United States Patent [19]

Wada et al.

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[45] **Nov. 5, 1974**

[54] **FOLDABLE HAIR DRYER**

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[73] Assignee: **Matsushita Electric Works, Ltd.,** Osaka, Japan

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[21] Appl. No.: **336,498**

[30] **Foreign Application Priority Data**

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Feb. 28, 1972	Japan	47-24486
June 30, 1972	Japan	47-78142
Feb. 29, 1972	Japan	47-20870

[52] **U.S. Cl.** ..... **417/234,** 34/97, 34/243, 219/366, 219/370, 219/373, 415/219 C

[51] **Int. Cl.** ... **F03b 11/02,** H05b 1/00, A45d 20/12

[58] **Field of Search** ..... 219/366–374, 219/375, 376, 379–382; 34/95–101, 243; 417/411, 234; 415/219 C, 219 B

[56] **References Cited**

FOREIGN PATENTS OR APPLICATIONS

1,091,797 11/1954 France ..... 34/243 R

Primary Examiner—A. Bartis

Attorney, Agent, or Firm—Wolfe, Hubbard, Leydig, Voit & Osann, Ltd.

[57] **ABSTRACT**

A foldable hair dryer consisting of a hollow nozzle assembly made up of a cylindrical portion and tangentially extending nozzle coaxially fitted into a handle assembly having a cylindrical portion and tangentially extending handle, the two assemblies being generally symmetrical. The thickness of the nozzle, handle and their associated cylindrical portions, measured axially, is approximately the same resulting in a compact, "flat" construction. Within the cylindrical portion of the nozzle assembly is mounted a motor and fan assembly also of "flat" configuration in which the blades of the fan are peripherally disposed about the motor. The nozzle is fitted with a heating element. The nozzle and handle assemblies are coaxially pivoted for movement between an operating condition in which the nozzle and handle are in "L" configuration and a collapsed condition in which the nozzle and handle lie compactly side by side. A switch on the handle is operated by the nozzle incident to the collapsing movement to insure that the motor and heating element are both turned off in the collapsed state.

