United States Patent [19]

Waters et al.

[11] **3,831,000**

[45] **Aug. 20, 1974**

[54] **PORTABLE HAIR DRYER**

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[73] Assignee: **Sunbeam Corporation,** Chicago, Ill.

[22] Filed: **Dec. 15, 1972**

[21] Appl. No.: **315,530**

Related U.S. Application Data

[62] Division of Ser. No. 127,666, March 24, 1971, Pat. No. 3,727,321.

[52] **U.S. Cl.** **219/368,** 34/99, 165/125, 219/364, 219/370, 219/374, 219/376

[51] **Int. Cl.** **H05b 3/00,** A45d 20/38, F24h 3/04

[58] **Field of Search** 219/366–377, 219/379–381, 359–364; 34/96–101, 243; 165/124–126

[56] **References Cited**

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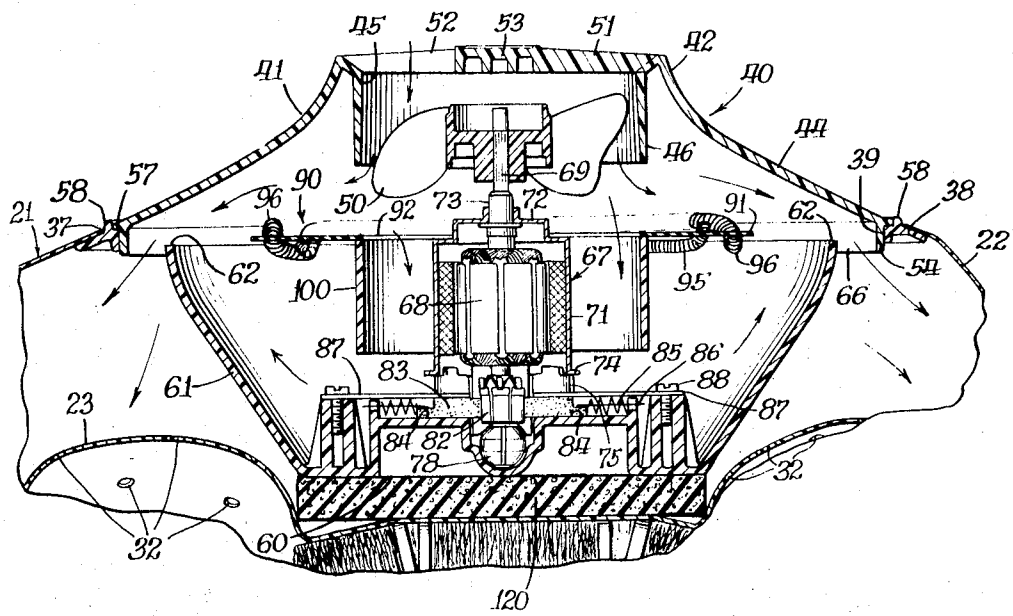
Primary Examiner—A. Bartis

Attorney, Agent, or Firm—George R. Clark; Neil M. Rose; John S. Pacocha

[57] **ABSTRACT**

A motor driven blower for use in supplying heated air to a flexible, double walled hat having provisions to support the motor driven blower centrally on the bonnet as it is worn on the head of the user. The motor driven blower is made up of two cup-shaped housing portions which enclose a motor driven fan and heater which draws air into the housing, heats it and discharges it from an annular opening formed by the spaced walls of the two housing portions.

9 Claims, 12 Drawing Figures



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SHEET 1 OF 5

Fig. 1.

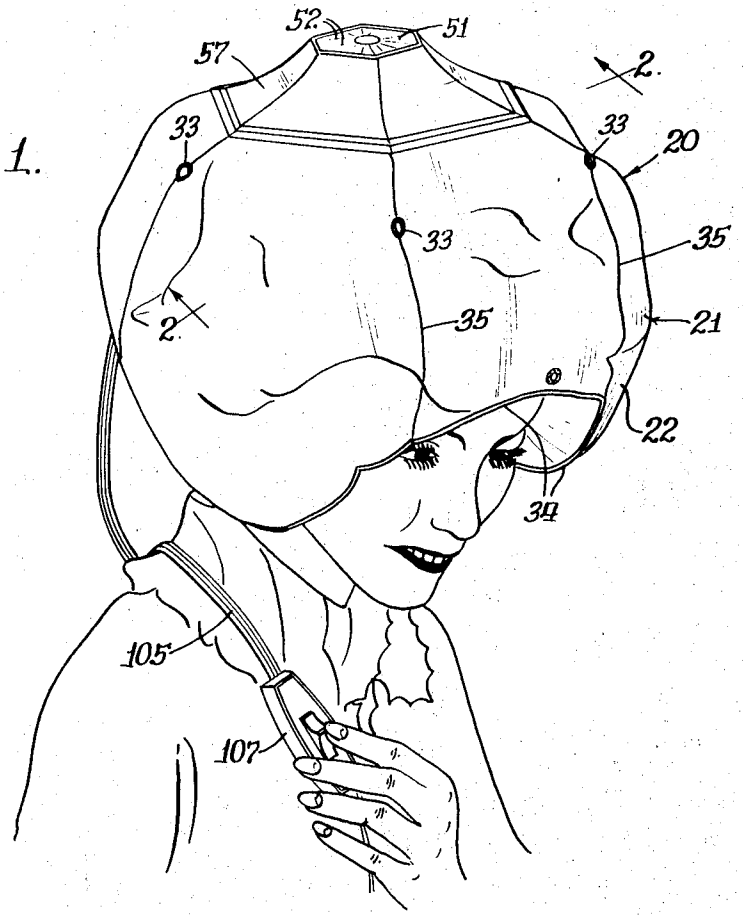


Fig. 2.

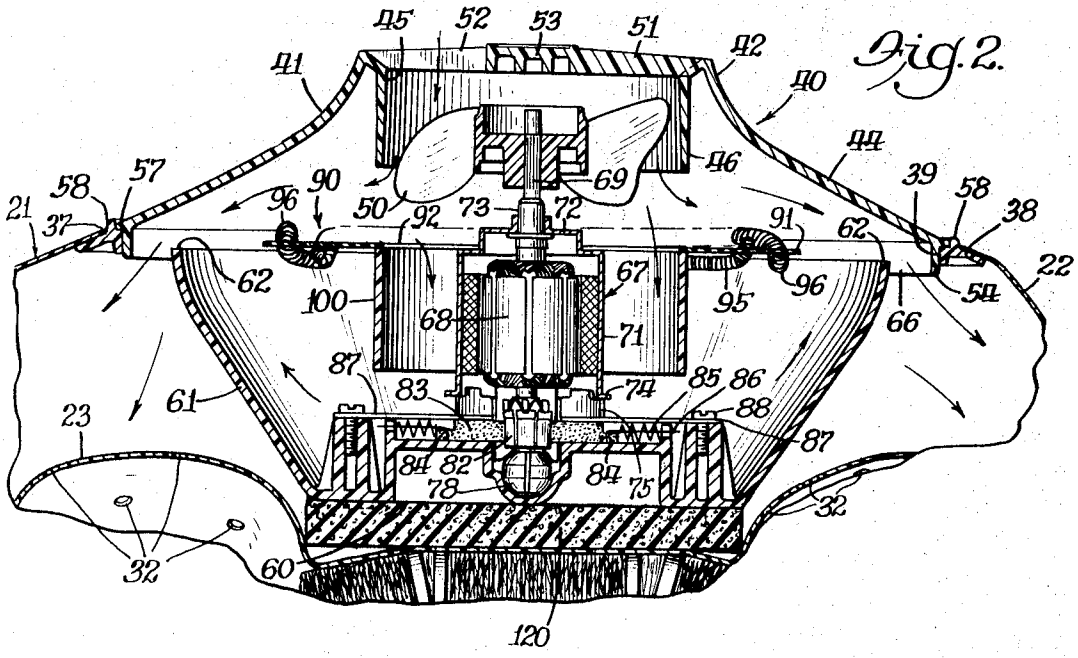


Fig. 3.

