

May 29, 1956

R. S. M. MITCHELL

2,747,296

APPARATUS FOR DRYING HAIR

Filed Sept. 6, 1951

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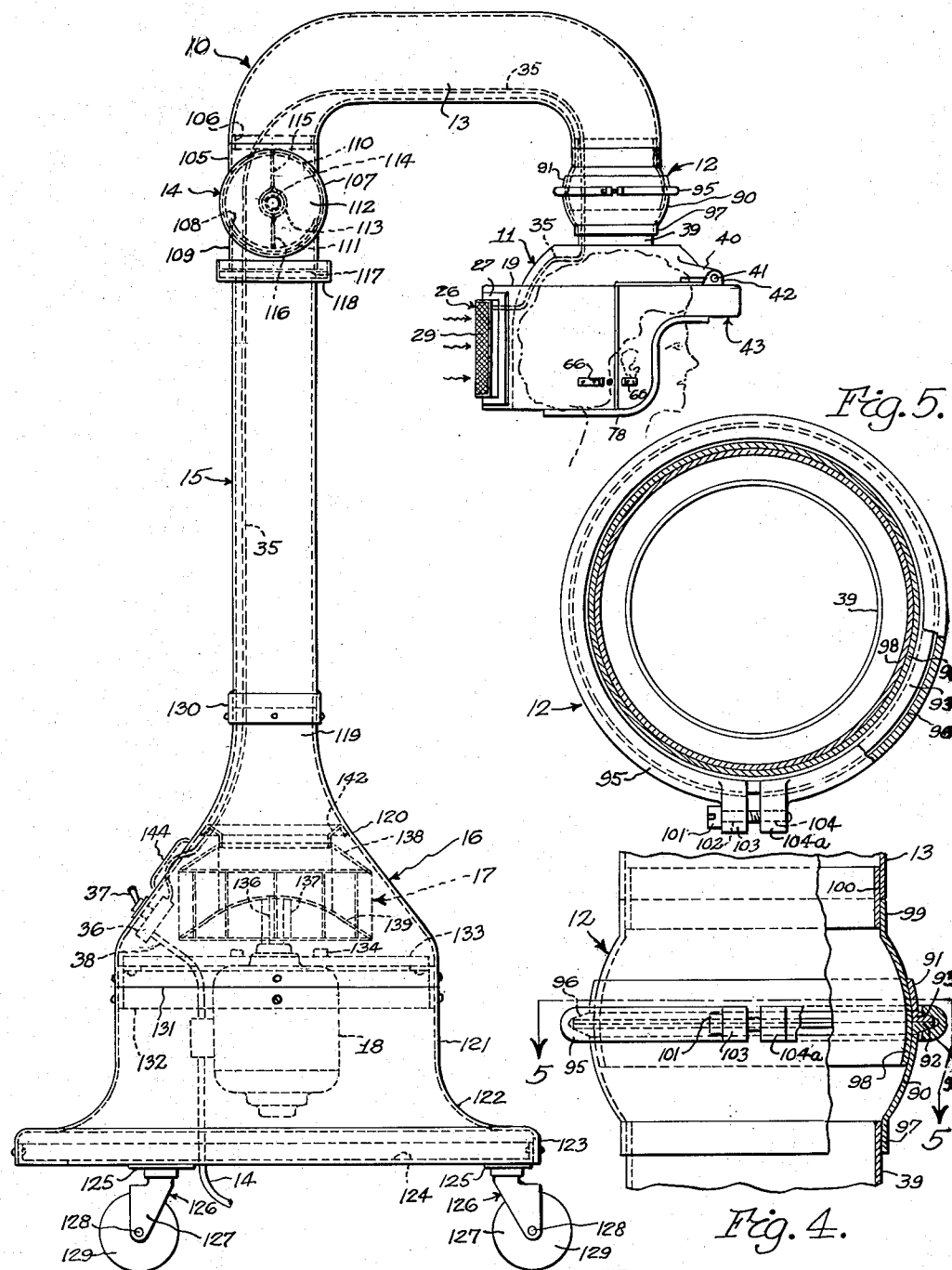


Fig. 1.

Fig. 4.