11 Claims, 20 Drawing Figures

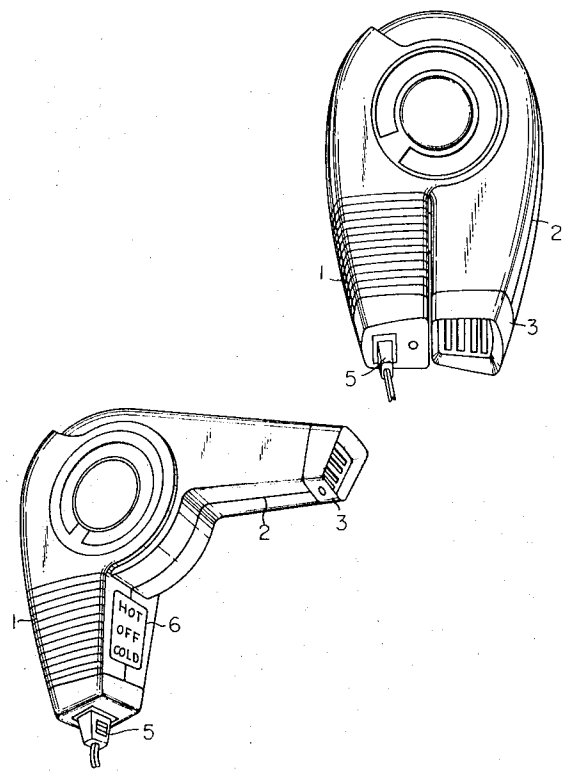

Fig. 1 PRIOR ART

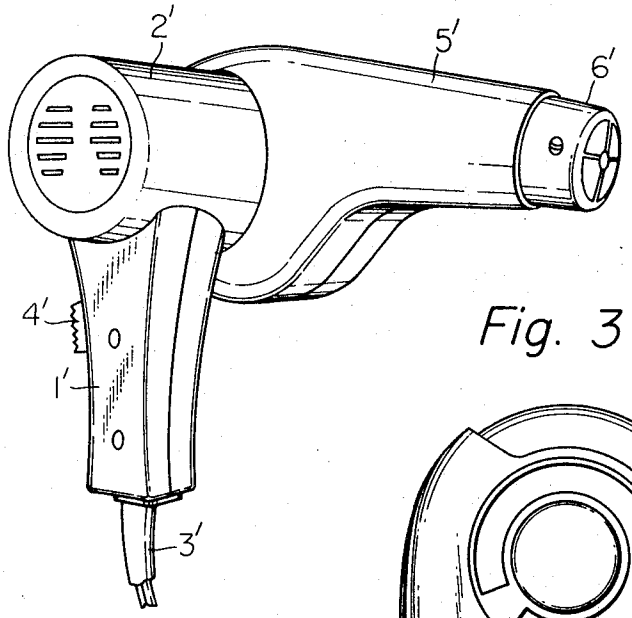

Fig. 3

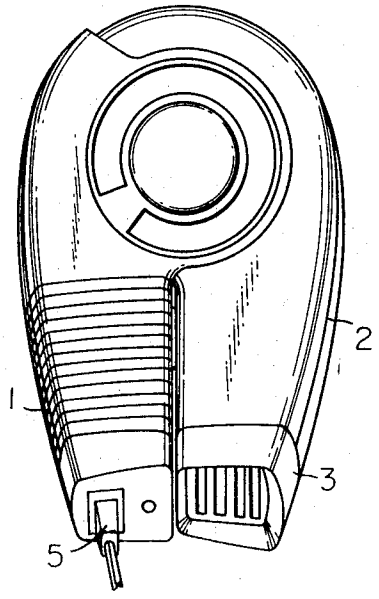

Fig. 2

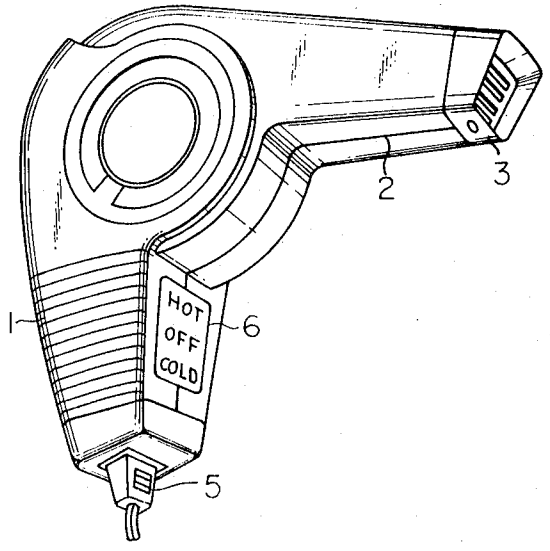

Fig. 4A

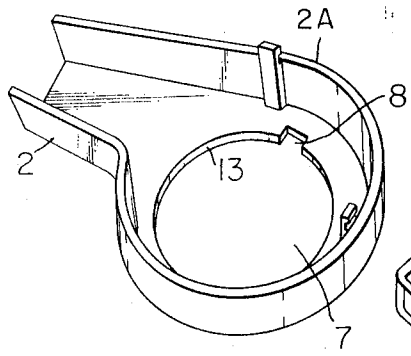

