassis means in spaced relation from said chassis means to define a thermal and electrically insulating air space between said chassis means and said housing, said housing defining a discharge aperture therein spaced from the side wall of the chassis means at which said air flow passageway terminates and being aligned with said air flow passageway to receive therethrough the stream of air directed by said fan through the air flow passageway, and connector means on said housing adjacent said aperture adapted for releasably receiving an air conduit and being operative to maintain the conduit spaced from said chassis.

2. A device as set forth in claim 1 wherein the heating includes a combination heater and thermostat control therefor positioned in the air discharge passageway, and there being a grillwork on said chassis means across the air discharge passageway at its terminus and spaced between said heater means and the aperture in said housing.

3. A hair drier as in claim 1 wherein the heating means includes a combination heater and thermostat control therefor which comprises, in combination, an insulating core member, a heater element wound upon said core member and defining a first heater whose individual energization produces a relatively high heat output and second current-reducing heater on said core member spaced from said first heater means and arranged to be selectively energized in series with the first heater and to thereby produce a total heat output that is lower than the said high heat output; and a single bimetal thermostat mounted on said core element and arranged relative to said first and second heaters to be sensitive to the heat output of both the first heater energized alone and to the first and second heater energized together as modified by heat transfer to the fluid passing thereover, said thermostat operating to terminate energization of the entire heater upon the ambient temperature reaching a predetermined level, and regardless of whether only the first heater is energized or whether both the first and second heaters are energized.

4. A hair drier as in claim 1 wherein the heating means includes a combination heater and thermostat control therefor which comprises, in combination, an insulating core member, a heater element wound upon said core

member and defining a first heater whose individual energization produces a relatively high heat output and a second current-reducing heater on said core member spaced from said first heater means and arranged to be selectively energized in series with the first heater and to thereby produce a total heat output that is lower than the said high heat output; and a single bimetal thermostat mounted on said core element and arranged relative to said first and second heaters to be sensitive to the heat output of both the first heater energized alone and to the first and second heater energized together as modified by heat transfer to the fluid passing thereover, said thermostat operating to terminate energization of the entire heater upon the ambient temperature reaching a predetermined level, and regardless of whether only the first heater is energized or whether both the first and second heaters are energized, and said thermostat being positioned between said spaced first and second heaters and closer to one of the said two heaters.

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