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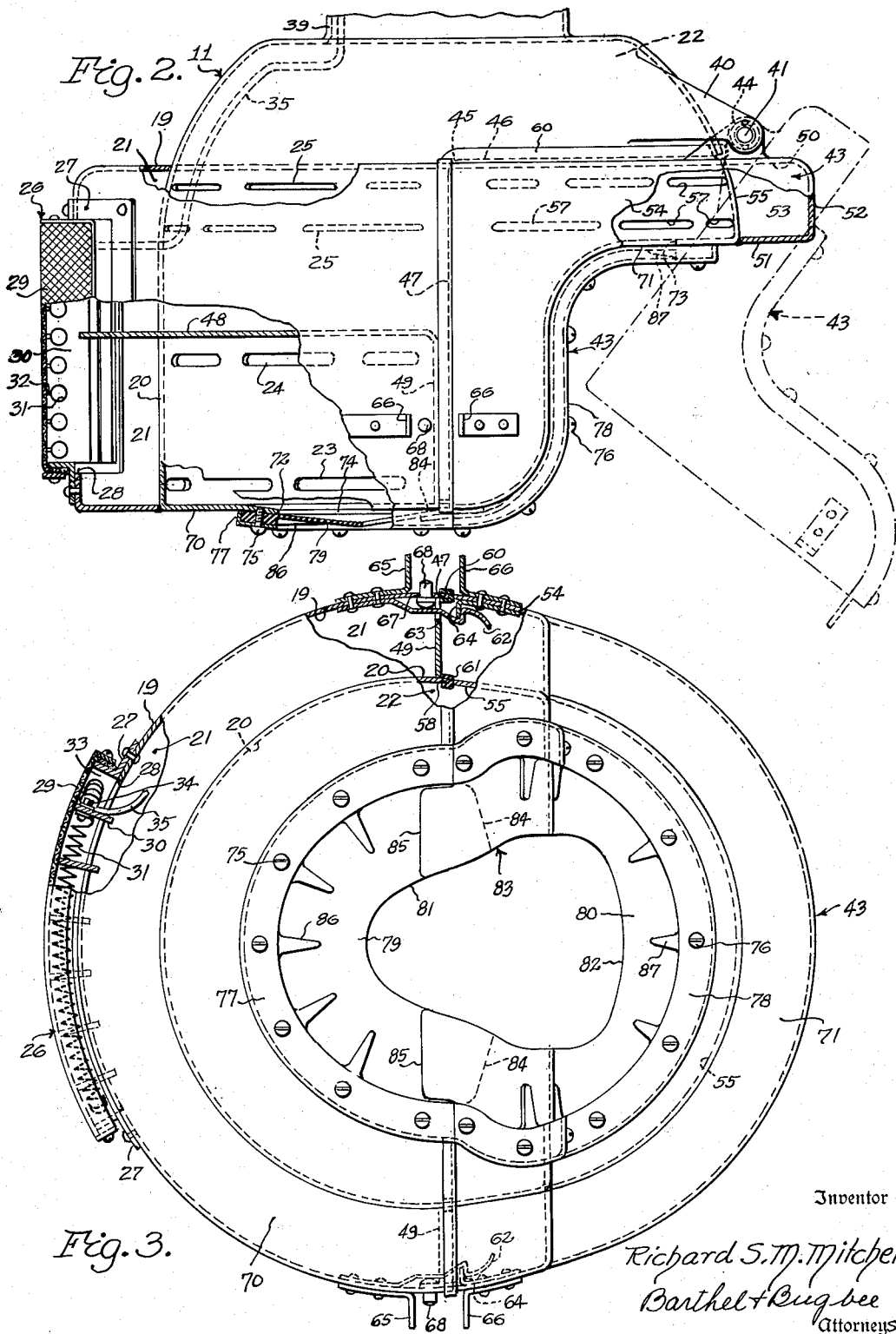
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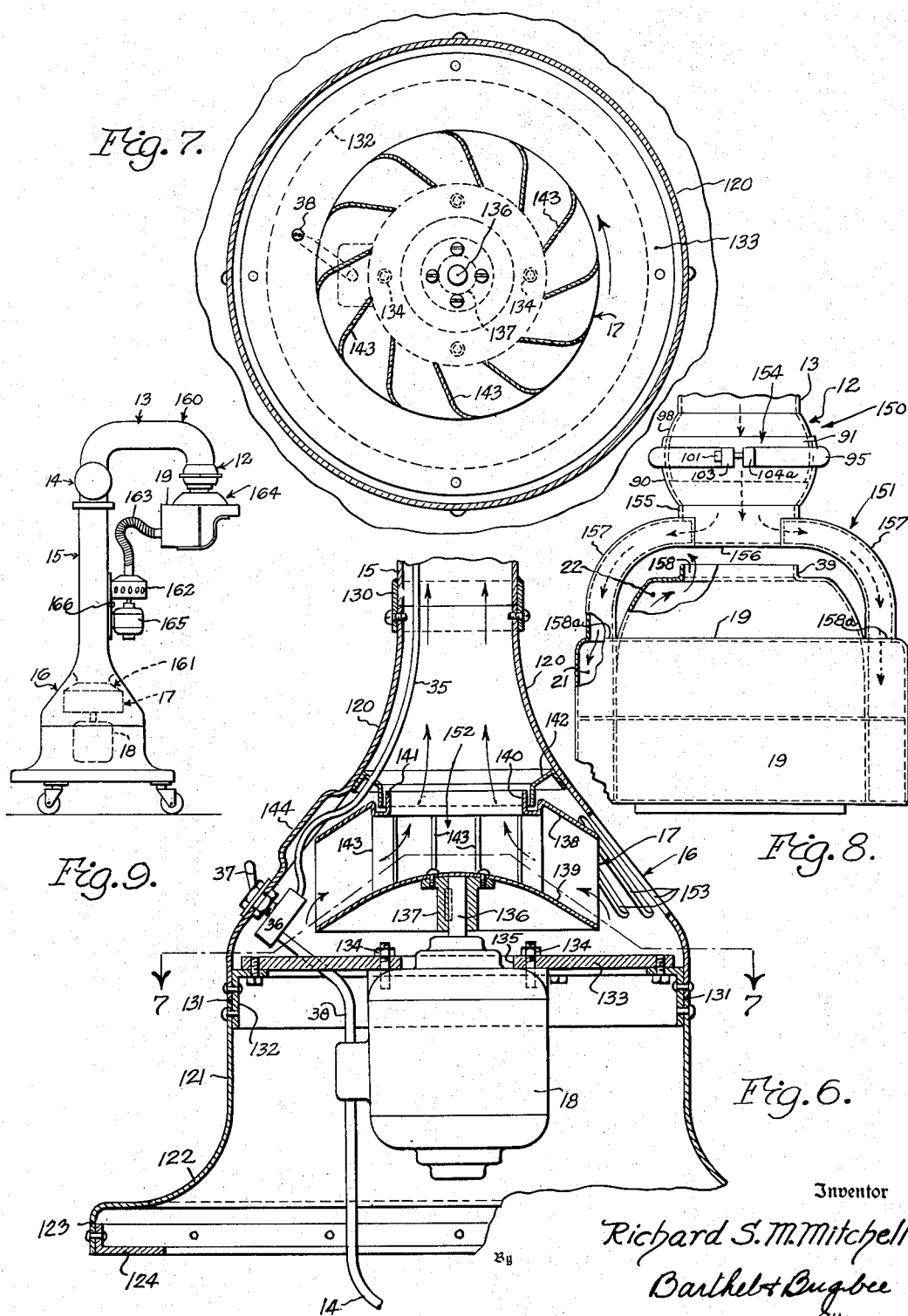
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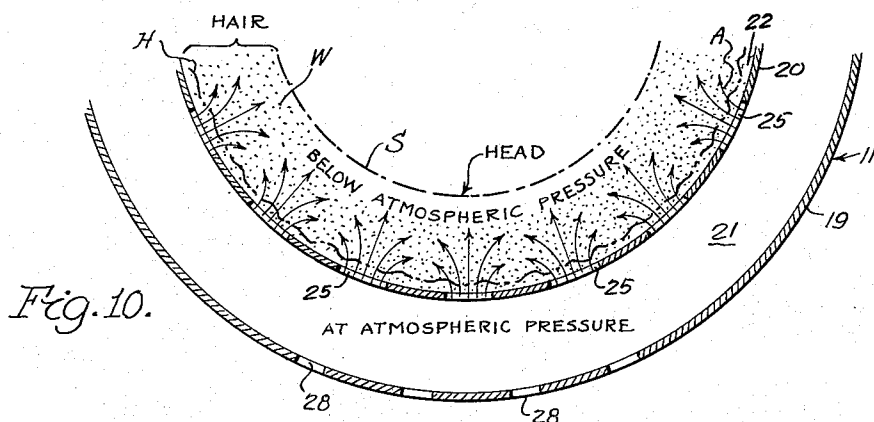
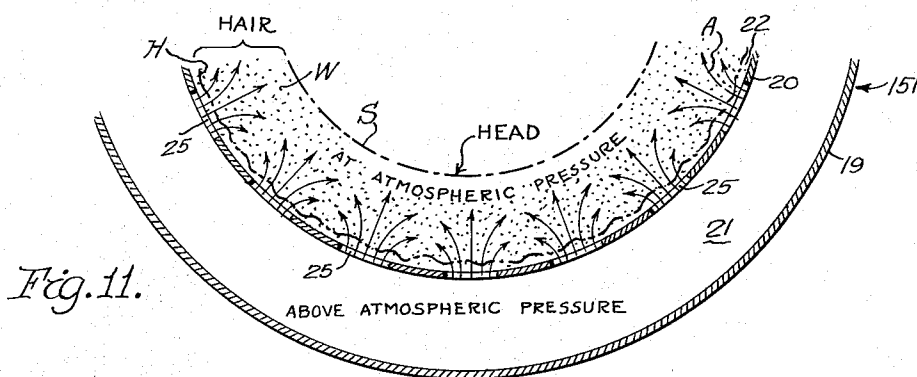
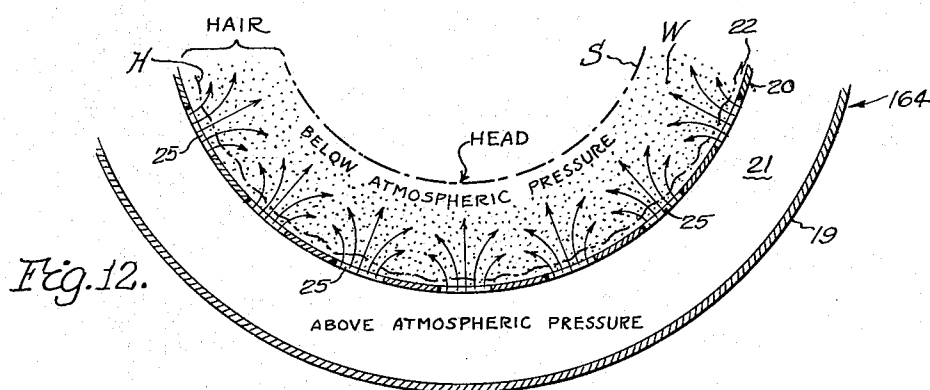
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APPARATUS FOR DRYING HAIR