Fig. 4B

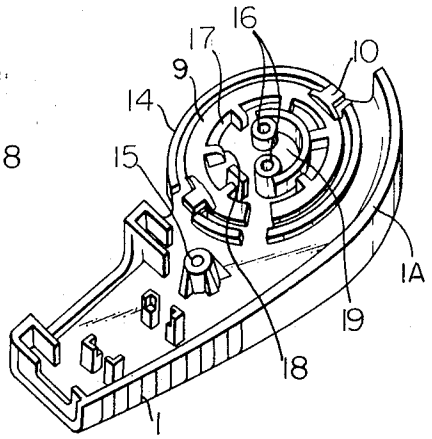

Fig. 4C

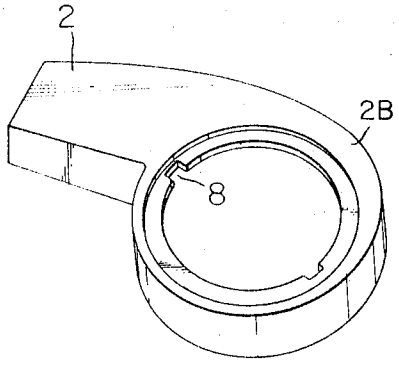

Fig. 4D

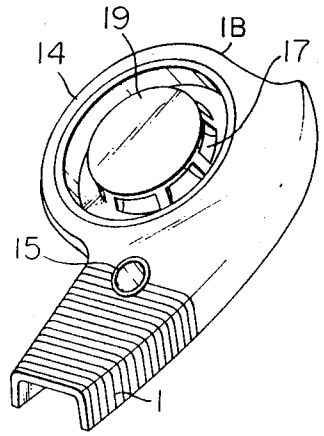

Fig. 4E

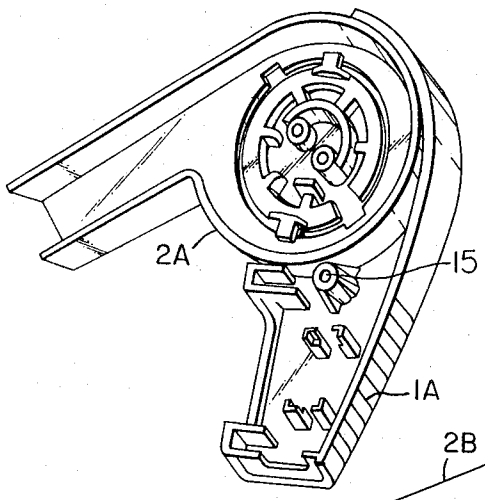

Fig. 4F

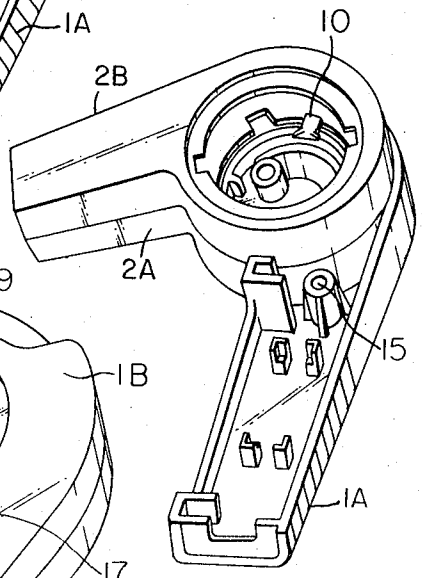