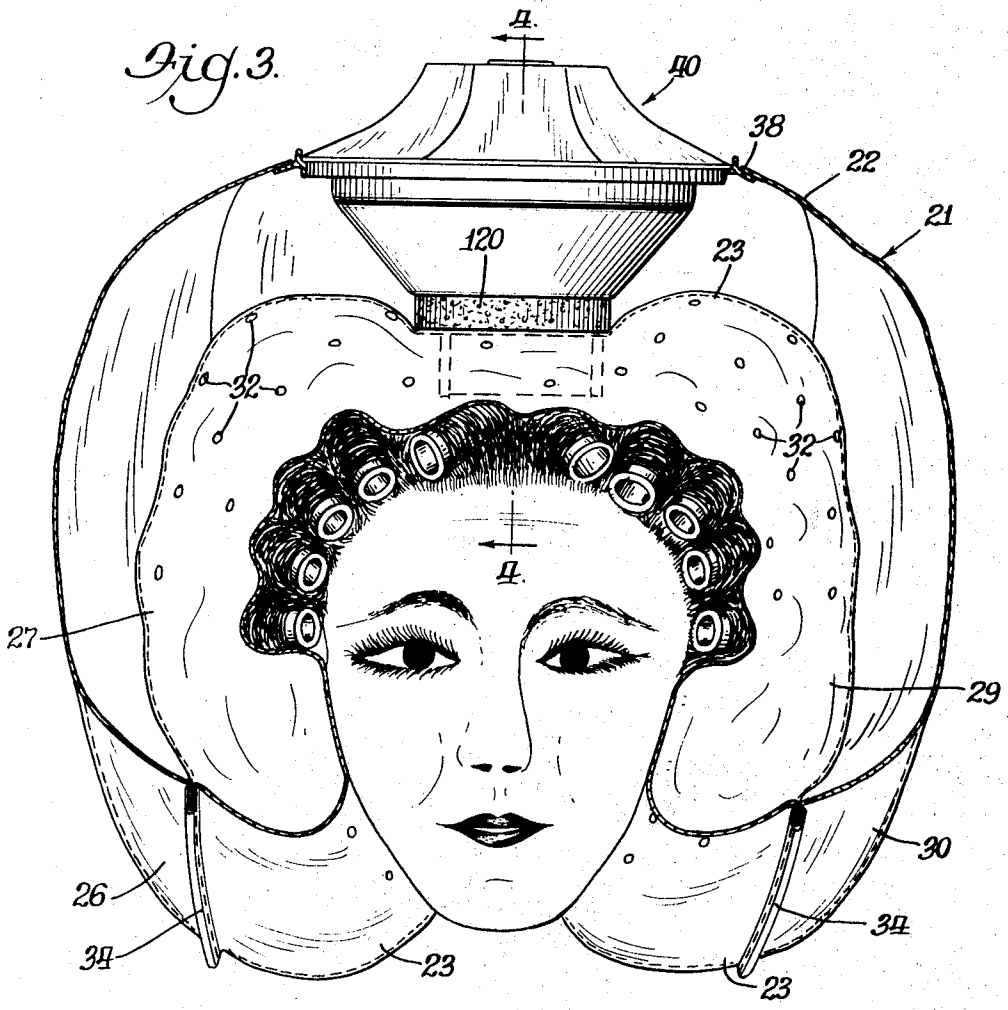

Д.
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Fig. 4.

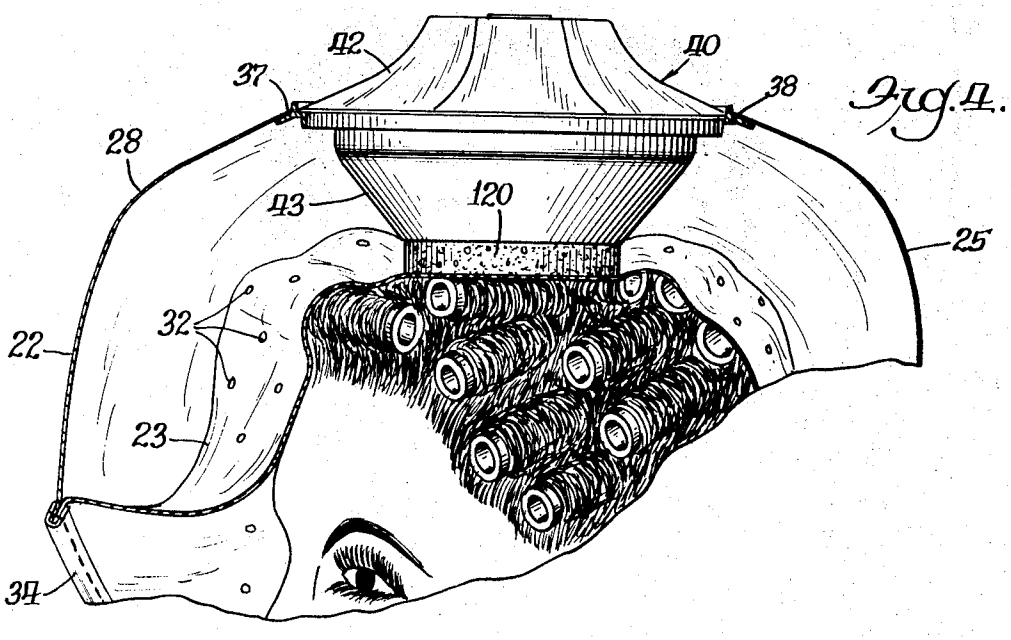

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Fig. 5.