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Application September 6, 1951, Serial No. 245,335

1 Claim. (Cl. 34—90)

This invention relates to hair driers and, in particular, to hair driers of the helmet type such as are used in beauty shops.

One object of this invention is to provide a hair drier of the helmet type wherein the hair is subjected to a rapid expansion of air in the vicinity of the hair, this expansion greatly increasing the capability of the air in taking up water from the hair and greatly increasing the speed and consequently shortening the time of drying the hair as compared with prior hair driers.

Another object is to provide a hair drier of the helmet type as set forth in the preceding object, wherein the air in the vicinity of the hair is maintained at a temperature which, while above room temperature, is considerably below the temperature prevailing in ordinary hair driers of this type, thereby giving greater comfort to the subject or patron, entirely eliminating perspiration, and imparting a soft natural and glossy appearance to the hair and avoiding the dry, brittle and baked-out appearance resulting from prolonged drying at high temperatures.

Another object is to provide a hair drier of the helmet type wherein the rapid expansion of the air in the vicinity of the hair is brought about by producing a pressure differential between the space or chamber around the hair and an adjoining space or chamber, either by establishing a partial vacuum by withdrawing air from the head chamber, the air entering from an adjoining chamber at atmospheric pressure; or by forcing air into the head chamber at atmospheric pressure from an adjoining chamber above atmospheric pressure; or by exhausting air from the head chamber to reduce the pressure therein below atmospheric pressure while maintaining the air in the adjoining chamber above atmospheric pressure.

Another object is to provide a hair drier of the helmet type of the foregoing character, wherein the head chamber in the helmet is substantially sealed off from the atmosphere by a sealing device, such as a sheet rubber closure member snugly fitting the head, so that air will enter and leave the head chamber of the helmet only at certain predetermined points and not at the junction between the head and the lower and forward parts of the helmet.