Fig. 4G

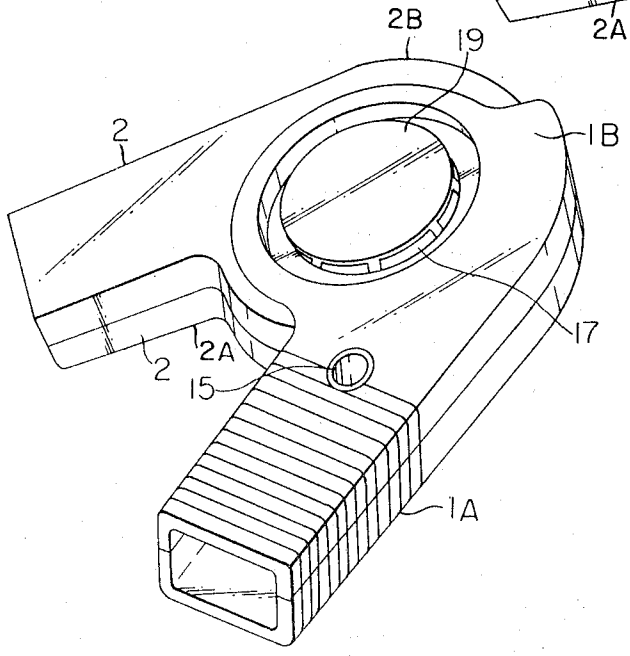

Fig. 4H

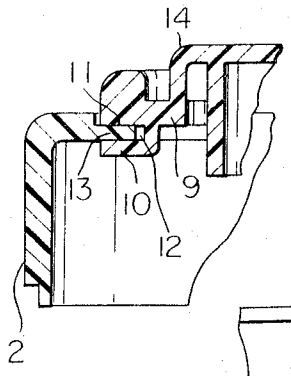

Fig. 5A

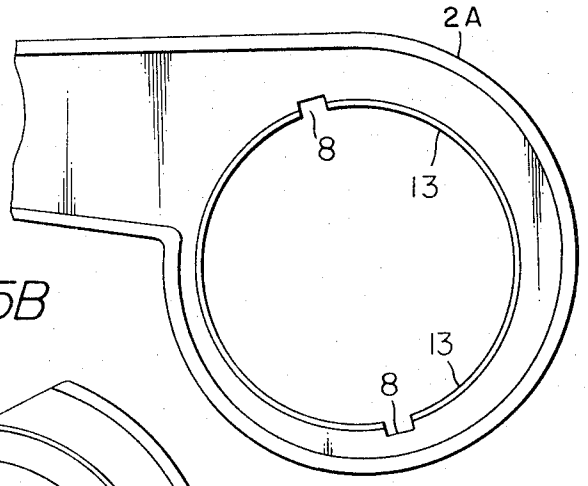

Fig. 5B

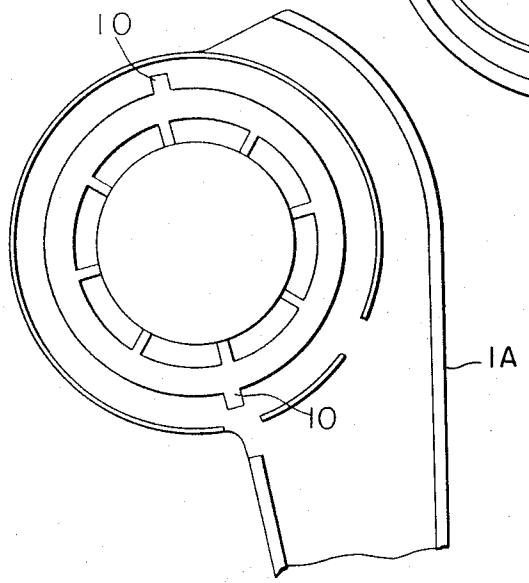

Fig. 5C

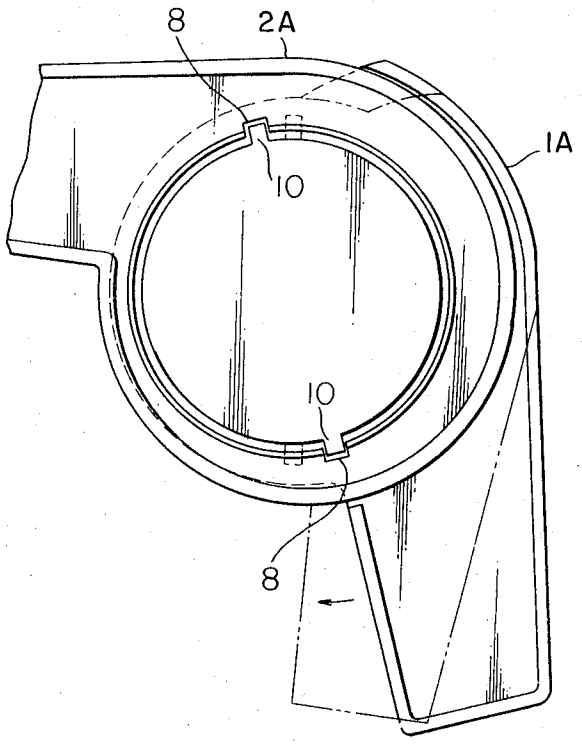