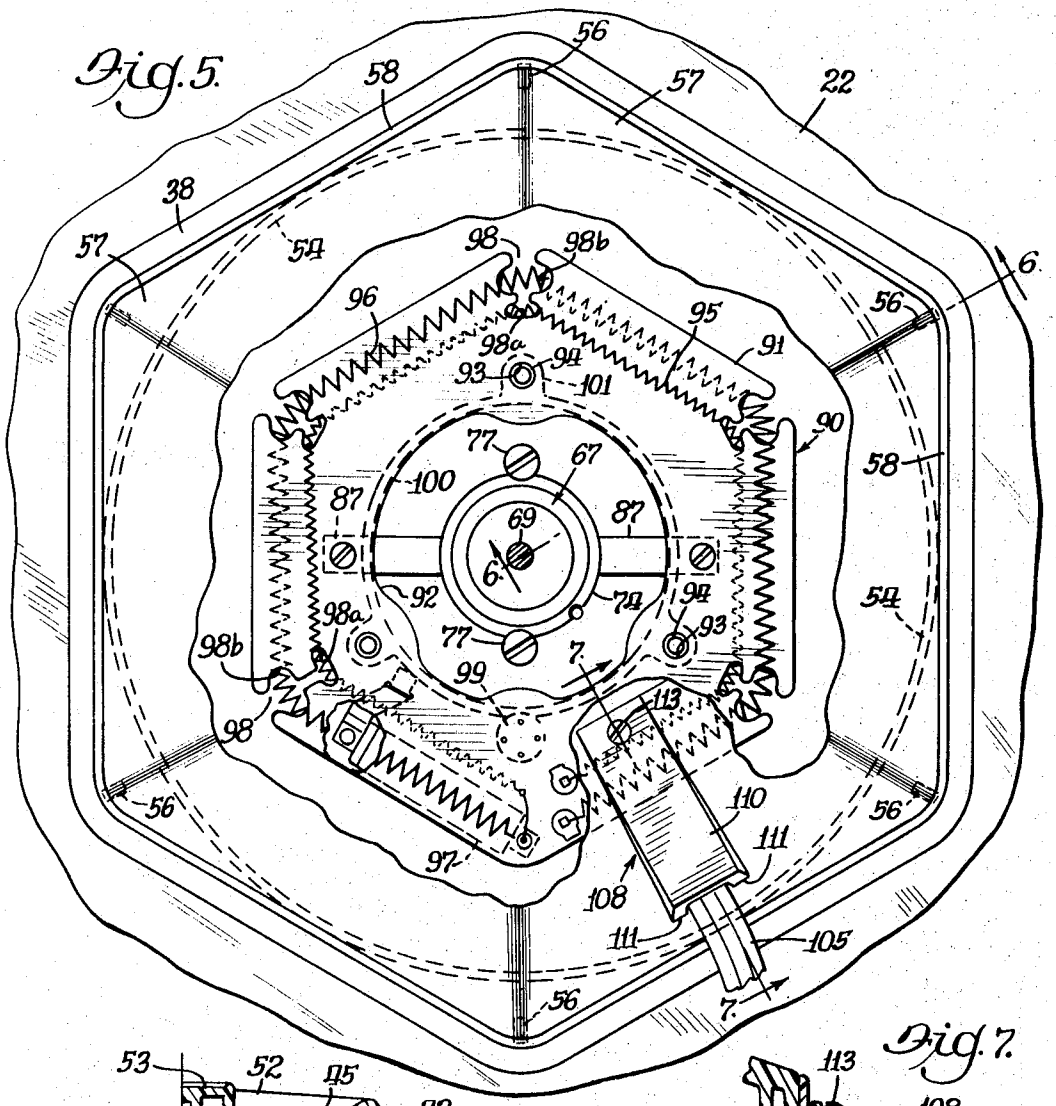


Fig. 6.

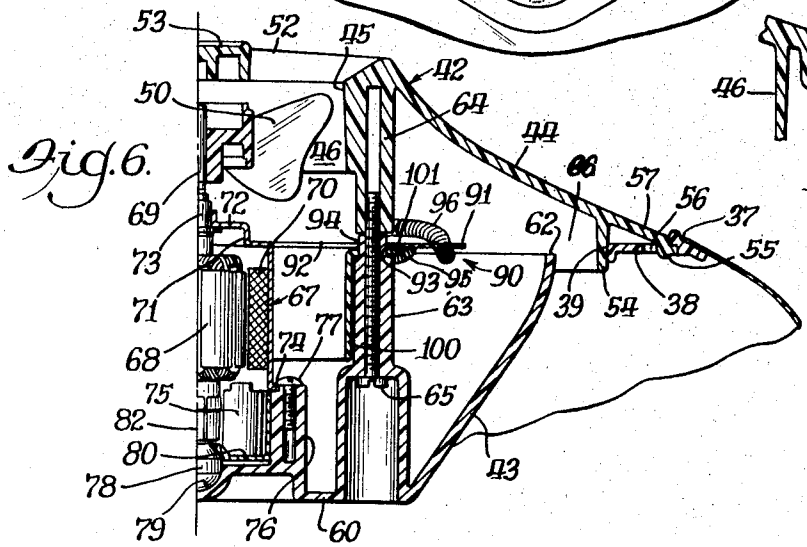


Fig. 7.

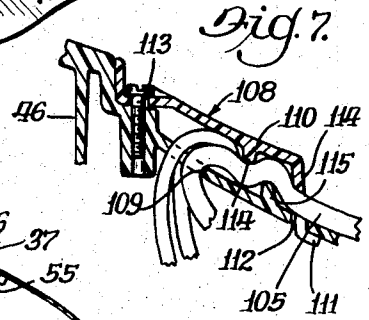
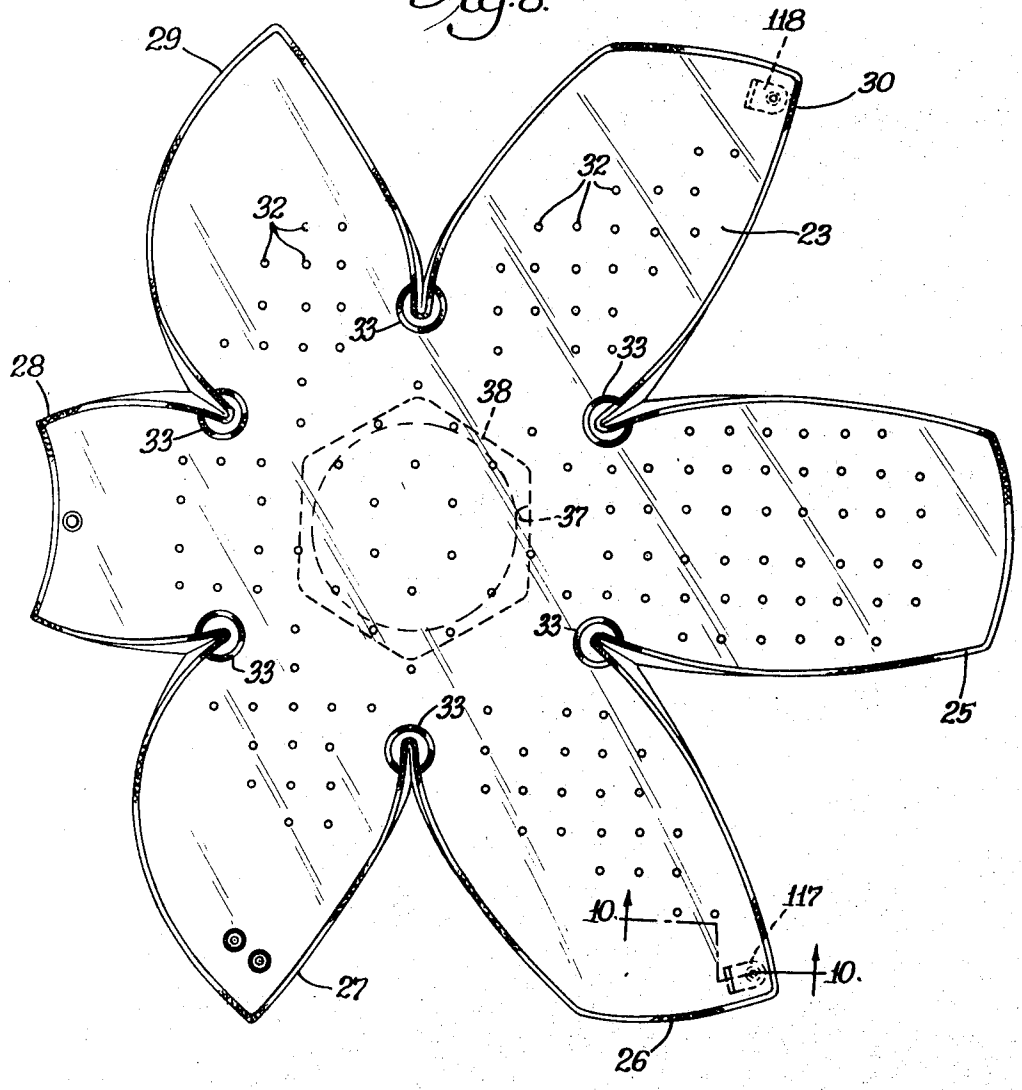


Fig. 8.



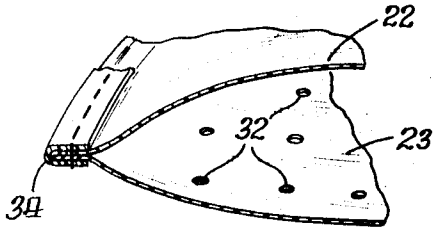


Fig. 9.