Another object is to provide a hair drier of the helmet type, wherein the hair entering the head chamber and expanding therein has been heated slightly merely to avoid chilling the scalp and not for the purpose of establishing a high temperature within the head chamber of the helmet, so that none of the vital natural oil is baked or burned out of the hair or scalp, the expansion of the air adjacent the hair and scalp in the lower pressure existing within the head chamber resulting in a stimulation of the scalp which increases the flow of blood to the scalp and the roots of the hair in the scalp, as well as increasing the flow of natural oil to the hair and consequently increasing the lustre and brilliance of the hair.

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Another object is to provide a hair drier of the helmet type, according to the foregoing objects, wherein the subject has greater freedom of movement of the head and body within the chair occupied by the subject, with complete freedom from vibration and noise within the helmet, so that there is no interference with the ability to carry on a conversation with the subject.

Another object is to provide a hair drier of the helmet type according to the foregoing objects, wherein the drier is easily and simply manipulated and quickly adjusted to the subject's head through a wide range of head and body sizes.

Another object is to provide a method of drying hair wherein the air is subjected to expansion in the immediate vicinity of the hair, thereby increasing its affinity for taking up moisture on the hair and adjacent scalp, the moisture-laden air being then withdrawn from the vicinity of the hair and replaced by dry air which is similarly subjected to a rapid expansion.

Another object is to provide a method of drying hair, according to the object immediately preceding, wherein the rapid expansion of the air is accomplished by the setting up of a pressure differential between the space occupied by the air and an adjoining space to which dry air is supplied.

Other objects and advantages of the invention will become apparent during the course of the following description of the accompanying drawings, wherein:

Figure 1 is a side elevation of a hair drier according to one form of the invention, wherein the pressure differential for the expansion of air within the helmet is brought about by withdrawing air rapidly from the helmet by means of an exhaust fan;

Figure 2 is an enlarged side elevation of the helmet of the hair drier shown in Figure 1, with a portion thereof broken away to indicate the internal construction, and with the open position of the helmet front or visor indicated in dotted lines;

Figure 3 is a bottom plan view of the helmet shown in Figure 2 with certain portions broken away to disclose the internal construction;

Figure 4 is an enlarged side elevation, partly in central vertical section, of the pivot joint, shown in Figure 1, by which the helmet is tiltably connected to the remainder of the apparatus;

Figure 5 is a horizontal section through the pivot joint, taken along the line 5—5 in Figure 4;

Figure 6 is a central vertical section through the base portion of a modified hair drier according to the invention, employing an air compressor fan for supplying air under pressure to the modified helmet shown in Figure 8 for producing a pressure differential adjacent the hair by admitting air thereto from an adjoining air chamber wherein the air is above atmospheric pressure, the air in the head chamber of the helmet being substantially at atmospheric pressure;

Figure 7 is a horizontal section, taken along the line 7—7 in Figure 6, showing details of the air compressor fan thereof;

Figure 8 is a rear elevation of a modified helmet employed with the modified hair drier shown in Figure 6;

Figure 9 is a side elevation on a reduced scale of a further modification of hair drier, according to the invention, wherein the pressure differential for expanding the air in the head chamber adjacent the hair is obtained by supplying air at a pressure above atmospheric pressure to a chamber surrounding the head chamber and communicating therewith while withdrawing air from the head chamber as by the exhaust fan shown in Figure 1;

Figure 10 is an enlarged diagrammatic top plan view illustrating the operation of the form of the invention

shown in Figures 1 to 5 inclusive, wherein the air in the vicinity of the hair is rapidly expanded by admitting it from an adjoining chamber at approximately atmospheric pressure, the air in the head chamber being below atmospheric pressure;

Figure 11 is an enlarged diagrammatic top plan view illustrating the form of the invention shown in Figures 6 to 8 inclusive wherein the air in the vicinity of the hair is rapidly expanded by admitting it from an adjoining chamber wherein the air is above atmospheric pressure, the air in the head chamber being substantially at atmospheric pressure; and

Figure 12 is an enlarged diagrammatic top plan view illustrating the operation of the form of the invention shown in Figure 9 wherein the air in the vicinity of the hair is rapidly expanded by admitting it from an adjoining chamber wherein the air is above atmospheric pressure, the air in the head chamber being at a pressure below atmospheric pressure by the withdrawal of air therefrom by means of an exhaust fan.

Hitherto, the drying of hair has been a long and trying ordeal for the subject or patron and an onerous task for the operator. Prior hair driers, particularly those of the helmet type, frequently employed highly heated air which not only gives great discomfort to the subject by causing perspiration, but also injures the hair itself or renders it of an unnatural and unattractive appearance.

The hair drier of the present invention solves these problems by providing a helmet type hair drier wherein the subject does not perspire, wherein the temperature is only slightly above room temperature, and wherein the drying effect is accomplished by rapidly expanding the air in the vicinity of the hair by creating a differential pressure between the head chamber and the adjoining atmosphere or adjoining chamber from which the air enters the head chamber within the helmet. This pressure differential is preferably produced by lowering the pressure in the head chamber below atmospheric pressure, as by the use of an exhaust fan (Figures 1 to 5 inclusive and 10), causing the air to enter the head chamber through apertures in the wall thereof. Immediately after it enters the low pressure head chamber, the air, which has previously been under atmospheric pressure, expands suddenly while it is passing through the hair, thereby increasing its affinity for taking up the particles of moisture from the hair and drying the hair in a much shorter time than is ordinarily required in conventional hair driers.

The entering air is preferably heated slightly merely to counteract the temperature-lowering effect brought about by the expansion of the air so as to avoid chilling the scalp. It has been found from tests of the present invention that drying of the hair can be accomplished without heating the incoming air, but heating is advisable to prevent this chilling action. Alternatively, the pressure differential for creating the expansion of the air may be established by forcing air under pressure into a chamber adjoining the head chamber, which is under atmospheric pressure, and discharging the air under pressure through apertures adjacent the hair (Figures 6 to 8 inclusive and 11). This also causes the air to expand rapidly in the vicinity of the hair, taking up the particles of moisture and drying the hair.