Fig. 7A

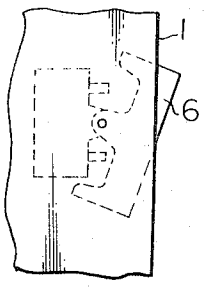

Fig. 7B

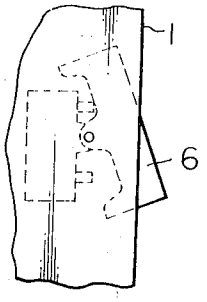

Fig. 7C

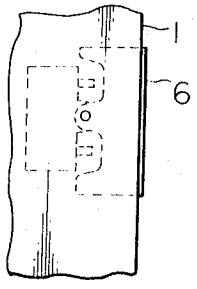

Fig. 6

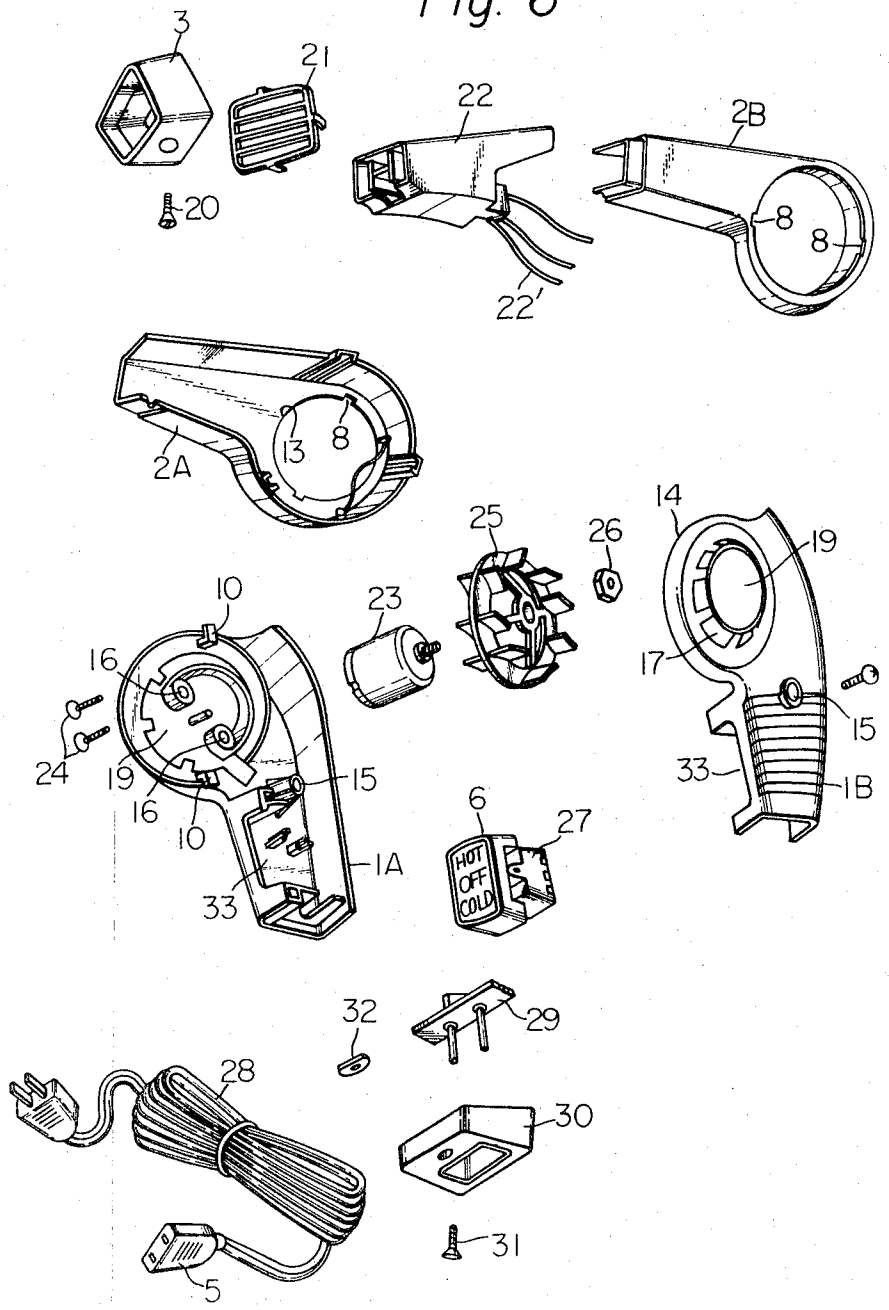
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Fig. 8