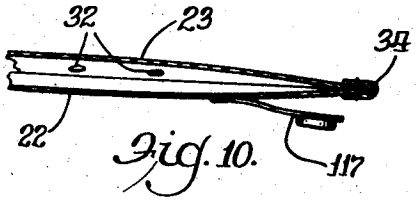
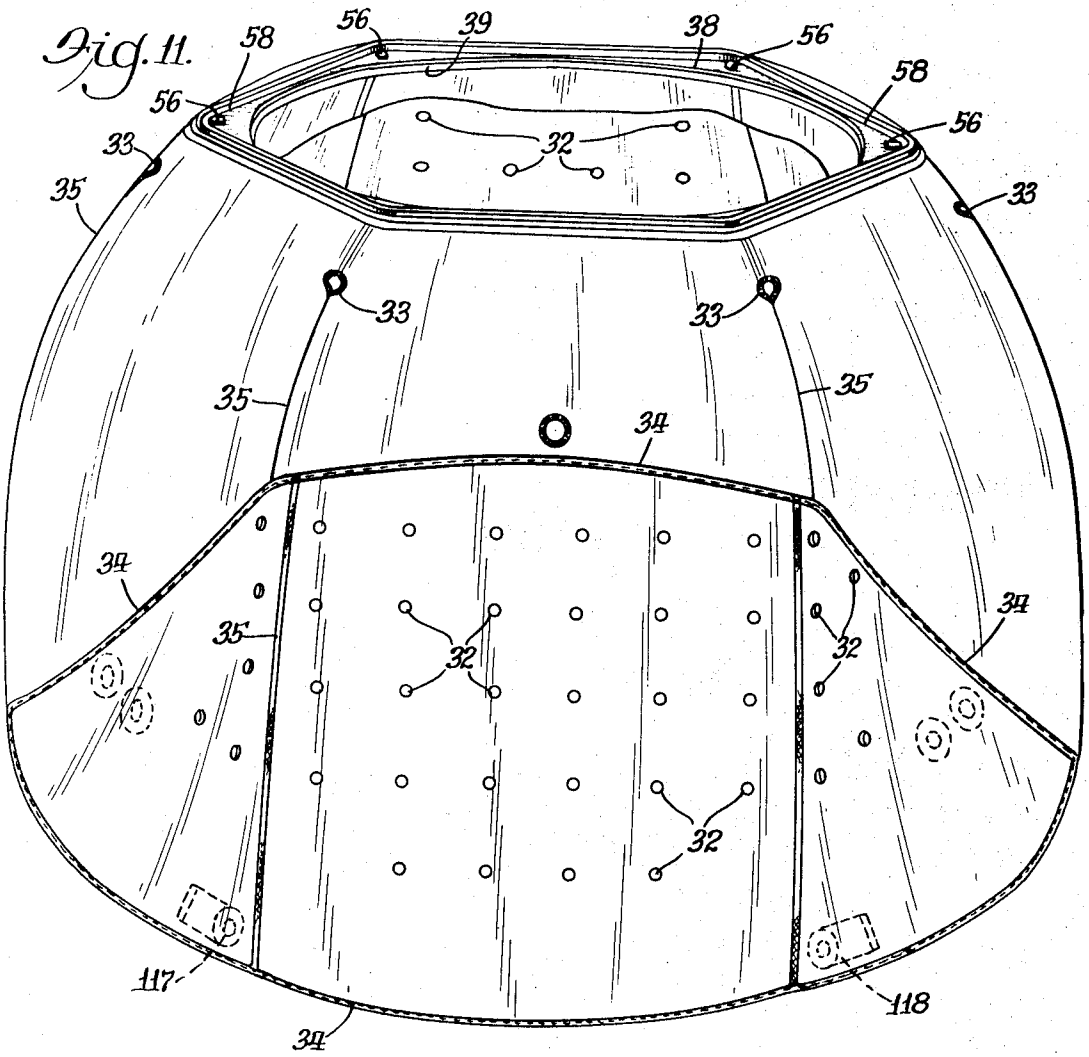


Fig. 10.

Fig. 11.


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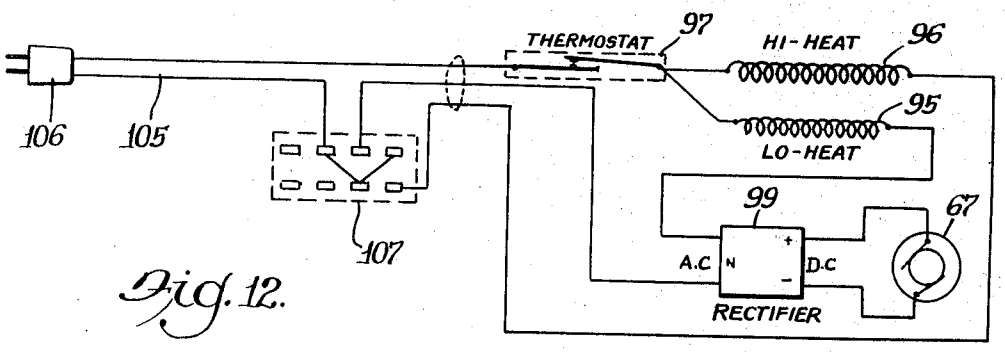

THERMOSTAT
97
HI-HEAT
96
95
LO-HEAT
106
105
107
99
67
A.C
N
+
-
D.C
RECTIFIER

Fig. 12.

PORTABLE HAIR DRYER

BACKGROUND OF THE INVENTION

This application is a division of U.S. application Ser. No. 127,666, filed Mar. 24, 1971 Now U.S. Pat. No. 3,727,321 and is assigned to the same assignee as the parent application.

The invention is concerned with a portable hair drying appliance of the type having a motor driven blower to circulate heated air through the hair of the user to dry the same. At the present time, there are several broad types of portable home hair dryers on the market, one of these types being characterized by having a hat or bonnet made of an air impervious material and formed to provide a manifold through which heated air is circulated to various portions of the head. At the outset, these so-called soft hat hair dryers included a motor driven blower which was connected to the soft hat or bonnet by means of a flexible conduit through which the heated air was circulated from the blower to the manifold within the hat.

In order to simplify the design and eliminate need for the rather bulky flexible air conduit from the motor driven blower to the bonnet, there have been hair dryers manufactured and sold in which the motor driven blower unit is attached directly to the hair dryer bonnet. An example of one such hair dryer is shown in Taylor U.S. Pat. No. 3,383,700.

One of the problems associated with hair dryers of the type shown in the Taylor patent is the fact that there is no convenient place to support the motor driven blower when it is attached directly to the hat. In some instances, such as in the Taylor patent, the motor driven blower is made as small as possible to minimize the problem created by the motor driven blower hanging from the hat and tending to disturb the carefully styled hair which is being dried. Nevertheless, the weight of the motor driven blower hanging at the back of the cap is annoying and tends to displace the hat and to disturb the set of the hair.

Another approach to the problem of supporting the motor driven blower on the hat is disclosed in Parker U.S. Pat. No. 3,032,891 in which a separate supporting frame is provided within the flexible hat to support the blower spaced above the head and hair of the user. Such an approach is less than satisfactory since it complicates the structure of the hair dryer considerably and complicates the problem of applying the hat to the hair after it has been set. Both the Taylor and Parker patents also have other disadvantages flowing from the lack of proper means to circulate the air to the various portions of the hair being dried.