Finally, this pressure differential may also be produced by supplying air under pressure to a chamber adjoining the head chamber (Figures 9 and 12) and at the same time reducing the pressure in the head chamber below atmospheric pressure by connecting the head chamber to the inlet of an exhaust fan. The first or exhaust arrangement shown in Figures 1 to 5 inclusive is preferred because the partial vacuum thereby created stimulates the flow of blood to the scalp and especially to the roots of the hair.

The hair drier of the present invention has been evolved as the result of prolonged experimentation and exhaustive tests.

Exhaust type hair drier

Referring to the drawings in detail, Figures 1 to 5 inclusive show a hair drier, generally designated 10, in which the pressure differential for drying the hair is created by withdrawing air from the head chamber, namely the chamber within the helmet in which the head is located, as shown diagrammatically in Figure 10. In general, the exhaust type hair drier 10 consists of a helmet, generally designated 11, connected by a swivel joint 12 to a horizontal conduit 13 which in turn is connected through a spring-balanced elbow joint 14 to a vertical conduit 15 which in turn is connected to a hollow base structure 16 containing an exhaust fan 17 driven by an electric motor 18 within the base structure 16.

In particular, the helmet 11 (Figures 2 and 3) consists of an outer approximately U-shaped metal casing or shell 19 within which is mounted an inner metal casing or shell 20 in spaced relationship with the outer wall of said outer casing 19. The approximately annular chamber 21 between the outer and inner casings or shells 19 and 20 forms an air supply chamber from which air reaches the head chamber 22 within the inner casing or shell 20 through lower, middle and upper apertures 23, 24 and 25 respectively. In order to heat the incoming air slightly to prevent chilling of the scalp of the patron whose hair is being dried, an electric heater 26 is mounted on the back of the outer casing or shell 19 by means of a rectangular frame 27 of angle or L-shaped cross-section mounted adjacent a rectangular opening 28 (Figure 3) in the outer casing 19. Secured by screws or other fasteners to the frame 27 is a grille or screen 29 of arcuate cross-section which screens the entering air so as to prevent the entry of dust particles.

Extending vertically at spaced intervals within the opening 28 in the outer casing 19 and secured at their tops and bottoms to the angle frame 27 are insulating strips and supports 30 (Figure 3) for electrical resistance heating elements or coils 31. The strips 30 are slotted as at 32 so that the heating coils or elements 31 may be threaded into the slots and thus attached to the strips 30. The heating coils or elements 31 are arranged horizontally and are disposed in a zigzag path of arcuate form (Figure 3) to and fro within the heating chamber 33 inside the heater 26, and are connected at their free ends to binding posts 34, only one of which is shown (Figure 3) and from which wires or other conductors 35 run to a source of electric current by way of the air chamber 21, the swivel joint 12, the conduit 13, the elbow joint 14, and the conduit 15 to an electric switch 36 (Figure 1) within the base structure 16. The switch 36, which is actuated by a knob 37, is connected by the wires or cables 38 to the electric motor 18, from which the cable 14 containing twin conductors runs to a suitable plug (not shown) which may be inserted in an ordinary house current outlet.

Extending upward from the top of the outer casing 19 is a tubular extension portion 39 by which a connection is made to the swivel joint 12 as described subsequently below in connection with Figures 4 and 5. Extending forwardly from the upper portion of the outer casing 19 are spaced parallel brackets 40 (only one of which is shown) carrying a pivot pin or rod 41. Pivotaly mounted on the pivot rod 41 by means of ears 42 (only one of which is shown) is a visor or movable helmet closure 43. The latter is normally urged forward and upward to the normally open position shown in dotted lines in Figure 2 by a pair of helical springs 44 (only one of which is shown) coiled around the pivot rod 41.

In order to accommodate the visor or helmet closure 43, the front portion of the helmet 11 is cut away to provide an approximately right-angled closure or visor opening or edge 45 having upper horizontal edge portions 46 and lower vertical edge portions 47 (Figure 2). The air chamber 21 between the outer and inner casings 19 and 20 is divided at about halfway up the vertical edge por-

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tions 47 of the opening or edge 45 by a semi-annular or approximately horseshoe-shaped horizontal partition 48 which extends from the heater 26 closely adjacent the vertical edge portions 47, where it continues in a downwardly-extending partition 49 (Figure 2). The purpose of the horizontal and vertical partitions 48 and 49 is to segregate the air in the lower part of the head chamber 22 so as to properly apportion the air in the various parts of the head chamber 22 and to prevent an excessive amount of the incoming air from passing upward through the slots or apertures 25 into the upper part of the head chamber 22 without reaching the lower portions of the hair.

The presence of the partition 48, 49 forces a certain portion of the air past into the lower portion of the air chamber 21 and thence through the apertures or slots 23, 24 into the lower portion of the head chamber 22, and thence through the lower portions of the hair. Above the horizontal partition 48, however, the annular air chamber 21 is unobstructed, and communicates freely with the interior of the visor or helmet closure 43, which is likewise provided with upper and lower walls 50 and 51 interconnected by a forward wall 52 providing a visor air chamber 53 with outer and inner walls 54 and 55, the air from the air chamber 21 also entering the head chamber 22 within the helmet 11 through additional apertures or slots 56 and 57 in the inner wall 55. The apertures 56 and 57 are of somewhat greater cross-sectional area than the apertures 25 in order to compensate for their greater distance from the heater 26 and opening 28 through which the incoming air enters.

At the opening 45 in the front of the helmet 11, the inner shell or casing 20 is provided with an approximately right-angled edge 58 (Figure 3) having a vertical portion parallel to the outer vertical edge portion 47 and similarly continuing in a horizontal inner edge portion (not shown) parallel to the horizontal outer edge portion 46 of the opening or edge 45. The edges 45 and 58 are sealed by means of L-shaped resilient sealing members 60 and 61 of rubber or other similar resilient material, these sealing members being of U-shaped cross-section to fit over their respective edges. The upper forward portions of the sealing members 60 and 61 are, of course, arcuate because they extend around the forward part of the helmet 11 which is likewise of arcuate shape.