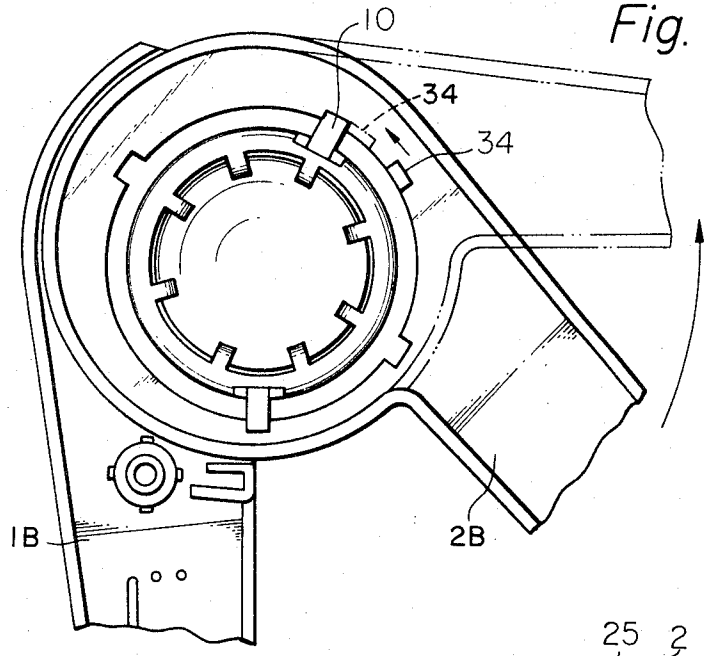
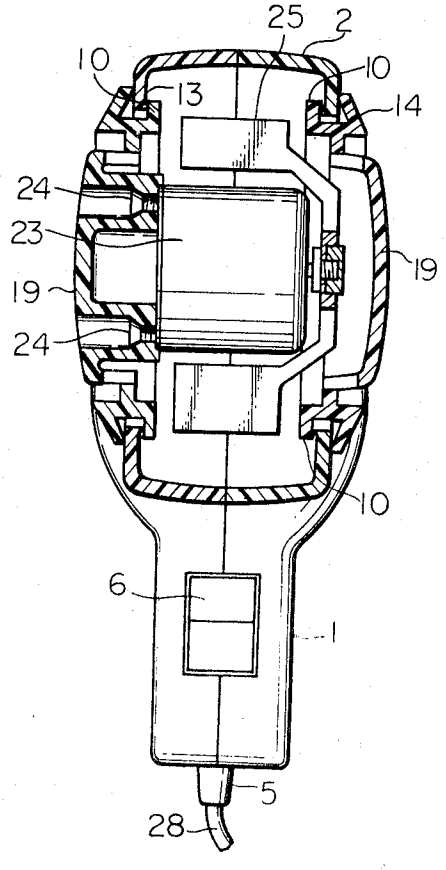


Fig. 9



FOLDABLE HAIR DRYER

It is an object of the present invention to provide a hair dryer which is of compact, flat construction having a handle and nozzle pivoted together and which are in "L" configuration when the device is in normal use, but which, for travel and storage, may be folded together into a collapsed condition with the nozzle and handle positioned closely side by side.