SUMMARY OF THE INVENTION

The hair dryer of the instant invention provides an improved means of supporting a motor driven blower on a flexible hair drying bonnet in such a way that it is virtually weightless as far as the user is concerned and so that it is arranged in a manner to provide optimum circulation of air to the various portions of the hair being dried. The housing for the motor driven blower is made somewhat pancake in shape with the housing being connected to the flexible hat around its periphery in such a manner that approximately half of the housing protrudes outwardly from the hat while the other half is positioned within the hat. The hat itself is of such dimensions that when the manifold contained therein inflates, the outer layer of the hat expands outwardly from the head of the user and thereby tends to support the motor driven blower and its housing in spaced relation to the head and hair of the user. Accordingly, the motor driven blower is supported, at least in part, by the cushion of air pumped into the manifold of the bonnet by the motor driven blower.

The housing of the motor driven blower is formed with a slight peripheral flange which snaps into engagement with a semiflexible frame heat sealed to the flexible bonnet. This construction permits the motor driven blower and its housing to be readily disengaged from the bonnet so that the bonnet may be washed or replaced. The housing for the motor driven blower comprises two cup-shaped members which are assembled to provide air circulation in one direction through the motor and then in a reverse direction to the peripheral opening which lies between the adjacent edges of the two housing halves. This arrangement provides optimum distribution of the air to all points of the bonnet by virtue of the location of the motor driven blower in the middle of the crown portion of the hat.

Accordingly, it is an object of the present invention to provide an improved portable hair dryer of the type having a motor driven blower mounted directly on a flexible hat or bonnet.

It is a further object of the present invention to provide an improved soft hat hair dryer having a motor driven blower unit which is detachably mounted directly on the soft hat.

Still another object of the present invention is to provide an improved portable hair dryer of the type in which the motor driven blower unit is connected directly to the flexible hat and wherein the weight of the motor driven blower unit is supported by a cushion of air formed within the hat manifold.

Another object of the present invention is to provide a portable hair dryer having a motor driven blower unit mounted in the crown portion of a flexible hat including an air distribution manifold and wherein the blower unit discharges the air around the periphery of a flat pancake housing.

Still another object of the present invention is to provide an improved motor driven blower unit for a hair dryer wherein the housing therefor is formed by the cup-shaped housings which mount a heater supporting insulating plate therebetween and which are spaced apart so that the heated air is discharged around the entire periphery of the housing.

Further objects and advantages of the present invention will become apparent as the following description proceeds and the features of novelty which characterize the invention will be pointed out with more particularity in the claims annexed to and forming a part of this specification.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the present invention, reference may be had to the accompanying drawings in which:

FIG. 1 is a perspective view of a hair dryer embodying our invention;

FIG. 2 is an enlarged fragmentary sectional view taken substantially on line 2—2 of FIG. 1;

FIG. 3 is a vertical sectional view taken substantially along line 2—2 of FIG. 1 but showing the motor driven

blower and housing in full lines as well as the head of the user;

FIG. 4 is a vertical sectional view taken substantially along line 4—4 of FIG. 3 showing the motor driven blower and its housing in full lines;

FIG. 5 is an enlarged top plan view of the hair dryer showing the motor driven blower and the adjacent portions of the hair dryer hat with portions of the motor driven blower housing cut away to expose the internal portions thereof;

FIG. 6 is a fragmentary vertical section taken substantially along line 6—6 of FIG. 5 assuming FIG. 5 shows the complete structure of the motor driven blower unit.

FIG. 7 is a fragmentary sectional view taken on line 7—7 of FIG. 5;

FIG. 8 is a layout drawing showing the shape of the hat material prior to its being heat sealed but after having been blanked;

FIG. 9 is a fragmentary sectional view of an inflated portion of the hat manifold;

FIG. 10 is a sectional view taken on line 10—10 of FIG. 8;

FIG. 11 is a perspective view of the flexible hat with the motor driven blower unit detached therefrom; and

FIG. 12 is a schematic circuit diagram of the electrical circuit for the hair dryer embodying our invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, there is shown a portable home hair dryer which is designated generally by reference numeral **20.** The hair dryer includes a flexible hat or bonnet **21** which is made up of an outer impervious layer **22** and an inner perforate layer **23.** The outer and inner layers **22** and **23** are formed of a suitable vinyl plastic which will be impervious to the air enclosed between the two layers and which may be readily washed. The outer and inner layers **22** and **23** are of identical shape and are blanked in a somewhat star-shaped form shown in FIG. **8** providing a plurality of outwardly extending projections **25, 26, 27, 28, 29,** and **30.** The adjacent edges of the layers **22** and **23** are heat sealed to provide continuous seam forming a manifold therebetween having manifold projections which extend outwardly from the central or crown portion of the hat **21.**

As may also be seen in FIG. **8,** the inner layer **23** is provided with a plurality of perforations **32** which are dispersed more or less evenly over the entire portion of the hat **21.** To prevent ripping or tearing of the heat sealed plastic in the area between the projections **25, 26, 27, 28, 29,** and **30,** reinforced sealing areas **33** are provided in a somewhat circular form as is evident from FIG. **8.** In order to form the layers **22** and **23** into the cup-shaped form which will receive the head of the user, the adjacent heat sealed edges of the projections **25, 26, 27, 28, 29,** and **30** are themselves heat sealed together in overlapped relation as at **35** to form the hat **21,** as shown in FIGS. **1** and **11.** FIGS. **9** and **10** illustrate the manner in which the mouth of the formed hat **21** is reinforced by the application of a folded over strip **34** which is stitched to the heat sealed edge of the hat to prevent tearing of the vinyl material.

The outer layer **22** of the hat **21** is formed with a generally hexagonal opening **37** positioned centrally between the projections **25** through **30.** Secured to the outer layer **22** along the edges defining opening **37** is a light, flexible vinyl frame **38** which is formed with a central opening **39.** The purpose of the vinyl frame **38** is to detachably mount a motor driven blower unit **40** in sealed position in the opening **37** in the outer layer **22** of the bonnet **21.** The blower **40** is provided with a housing **41** which consists of an outer or cover portion **42** and an inner housing portion **43.** The cover portion **42** of the housing is generally conical in shape having sloping side walls **44** which terminate inwardly at a central opening **45** which serves as the air inlet opening for the motor driven blower **40.**

Extending downwardly from the opening **45** is a fan shroud **46** which is generally cylindrical in configuration and closely encloses a fan **50.** In order to prevent engagement of the fan **50** by the hands or fingers of the user, a protective grill **51** is formed in the opening **45** by a plurality of radially extending fins **52** which extend from a hub **53** outwardly into engagement with the walls of cover portion **42** defining the central opening **45.**

The outermost edge of the cover portion **42** of the housing is formed with a cylindrical flange **54** which is adpated to be received snugly within the opening **39** formed in the mounting frame **38.** For the purpose of detachably retaining the motor driven blower **40** with respect to the vinyl frame **38,** the housing **41** has formed on the walls **44** adjacent to the flange **54** a plurality of peripherally spaced latching projections **55** which extend into holes **56** formed in the vinyl frame **38,** as is best shown in FIG. **6.** When all of the six latching projections **55** are snapped into engagement in the holes **56,** as shown in FIG. **6,** the motor driven blower **40** is securely attached to the frame **38** and the adjacent portions of the hat **21.** The flexibility of the frame **38** permits the motor driven blower **40** to be quickly and easily removed from the hat **21** without the aid of any tools when the user finds it necessary to wash the hat **21.** In the assembled position on the hat **21,** the cover portion **42** of the motor driven blower **40** is sealed to the frame **38** by virtue of the flange **54** which extends through the opening **39** in the frame **38** and by the fact that the outer terminus of the walls **44** is formed by a projecting wall or shoulder **57.** The wall **57** forms a hexagonal frame and extends into engagement with an upstanding bead **58** formed on the frame **38,** as is best shown in FIG. **11.**