In order to hold the visor or helmet closure 43 in its closed position against the action of the coil spring 44, the helmet 11 is provided with a spring latch 62 (Figure 3) which is riveted or otherwise secured to the outer casing 19 and extends forwardly through an opening 63 in the partition 49 where its outer end is hooked and engages a catch or keeper 64 which is likewise riveted or otherwise secured to the outer wall 54 of the visor or closure 43. Two of these spring latches 62 are provided, one on each side of the opening 45 at the bottom of the helmet 11. To assist the operator in snapping the visor or helmet closure 43 into its closed position against the resistance of the spring latches 62, the outer casing 19 and visor outer wall 54 are provided with angled finger grips 65 and 66 respectively, these being likewise riveted or otherwise secured thereto. In order to release the spring detents 62, the outer casing 19 is provided with holes 67 adjacent the finger grips 65, these holes 67 receiving buttons or plungers 68 which at their inner ends engage the spring detents 62. When the buttons 68 are pushed inward by the operator's fingers, they force the spring latches 62 out of engagement with their catches or keepers 64 and permit the springs 44 to swing the visor 43 into its open position, as shown by the dotted lines in Figure 2.

In order to accommodate the face and neck of the patron and leave her face exposed while her hair is being dried, the bottom walls 70 and 71 of the helmet 11 and its visor or closure 43 are provided with cutaway portions 72 and 73 respectively (Figure 3) cooperating with one another to form an opening 74. Secured as at 75 and 76

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to the bottom walls 70 and 71 adjacent the opening 74 are arcuate retaining bands 77 and 78 which closely follow the cutaway portions 72 and 73 and serve to clamp overlapping sealing members 79 and 80 of sheet rubber or similar resilient sheet material to the bottom walls 70 and 71, the members 79 and 80 having cutaway portions 81 and 82 in cooperation forming an opening 83 for the face and neck of the patron. The members 79 and 80 are approximately U-shaped and their adjacent free ends 84 and 85 overlap one another to enhance the sealing effect. The sealing members 79 and 80 are reinforced by ribs 86 and 87 molded into the members 79 and 80. The retaining bands 77 and 78 are of angle cross-section (Figure 2) in order to accommodate the sealing members 79 and 80. It will be observed from Figures 2 and 3 that the neck opening 81 lies in approximately a horizontal plane, whereas the face opening 82 is partly vertical and partly horizontal.

The swivel joint 12 upon which the helmet 11 is pivotally mounted by means of its tubular extension 39 at the top thereof, consists of a pair of partially spherical annular outer members 90 and 91 having flanges 92 and 93 of wedgeshaped cross-section (Figure 4) held together by a split clamping ring 95 with an internal groove 96 of V-shaped cross-section engaging the flanges 92 and 93. The lower member 90 has a tubular extension 97 which is secured to the tubular extension 39 of the helmet 11 as by welding, soldering or in any other suitable way. Pivotaly mounted within the partially spherical members 90 and 91 so as to slide arcuately therein is a partially spherical inner member 98 (Figure 4) having a tubular extension 99 at the upper end thereof which abuts the lower end of the conduit 13, the two being secured to one another by a coupling ring or annular band 100 secured therebetween by welding, soldering or the like. The clamping ring 95 is held tightly in engagement with the flanges 92 and 93 by a clamping screw 101 which passes through a hole 102 in a radial arm 103 projecting from the clamping ring 95 and is threaded into a threaded hole 104 in a similar arm 104a projecting radially from the opposite end of the ring 95. Consequently, by tightening or loosening the clamping ring 101, the outer spherical portions 90 and 91 may be caused to frictionally engage the inner spherical portion 98 with the desired amount of friction so as to enable the helmet 11 to be tilted freely by the operator, but held in its tilted position by friction.

The opposite end of the conduit 13 engages the upper tubular portion 105 of the elbow joint 14 and is secured thereto by the internal ring or band 106 which is soldered, welded or otherwise held in position in a manner similar to the annular band 100. The elbow joint 14 is of a conventional type with a horizontal outer tubular portion 107 connected to the tubular member 105 and an inner tubular portion 108 connected to a lower tubular portion 109, the tubular portions 107 and 108 having holes 110 and 111 for the passage of the air. The outer tubular portion 107 has end walls or caps 112 and the two portions 107 and 108 are held in position by a counterbalancing spring 113. The latter surrounds a tubular pivot shaft 114 and has arms 115 and 116 connected respectively to the upper and lower portions of the elbow joint 14. As a consequence, the conduit 13 may be swung upward relatively to the conduit 15 so as to raise or lower the helmet 11 to fit it to the head of the patron as she sits in an ordinary chair underneath the helmet 11. The elbow joint 14 is conventional and its details form no part of the present invention. The lower tubular portion 109 of the elbow joint 14 is provided with a flange 117 which rests within an annular cup-shaped member 118 and is supported therein on anti-friction thrust bearings (not shown) so as to permit free horizontal swinging of the helmet 11, the horizontal conduit 13 and the elbow joint 14 around the axis of the vertical conduit 15.

The cup-shaped annular member 118 in turn is secured

to the upper end of the vertical conduit 15, the lower end of which abuts and is secured to the upper tubular portion 119 of the hollow base structure 16 which has an approximately conical upper housing 120 and an approximately cylindrical lower housing 121, the lower end of which is flared outward as at 122 and terminates in a skirt 123 to which a base ring 124 of L-shaped cross-section is riveted or otherwise firmly secured. Mounted on the base ring 124 are the bases 125 of swivel casters 126, the brackets 127 of which carry axles 128 for wheels 129. The upper tubular portion 119 of the upper casing 120 is secured to the lower end of the conduit 15 by a coupling band 130 which is bolted, riveted or otherwise secured thereto.