It is a more specific object to provide a hair dryer which, in addition to being highly compact, is economically formed of handle and nozzle assemblies which have cylindrical positions, one of which is open-sided, for interfitting, or nesting, together in coaxial relation, and with interengaging stop surfaces to limit the range of relative pivoting movement. It is another, and related, object to provide such a design of hair dryer which may be economically assembled using a few simply formed, right and left-hand interfitting parts.

It is still another object to provide a collapsible hair dryer which is automatically restored to a safe (off) condition incident to the collapsing movement.

It is a related object to provide a foldable hair dryer made up of nozzle and handle assemblies which are of generally symmetrical shape having interfitted portions which are pivoted together and in which the assemblies have approximately uniform thickness, measured axially, resulting in a "flat" construction which is well balanced in use and conveniently storable.

Other objects and advantages of the present invention will be made clear on reading the following detailed description with reference to the accompanying drawings, in which:

FIG. 1 is a perspective view showing a conventional hair dryer of the kind referred to while being used;

FIGS. 2 and 3 are perspective views of the hair dryer of the present invention in its state of use and the state of being not used, respectively;

FIGS. 4A to 4D are perspective views of the respective holding and duct parts as disassembled according to the present invention;

FIGS. 4E to 4G are perspective views showing sequences of assembly of the members in FIGS. 4A to 4D;

FIG. 4H is a fragmentary section showing the bayonet type coupling between the respective members in FIGS. 4A to 4D;

FIGS. 5A to 5C are views showing engagement of the bayonet connection

FIG. 6 is an exploded perspective view showing all component parts including internal elements of the hair dryer of the present invention as disassembled;

FIGS. 7A to 7C are fragmentary side views showing the rocker switch in its three positions;

FIG. 8 is a supplemental view showing the air duct and limit stops;

FIG. 9 is a vertically sectioned view of the hair dryer of the present invention.

Referring first to the conventional hair dryer shown in FIG. 1, 1′ is a holding part, 2′ is a motor housing part, 3′ is a plug cap, 5′ is an air blowing duct part supported by the motor housing part 2′ so as to be rotatable with respect to the holding part 1′ and contains electric heater and fan means. 6′ is a mouthpiece member for that duct. Such formation as in FIG. 1 has the defect that the entire width is large since the holding part and duct part are overlapped side by side as folded.

Referring now to FIGS. 2 and 3 showing the hair dryer of the present invention in its states of being used and not being used, respectively, 1 is a holding part, 2 is an air blowing duct part, 3 is a mouthpiece for outlet port of the duct part 2, 5 is a plug cap with a cord, and 6 is a push button of an electric switch means. As clear from the drawings, the hair dryer of the present invention is compact and convenient for carrying.

One of the features of the present invention is that the body case comprises four members preferably made of a plastic, a first pair of members being coupled to each other and mated so as to form a first casing having a rotary section and the other pair being respectively fitted at one end over the rotary section of said first casing from both external sides so as to be rotatable thereabout and to form a second casing. The first casing is utilized conveniently as the air blowing duct part, or nozzle and the second casing is utilized as the holding part, or handle. FIG. 4 shows these members and their assembly sequences. FIG. 4A shows an air blowing duct part member 2A, FIG. 4B shows a holding part member 1A, FIG. 4C shows another duct part member 2B and FIG. 4D shows another holding part member 1B. Referring first to FIG. 4A, a circular opening 7 is made on sideward part of the duct part member 2A and a plurality of notches 8 there are shown two of them in the drawing are made on the peripheral edge of this opening. In FIG. 4B, next, a circular flange 9 is made to project inside the upper part of the holding part part member 1B and a plurality (two in the drawing) of L-shaped bent projections 10 are provided on this flange 9. Referring to the cross-section of this bent projection 10 of FIG. 4H, a gap 12 is made between this projection 10 and inward extension 11 of the flange 9 so that, as described later, peripheral edge part 13 of the opening 7 of the duct part 2 will be slidably supported in this gap 12. The notches 8 are bent projections 10 are respectively provided substantially at corresponding positions to each other forming a bayonet type of joint.