The inner housing portion **43** is of generally cup-shaped configuration having a bottom wall **60** and upwardly extending side walls **61** which terminate at an upper circular lip **62.** The bottom wall **60** is formed with three equally spaced upwardly extending projections **63** (one of which is shown in FIG. **6**) which extend into engagement with corresponding depending projections **64** formed on the cover portion **42** of the housing **41.** Assembly screws **65** extend through the projections **63** into threaded engagement with the projections **64** to retain the housing portions **42** and **43** assembled, as shown in FIGS. **2** and **6.** In this assembled position, the lip **62** on the inner housing portion **43** is spaced inwardly from the flange **54** providing a continuous annular space or opening **66** through which air may be delivered from within the housing **41** to the manifold formed by the hat **21.**

Mounted within the housing **41** below fan **50** is a motor **67** which is supported on the bottom wall **60** of the inner housing portion **43.** The bottom wall **60** is formed with integral projections and recesses with receive and locate the various portions of the motor **67** as will be explained in greater detail below. The motor **67** includes a rotary armature **68** including an armature shaft **69** which extends upwardly into driving and supporting engagement with the fan **50.** Surrounding the armature **68** is a cylindrical permanent magnet field **70** which is supported by an inverted cup-shaped frame member **71.** The frame member **71** has an upper wall **72** into which is press fitted a bronze bearing **73** which journals the upper end of the armature shaft.

The lower end of the frame **71** is formed with a peripheral flange **74** which is supported on upwardly extending curved posts **75** which are stepped at their upper ends to extend partially with the cylindrical end of frame **71** as well as to support the flange **74.** In order to secure the frame **71** to the inner housing portion **43,** there are provided two diametrically positioned, upwardly extending bosses **76** which receive assembly screws **77,** the head of which overlie the flange **74,** as best shown in FIGS. **5** and **6.** The lower end of the armature shaft **69** is journalled by a spherical bearing **78** which is received in a pocket **79** formed in the bottom wall **60.** The bearing **78** is retained in position by a U-shaped bearing retainer **80.** The central portion of the U-shaped retainer **80** engages the bearing **78,** as shown in FIG. **6,** and the upwardly extending legs thereof engage the flange **74** of the frame **71** thereby urging the retainer **80** into seated engagement against bearing **78.**

The motor **67** includes a commutator **82** which is positioned immediately above the lower armature bearing **78,** as best shown in FIG. **2.** Mounted on the bottom wall **60** and positioned to engage the commutator **82** are a pair of radially extending carbon brushes **83** which are slidably supported in upwardly facing channels **84** formed in the bottom wall **60** of the inner housing portion **43.** The brushes **83** are provided with suitable biasing springs **85** and pigtail connectors **86.** In order to retain the brushes **83** and their biasing springs **85** in seated position within the channels **84,** there are provided cover plates **87** which are retained in position by screws **88** and extend inwardly overlying and closing the channels **84.** By forming the channels **84** integrally with the inner housing portion **43,** there is provided a simple and effective means for supporting the brushes **83** in an easily accessible position within the housing **41.** In summary, it should be noted that the motor **67** and its various components are supported by the integrally formed portions of the bottom wall **60** of the inner housing portion **43.**

The motor **67** serves to rotate the fan **50** at a relatively high velocity so that the angled blades of the fan **50** draw air inwardly through the opening **45** in the cover portion **42** of the housing **41.** The scroll **46** tends to direct and restrict the movement of the air drawn in. After passing the inner edge of the cylindrical scroll **46,** the air divides with some of it passing radially outwardly toward the annular discharge opening as shown by the arrows in FIG. **2.** Some of the air, however, is urged downwardly thereby passing across the motor **67.** Supported within the air stream is a heater assembly **90** which consists of a mica card **91** having a generally hexagonal outer configuration and being provided with a central opening **92.** The card **91** is formed with three mounting openings **93** through which the upper ends of the projections **63** extend, as is best shown in FIG. **6.** The three projections **63** are formed with ends of reduced diameter, as indicated at **94,** thereby provided a shoulder which limits axial movement of the card **91** with respect to the motor **67.**

The heater assembly **90** includes a low wattage heating element **95** and a high wattage heating element **96,** both of which consists of helical coils of resistance wire which extend around the periphery of the card **91** and are interlaced with the card extending through slots **98** in the card thereby presenting adjacent sections of the elements positioned above and below the card **91** as shown in FIG. **5.** The slots **98** are formed with oval-shaped inner ends **98***a* through which the element **95** extends and intermediate enlargements **98***b* through which the larger, higher wattage element **96** extends. To minimize the possibilities of short circuiting the two heating elements, the adjacent portions of the low and high wattage elements are positioned on opposite sides of the card **91,** as is evident from FIG. **5.** Also mounted on the card **91** and included with the heater assembly **90** is a safety thermostat **97** and a rectifier **99** which are shown in FIG. **5** and schematically in FIG. **12.**

Also mounted on the projections **63** and adjacent to the heater assembly **90** is a cylindrical baffle **100** which surrounds and is spaced outwardly from the motor **67,** as is best shown in FIGS. **2, 5,** and **6.** The cylindrical baffle **100** has three integrally formed apertured ears **101** which extend outwardly from the upper end thereof, as shown in FIG. **6,** to be received on the reduced diameter portions **94** of the projections **63.** The purpose of the cylindrical baffle **100** is to direct air which flows axially with respect to the motor **67** downwardly toward the bottom wall **60** so as to obtain satisfactory cooling of the motor by the air which has passed directly through the opening **92** in the heater assembly **90** and has been unaffected by the heating elements **95** and **96.** After passing across the motor **67,** the reverses reverse direction upon passing around the lower end of baffle **100** and flows upwardly across the heating assembly **90** and thence to the annular discharge opening **66** where it exits from the housing **41** and enters the manifold between the outer layer **22** and inner layer **23** of the hat **21.** This arrangement of the heater assembly **90,** the motor **67,** and the baffles within the housing **41** provides an extremely flat and compact arrangement which circulates and heats a large volume of air and discharges the air outwardly of the motor driven blower **40** so as to facilitate circulating the air to the various portions of the hat **21.**

In order to provide power for the motor **67** and the heating assembly **90,** there is provided a power cord **105** which includes a plug **106** suitable for connection to a conventional utility line outlet. Also included with the power cord **105** in a position where it is reasonably accessible to the operator is a three position switch **107** which is shown schematically in FIG. **12.** As illustrated in FIG. **1,** the switch **107** is positioned reasonably close to the hair dryer **20** so that it may be draped over the shoulder of the user in a position where it may be conveniently operated. It should be understood that the portion of the cord **105** extending from the switch **107** to the plug **106** will normally be of substantial length thus permitting the user to take full advantage of the portability of the hair dryer **20.** Because of the light

weight and the lack of any dangling hose connections between the hat and the motor driven blower, the hair dryer of the instant invention permits the user to conveniently perform many household tasks, such as ironing, cleaning, dishwashing, and the like even while the hair is being dried.