Interconnecting the upper and lower housings 120 and 121 at their parting line or junction 131 is a mounting ring 132 of L-shaped cross-section, which is riveted or otherwise secured to the adjacent portions of the structures 120 and 121. Mounted upon and bolted or otherwise secured to the upper flange of the ring 132 is a mounting disc 133 to which the motor 18 is bolted or otherwise secured as at 134. The upper end of the motor 18 projects through a central hole 135 into the interior of the upper housing 120 and to the motor shaft 136 is secured the hub 137 of the exhaust fan 17. The exhaust fan 17 is conventional and any suitable type may be employed. The type shown is preferred because of its comparatively silent operation. The fan 17 includes upper and lower rotor walls 138 and 139 respectively, both of these walls being of concave or dished form, the upper wall 138 having a central opening 140 surrounded by a flange portion 141 with which an oppositely-flanged annular baffle member 142 cooperates. The baffle member 142 is secured to the inner surface of the upper housing 120 and cooperates with the flange 141 to minimize the escape of air therebetween. Mounted between and secured to the upper and lower rotor walls 138 and 139 of the fan 17 are angled vanes or blades 143. These propel the air downward when the fan 17 is rotated by the motor 18, creating a partial vacuum in the conduit 15. The upper housing 120 is provided with a bulge or outwardly-dished portion 144 which permits the conductor cable 35 to arch around the rotor or fan 17 without interfering therewith.

In the operation of the exhaust type hair drier 10 of Figures 1 to 5 inclusive, the operator opens the visor 43 of the helmet 11 by pressing the buttons 68 inward, releasing the latches 62. The springs 44 then swing the visor 43 outward into the dotted line position of Figure 2. With the patron seated in a chair, the operator rolls the drier 10 over toward her by means of the casters 126 until the helmet 11 is properly positioned with respect to her head. He then lowers the helmet 11 by pulling downward upon it, swinging the horizontal conduit 13 downward around the elbow joint 14. At the same time, if necessary, he tilts the helmet 11 around the pivot joint 12 while bringing the helmet down over the head of patron, with the sealing member 79 extending around her neck. He then swings the visor 43 downward toward the remainder of the helmet 11 until it reaches the closed position shown in Figure 2, at which time the upper sealing member 80 engages the forehead and face of the patron, the two sealing members overlapping at their adjacent portions 84 and 85.

When the helmet 11 is in its desired position, the operator shifts the knob or lever 37 of the switch 36, simultaneously energizing the motor 18 and heater 26. The fan 17 immediately starts rotating, lowering the air pressure in the conduits 15 and 13 and withdrawing air from the head chamber 22 so as to create therein a partial vacuum wherein the air is at sub-atmospheric pressure. The atmospheric pressure outside the helmet then forces the air through the screen 29 of the heater 26 and past the now energized heating elements 31 into the outer air chamber 21 within the outer casing 19. A portion of the

air thus heated passes beneath the partition 48 and through the apertures 23 and 24 into the lower part of the head chamber 22 against the lower portion of the hair and scalp. The remaining portion of the air passes above the partition 48 and through the apertures 25 and 57 into the upper portion of the head chamber 22 against the upper portion of the hair and scalp, this portion of the air of course passing freely into the visor air chamber 53, the inner wall of which is provided with the apertures 57.

As shown diagrammatically in Figure 10, the incoming air, indicated by the arrows A, expands immediately after passing through the apertures 25 (or 23, 24 and 57) as indicated by the diverging arrows. The rapid expansion of the air created by the pressure differential between the outer air chamber 21 and the inner head chamber 22 occurs in the immediate vicinity of the hair H, the outer limits of which are indicated by the wavy line H and immediately takes up the water particles W, indicated by the dots W, as a result of this rapid expansion. Due to the reduction of pressure set up within the head chamber 22 by the exhaust fan 17, the rapidly expanding air A is drawn through the hair H so that the air particles which have entrained water particles W move onward and upward through the tubular extension 39 of the helmet 11 and onward through the conduits 13, 15 and housing structure 16 and outward through holes in the motor and fan mounting disc 133.

In this manner, the hair is rapidly and efficiently dried without the employment of excessive heat and without discomfort to the patron. The rapid expansion of the air in the immediate presence of the hair increases the affinity of the air for moisture at the very location where the particles of moisture W occur on the hair H and scalp S. The slight heating of the air by the heater 26 avoids the chilling effect resulting from the rapid expansion of the air, according to the principles of thermodynamics. The heater 26 is not indispensable. Actual tests of the drier of this invention have proved that if the heater 26 is de-energized by disconnecting it from the conductor cable 35 while the fan motor 18 remains energized, the hair will still be dried in response to the rapid expansion of the air in the vicinity of the hair, as brought about by the pressure differential created at that location by the fan, as shown diagrammatically in Figure 10, but with some possible chilling of the scalp.

When the drying has taken place for a sufficient length of time, such as, for example, approximately 35 minutes, the operator presses the buttons 68 to release the visor 43 to swing to its dotted line position in Figure 2, and swings the helmet 11 upward around the elbow joint 14 so as to enable the patron to withdraw her head from the helmet. When thus dried, the hair is found to be soft and lustrous with no traces of brittleness and with no evidence of baking out the natural oil of the hair, which usually occurs with other prior types of driers.

Pressure type hair drier

The pressure type hair drier (Figures 6 to 8 inclusive and 11), generally designated 150, according to the invention, consists generally of a helmet 151 which is connected to a pivot joint 12 of identical construction to that shown in Figure 1. The remainder of the apparatus is identical and is similarly designated by the same reference numerals employed in Figures 1 to 5 inclusive, hence a repetition of the description is unnecessary. In the pressure type hair drier 150, however, the fan is generally designated by the different reference numeral 152, because it rotates in the opposite direction from the fan 17 although of identical construction. The fan 152 is an air compression fan, in contrast to the exhaust fan 17 and draws air upward, as shown in the arrows in Figure 6 through louvers or openings 153 in the housing structure 16. These louver openings 153 are provided in order to avoid drawing air in from the vicinity of the floor, with consequent likelihood of drawing in dust.

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The helmet 151, shown in rear elevation in Figure 8, is of somewhat different construction from the helmet 11 of Figures 2 and 3 in that the pivot joint 154 is provided with a tubular lower portion 155 which is closed at its bottom 156 and has branch conduits 157 extending downward to the upper wall 158a of the outer casing 19. The tubular extension 39 of the inner casing 20 opens directly into the atmosphere through the passageway 158 in Figure 8 for the direct discharge of the air, as indicated by the arrows. The heater 26 is omitted and the unheated air enters the chamber 21 and the head chamber 22 in the same manner described in connection with Figures 2 and 3, the remainder of the construction of the helmet 151 being the same as that of the helmet 11 of Figures 2 and 3.

The operation of the pressure-type hair drier 150 is analogous to that described in connection with the hair drier 10, and the procedure of adjusting the helmet to the head of the patron is identical. When the operator has completed this adjustment, he shifts the lever 37 of the switch 36 as before, energizing the motor 18 in the reverse direction from that of Figure 1, and causing the fan 152 to rotate in the reverse direction from the fan 17 of Figure 1. This causes air to be drawn in through the louver openings 152 and forced upward through the upper housing 120, the vertical conduit 15, the elbow joint 14, the horizontal conduit 13, and the pivot point 154, whence it flows in the direction of the arrows through the branch conduits 157 into the outer or air chamber 21, causing the pressure in the latter to be raised above atmospheric pressure.

Since the pressure within the head chamber 22 is at atmospheric pressure, because of the fact that the tubular extension 39 is open to the atmosphere (Figure 8), the air entering the head chamber 22 also through the openings 25 (23, 24 or 57) expands immediately as shown by the diverging lines A at the very instant the air impinges upon the hair, the limit of which is indicated by the wavy line H (Figure 11). A pressure differential is thus created between the chambers 21 and 22. This rapid expansion of the air from above atmospheric pressure in the chamber 21 to atmospheric pressure in the head chamber 22 increases the affinity of the air for absorbing moisture and it accordingly entrains the particles of moisture or water W which are on the hair H and scalp S. The moisture-bearing air passes outward through the opening 158 in the tubular extension 39 at the top of the helmet 151 into the open air. The helmet is then removed from the head in the manner previously described in connection with the operation of the exhaust type of hair drier 10 of Figures 1 to 5 inclusive and 10.

Combined exhaust and pressure type hair drier

The combined exhaust and pressure type hair drier, generally designated 160 according to the invention (Figures 9 and 12) combines the features of the hair driers 10 and 150 in that the pressure differential by which the expansion of the air is accomplished is created by withdrawing air from the head chamber 22 by an exhaust fan 161 while at the same time air under superatmospheric pressure is supplied by an air compression fan 162 through a flexible conduit 163 to the outer chamber 21 in the outer casing 19 of the helmet 164. The air compression fan 162 and its driving motor 165 are mounted upon a base 166 which in turn is mounted upon the vertical conduit 15 for convenience of operation. The helmet 164 is otherwise the same as the helmet 11 as shown in Figures 2 and 3, the heater 26 being optionally omitted, and similar reference numerals designate similar parts. The exhaust fan 161 is also identical with the

fan 17 of Figure 1 and similar parts are likewise designated with similar reference numerals.

So far as the creation of the sub-atmospheric pressure in the head chamber 22 within the inner casing 20 of the helmet 164 is concerned, the operation is identical with that described in connection with the exhaust type hair drier shown in Figures 1 to 5 inclusive, and the manipulation of the helmet 164 is likewise identical with the manipulation of the helmet 11 previously described. With the helmet 164 in its proper position upon the head of the patron, the motors 18 and 165 are started in operation, causing the exhaust fan 161 to withdraw air rapidly from the head chamber 22 of the helmet 164 while the air compression fan 162 supplies air under pressure through the flexible conduit 163 to the air chamber 21 within the outer casing 19 of the helmet 164. With a pressure differential thus established between the chamber 21 at a super-atmospheric pressure and the chamber 22 at a sub-atmospheric pressure, the air, as before, flows through the apertures 25 (also 23, 24, 57), expanding rapidly as it passes into the inner casing 20. As before, the expansion increases the affinity of the air for taking up moisture, and since it comes immediately into contact with the hair H beyond the inner casing 20, it takes up the particles of moisture W on the hair H and scalp S as it passes by on its way to the conduits 13 and 15 and the exhaust fan 161. When the drying has been accomplished, the helmet 164 is removed from the patron's head in the manner previously described.

What I claim is:

A hair drier comprising a base, a helmet-supporting conduit extending upward from said base, an air-circulating fan disposed in said base and discharging air upwardly into said helmet-supporting conduit, and a helmet shaped to fit the head and connected to the upper end of said helmet-supporting conduit, said helmet having an inner casing containing a head chamber with a head opening and a head opening sealing element therein, said inner casing having a multiplicity of air inlet apertures disposed around the lower part thereof in circumferentially-spaced relationship adjacent the portion of said chamber adapted to be occupied by the sides of the head, said inner casing having a moist air outlet opening in the upper portion thereof remote from said air inlet apertures, an outer casing spaced outwardly from and extending around said lower part of said inner casing adjacent said air inlet apertures to form an air inlet chamber between said casings, and a pair of air supply conduits connected to and extending downwardly from said helmet-supporting conduit on opposite sides of said helmet, the lower portions of said air supply conduits being connected to one of said casings and communicating with said air inlet chamber on opposite sides thereof whereby said air supply conduits also serve as brackets supporting said helmet.

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