The inner end of the power cord **105** extends from the switch **107** into the housing **41** through a strain relief **108,** as best shown in FIG. **7.** A suitable opening **109** is formed in the cover portion **42** of the housing while a somewhat L-shaped clamping member **110** is secured to the housing **41** in a position overlying the cord **105** in the area of the opening **109,** as shown in FIG. **7.** The outer end of the clamping member **110** is formed with spaced, parallel legs **111** which straddle the cord **105** and extend through opening **112** into engagement with the inside of the cover portion of the housing portion **42.** The inner or upper end of the clamping member **110** is secured in place by a retaining screw **113** which is in threaded engagement with a hole in the cover portion **42.** The clamping member **110** is formed with a pair of spaced walls **114** which cooperate with an intermediate wall **115** formed on the cover portion **42** to provide a tortuous passageway which grips the cord **106** and provides a suitable strain relief. The three conductors of the cord **105** extending through the opening **109** extend into connection with the heating assembly **90,** the thermostat **97,** and the rectifier **98,** as shown schematically in FIG. **12.**

When the motor driven blower **40** is energized causing air to be circulated into the manifold of the hat **21,** the portions thereof inflate, as shown in FIGS. **2, 3,** and **4** of the drawings. The hat **21** has the motor driven blower **40** mounted in the crown portion with the six manifold projections **25, 26, 27, 28, 29,** and **30** radiating outwardly therefrom. The fact that the air discharge or outlet **66** of the blower **40** extends completely around the housing **41** results in direct delivery of the heated air into each of the projections **25** through **30** with a minimum loss in efficiency. As the manifold projections are inflated, they tend to expand inwardly against the head of the user, as shown in FIGS. **3** and **4.** The sectional view of FIG. **4** is taken through the front and rear inflated manifold projections **28** and **25,** respectively. Similarly, the sectional view of FIG. **3** is taken forward of the crown portion through the manifold projections **27** and **29** with the more rearwardly located manifold projections **26** and **30** visible in full lines. FIG. **3** and **4** serve to demonstrate the manner in which the manifold projections **25** through **30** inflate causing the inner layer **23** of the manifold to snugly enclose the styled hair of the user. Thus, as the heated air is discharged through the perforation **32,** the air passes directly through the hair and is most efficient in performing the drying function.

It should also be noted from FIGS. **3** and **4** that the outer layer **22** of the hat **21** billows outwardly raising up the frame **38** which supports the motor driven blower **40.** As a consequence, the blower **40** tends to be supported on the cushion of air which inflates the entire manifold area within the hat **21.** Accordingly, the blower **40** is almost weightless as positioned on the top of the head and has little or no tendency to disturb the set of styling of the hair.

The hat **21** is made sufficiently large so that it will accommodate any of the bouffant hair styles which require setting with enlarged, bulky rollers. Because of the inflatability of the manifold projections **25** through **30,** the hat **21** is adapted to accommodate itself to and function properly with less bulky hair styles, such as the one shown in FIGS. **3** and **4.** In the case of some children or people with small heads, however, it may be desired to lessen the size of the bonnet slightly. This may be accomplished easily by use of a pair of interengaging snaps **117** and **118** which are secured to the outer layer **22** of the hat **21,** as is best shown in the sectional view of FIG. **10.** Securing the snaps **117** and **118** together reduces the circumference at the mouth of the hat by approximately five inches. This provides additional versatility and permits the hat **21** to function properly on a wide range of head sizes and types of hair styles.

As may be readily appreciated, the position of the blower **40** with respect to the head and hair style will vary considerably depending on the size of the head and type of hair styling. If the interior of the hat is well filled by hair which has been styled using large, bulky rollers, there will be less space or opportunity for the manifold projections **25** through **30** to inflate in the manner shown in FIGS. **3** and **4.** Accordingly, there is provided on the bottom wall **60** of the inner housing portion **43** a cushion or pad **120** which will serve to cushion or support the blower **40** with respect to the head of the user. In situations when the manifold projections **25** through **30** are well inflated, there will be little or none of the weight of the blower **40** resting on the pad **120** and the head. In other instances, however, the large size of the head with its styled hair may decrease the inflation of the hat and result in the blower **40** being largely supported by the pad **120.**

In considering the flow of air from the blower **40,** it is evident that the air passes from the outlet **66** in the housing **41** almost directly into the manifold projections **25** through **30.** There is, however, a certain portion of the inner layer **23** which lies directly below the housing **41** and it might be thought that there would be a tendency for the pad **120** to obstruct passage of the air through the holes **32** located immediately below the blower **40.** In actuality, however, there is a limited amount of heat which is directed downwardly from the housing **41** thus improving the drying conditions immediately below the blower **40.** As a consequence, the hair immediately below the blower **40** dries at approximately the same rate as the hair elsewhere on the head in spite of the limited obstruction to air flow which occurs in that area.

There are many advantages accruing from the construction and arrangement of the motor driven blower unit **40** and the hat **21** described above. The entire assembly is obviously very compact and easy to store as a consequence of the compact shape of the unit **40** and the central location of the unit in the crown portion of the hat. In addition, the discharge of the air from the unit **40** through an annular opening with which the open ends of the manifold projections communicate directly provides maximum efficiency for circulating heated air from the blower unit **40** to the various parts of the head. By minimizing the distance the air must travel from the blower unit to the discharge openings **32** in the inner layer, the efficiency of the air delivery system is increased requiring less power and a smaller motor to circulate the heated air.

By contouring the cover portion **42** of the housing **41** to the general shape of the hat **21,** a pleasing appearance is achieved while obtaining the above mentioned

advantages as to efficiency. The inner housing portion **43** of the housing **41** is essentially hidden or obscured when the appliance **20** is in use since it is effectively recessed within the inflated manifold formed by the two layers of the hat **21.** This positioning of the housing **41** offers the further advantage of reducing or eliminating the weight of unit **40** carried by the head as a result of the supporting frame **38** on the outer layer **22** of the hat being elevated by the inflated manifold so that the unit **40** is supported by the cushion of air in the manifold.

While there have been illustrated and described particular embodiments of the present invention, it will be appreciated that numerous changes and modifications will occur to those skilled in the art, and it is intended in the appended claims to cover all those changes and modifications which fall within the true spirit and scope of the present invention.

What is claimed as new and desired to be secured by Letters Patent of the United States is:

1. A motor driven blower for use in a portable hair dryer comprising an outer housing portion and an inner housing portion which fit together to form an enclosure for a motor driven fan and an air heater, said inner housing portion being cup-shaped and supporting therein a motor with its shaft extending outwardly therefrom and said shaft supporting an axial flow fan in said outer housing portion, air inlet means in said outer housing portion adjacent said fan, a cylindrical baffle mounted in said inner housing portion coaxial with said motor and spaced outwardly therefrom, the inner end of said baffle being spaced from the bottom of said inner housing portion to form an annular air flow passage therebetween, an annular heater supported adjacent to said baffle and outwardly thereof to heat air which is circulated upwardly from the bottom of said cup-shaped housing portion outwardly of said baffle, said cup-shaped inner housing portion having a lip spaced from the outer edge of said outer housing portion to form an annular opening through which air is discharged, said annular opening being adjacent to and outwardly of said annular heater.

2. A motor driven blower for use in a portable hair dryer comprising an outer housing portion and an inner housing portion which fit together to form an enclosure for a motor driven fan and an air heater, said inner housing portion being cup-shaped and supporting therein a motor with its shaft extending outwardly therefrom and said shaft supporting an axial flow fan in said outer housing portion, air inlet means in said outer housing portion adjacent said fan, a cylindrical baffle mounted in said inner housing portion coaxial with said motor and spaced outwardly therefrom, the inner end of said baffle being spaced from the bottom of said inner housing portion to form an annular air flow passage therebetween, an annular heater supported adjacent to said baffle and outwardly thereof to heat air which is circulated upwardly from the bottom of said cup-shaped housing portion outwardly of said baffle, said cup-shaped inner housing portion having a lip spaced from the outer edge of said outer housing portion to form an annular opening through which air is discharged, said outer and inner housing portions being connected by a plurality of coaxial pairs of bosses which abut within said enclosure, assembly means extending within each pair of bosses to secure said housing portions in assembled relation, said heater having a flat insulating card which supports an elongated resistance heating element thereon, said card being received on said bosses to support said heater within said housing, said cylindrical baffle being supported on said bosses below said heater.

3. A motor driven blower for use in a portable hair dryer comprising an outer housing portion and an inner housing portion which fit together to form an enclosure for a motor driven fan and an air heater, said inner housing portion being cup-shaped and supporting therein a motor with its shaft extending outwardly therefrom and said shaft supporting an axial flow fan in said outer housing portion, air inlet means in said outer housing portion adjacent said fan, a cylindrical baffle mounted in said inner housing portion coaxial with said motor and spaced outwardly therefrom, the inner end of said baffle being spaced from the bottom of said inner housing portion to form an annular air flow passage therebetween, an annular heater supported adjacent to said baffle and outwardly thereof to heat air which is circulated upwardly from the bottom of said cup-shaped housing portion outwardly of said baffle, said cup-shaped inner housing portion having a lip spaced from the outer edge of said outer housing portion to form an annular opening through which air is discharged, said motor having upper and lower armature bearings and a cylindrical frame member and commutator brushes and a permanent magnet field, said inner housing portion being formed at its bottom wall with a bearing receiving recess within which said lower armature bearing is received, said commutator brushes being supported on said bottom wall by upwardly extending wall portions, said cylindrical motor frame member being carried by said bottom wall and supporting said permanent magnet field adjacent to said armature, said frame supporting said upper armature bearing above said field.

4. 4. The motor driven blower of claim **3** wherein said upwardly extending wall portions are formed with channel-shaped slots extending radially of said armature shaft and opening inwardly adjacent to a commutator carried by said shaft, said brushes and brush biasing springs being received within said slots, and cover plates overlaying said slots to retain said brushes and said springs therein.

5. A motor driven blower comprising first and second housing portions which fit together to form an enclosure for a motor driven fan and an air heater, said first housing portion being cup-shaped and supporting therein a motor with its shaft extending outwardly therefrom and said shaft supporting a fan in said second housing portion, air inlet means in said second housing portion adjacent said fan, a cylindrical baffle mounted in said first housing portion coaxial with said motor and spaced outwardly therefrom, the inner end of said baffle being spaced from the bottom of said first cup-shaped housing portion to form an annular air flow passage therebetween, an annular heater supported adjacent to said baffle and outwardly thereof to heat air which is circulated outwardly from the bottom of said cup-shaped housing portion outwardly of said baffle, said housing portions being spaced to form an annular opening through which air is discharged, said annular heater and said annular opening being concentric and positioned in substantially the same place.

6. A motor driven blower comprising first and second housing portions which fit together to form an enclo-

sure for a motor driven fan and an air heater, said first housing portion being cup-shaped and supporting therein a motor with its shaft extending outwardly therefrom said shaft supporting a fan in said second housing portion, air inlet means in said second housing portion adjacent said fan, a cylindrical baffle mounted in said first housing portion coaxial with said motor and spaced outwardly therefrom, the inner end of said baffle being spaced from the bottom of said inner housing portion to form an annular air flow passage therebetween, an annular heater supported adjacent to said baffle and outwardly thereof to heat air which is circulated outwardly from the bottom of said cup-shaped housing portion outwardly of said baffle, said housing portions being spaced to form an annular opening through which air is discharged, said housing portions being connected by a plurality of coaxial pairs of bosses which are positioned inwardly of said annular opening and which abut within said enclosure, said annular opening being continuous and unobstructed.

7. A motor driven blower comprising first and second housing portions which fit together to form an enclosure for a motor driven fan and an air heater, said first housing portion being cup-shaped and supporting therein a motor with its shaft extending outwardly therefrom and said shaft supporting a fan in said second housing portion, air inlet means in said second housing portion adjacent said fan, a cylindrical baffle mounted in said first housing portion coaxial with said motor and spaced outwardly therefrom, the inner end of said baffle being spaced from the bottom of said inner housing portion to form an annular air flow passage therebetween, an annular heater supported adjacent to said baffle and outwardly thereof to heat air which is circulated outwardly from the bottom of said cup-shaped housing portion outwardly of said baffle, said housing portions being spaced to form an annular opening through which air is discharged, said motor having upper and lower armature bearings and a cylindrical frame member and commutator brushes and a permanent magnet field, said first housing portion being formed at its bottom wall with a bearing receiving recess within which said lower armature bearing is received, said commutator brushes being supported on said bottom wall by upwardly extending wall portions, said cylindrical motor frame member being carried by said bottom wall and supporting said permanent magnet field adjacent to said armature, said frame member supporting said upper armature bearing above said field.

8. In a generally flat compact air heating and circulating appliance, the combination comprising a motor having an armature shaft on which a fan is supported, a motor supporting housing portion and a fan housing portion, said housing portions being assembled together to form a housing which encloses said motor and fan, said fan housing portion having an air inlet disposed axially of said shaft and adjacent to said fan, an annular air discharge disposed at the periphery of said housing and defined by the spaced edges of said housing portions, air drawn into said inlet by said fan being circulated axially across said motor into said motor supporting housing portion where it reverses direction and flows out of said motor supporting housing portion to said annular discharge, and an annularly shaped heater being disposed between said motor and said discharge to heat air discharged from said housing, said annular heater and said annular opening being concentric and positioned in substantially the same plane, said fan housing portion being formed with a cylindrical wall portion which extends inwardly from the housing portion surrounding said air inlet to form a fan shroud, a cylindrical air directing baffle supported in said motor supporting housing portion and positioned coaxially with said motor and spaced therefrom, one end of said baffle being spaced from the bottom of said motor supporting housing portion to form an annular air flow passage for air flowing within said baffle to pass outwardly thereof, and said heater is disposed outwardly of said cylindrical baffle in the path of said flowing outwardly from said motor supporting housing portion to said discharge.

9. In a generally flat compact air heating and circulating appliance, the combination comprising a motor having an armature shaft on which a fan is supported, a motor supporting housing portion and a fan housing portion, said housing portions being assembled together to form a housing which encloses said motor and fan, said fan housing portion having an air inlet disposed axially of said shaft and adjacent to said fan, an annular air discharge disposed at the periphery of said housing and defined by the spaced edges of said housing portions, air drawn into said inlet by said fan being circulated axially across said motor into said motor supporting housing portion where it reverses direction and flows out of said motor supporting housing portion to said annular discharge, and an annularly shaped heater being disposed between said motor and said discharge in the path of said air flowing outwardly from said motor supporting housing to heat air discharged from said housing, said fan housing portion being formed with a cylindrical wall portion which extends inwardly from the housing portion surrounding said air inlet to form a fan shroud, a cylindrical air directing baffle being supported in said motor supporting housing portion and positioned coaxially with said motor and spaced therefrom, one end of said baffle being spaced from the bottom of said motor supporting housing portion to form an annular air flow passage for air flowing within said baffle to pass outwardly thereof, said heater being disposed outwardly of said cylindrical baffle, said shroud and said baffle being of the same diameter and being axially spaced, a portion of the air drawn in by said fan circulated radially through the space between said shroud and said baffle and across said heater to said discharge.

* * * * *

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,831,000 Dated August 20, 1974

Inventor(s) Robert S. Waters and Ronald R. Liedtke

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 4, line 27 - "adpated" should be --adapted--;

Column 5, line 4 - second occurrence of "with" should be --which--;

Column 6, line 31 - "end" should be --edge--;

Column 6, line 41 - "reverses reverse" should be --air reverses--;

Column 10, line 36 - after "frame" insert --member--;

Column 10, line 38 - delete first occurrence of "4" ;

Column 10, line 44 - "overlaying" should be --overlying--;

Column 10, line 65 - "place" should be --plane--;

Column 11, line 4 - after "therefrom" insert --and--;

Column 12, line 21 - before "flowing" insert --air--;

Column 12, line 56 - after "fan" insert --being--.

Signed and sealed this 3rd day of December 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents

FORM PO-1050 (10-69)

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