Now, in assembling the duct part member 2A of FIG. 4A (see FIG. 5A) and the holding part member 1A of FIG. 4B (see FIG. 5B), the duct part member 2A is mounted on the holding part member 1A so that the respective notches 8 and bent projections 10 will coincide with each other and the bent projections 10 will go through the notches 8, and the holding part member 1A is rotated in the direction indicated by the arrow with respect to the duct part member 2A, as shown in FIG. 5C. Thus the both members 1A and 2A will be rotatably coupled with each other. This state is shown in FIG. 4E.

Further, in FIG. 4B, 14 is a mounting flange, 15 is a screw hole for coupling the holding part members 1A and 1B as assembled, 16 are motor mounting holes, 17 are air inlet apertures, 18 are ribs and 19 is a side wall of motor housing part.

The other duct part member 2B and holding part member 1B shown respectively in FIGS. 4C and 4D will be coupled in the same manner as the above described members 1A and 2B. The duct part member 2B in FIG. 4C is first fitted over the member 2A in the coupled state with the member 1A as in FIG. 4E so that the state shown in FIG. 4F will be established. Then the holding part member 1B in FIG. 4D is further fitted over the

member 2B so that the coupling state of FIG. 4G will be obtained. Then, by passing a bolt through the hole 15 and fastening it with a nut, all the body case members can be coupled without being separated.

Referring next to FIG. 6 showing the respective components in disassembled condition 3 is a mouthpiece, 20 is a mouthpiece fitting screw, 21 is a metal screen to be fitted in the mouthpiece, 22 is an electric heater device, 23 is a motor, 24 are motor mounting screws, 25 is a fan, 26 is a fan fixing nut, 27 is an electric switch device, 6 is a push button to operate the switch device, 28 is a cord, 5 is a plug cap, 29 is a terminal plate, 30 is a terminal plate fixing cap, and 31 and 32 are a screw and a nut, respectively, for fixing the cap 30 to the bottom of the holding part 1.

The foregoing description with reference to FIGS. 4 and 5 has been made simply to explain the manner of assembling the first and second casings comprising the four members, while the actual assembly steps of the hair dryer of the present invention are apparently different therefrom since certain such essential components as electric heater, motor and the like have to be included. Therefore, the actual assembly steps of the hair dryer according to the present invention shall be made next, with reference to FIG. 6.

Initially, the holding part member 1A and duct part member 2A are assembled as disclosed and shown in FIG. 4E, thereafter the heater 22 is fitted in the duct part member 2A adjacent its free end opening, lead wires 22′ of the heater 22 are led through adjacent rotary center of the duct part member 2A down into the holding part member 1A, and them the motor 23 is fixed to the holding part member 1A at the rotary coupling side by means of the screws 24 passed through the holes 16 respectively. The fan 25 is secured to the rotary drive shaft of the motor 23 by means of the nut 26. Electric wiring is then performed between the respective heater 22, motor 23, switch device 27 and terminal plate 29 by means of soldering.

After the switch device 27 with the operating button 6 and the terminal plate 29 are fitted to the respective positions in the holding part 1A, the other duct part member 2B and holding part member 1B are fitted respectively to the above described duct part member 2A and holding part member 1A in the sequences of FIGS. 4F and 4G so that the respective holding part members 1A and 1B and the respective duct part members 2A and 2B will be coupled together as overlapped and, thus, the holding part 1 and the air blowing duct part 2 will be formed respectively independently and in the rotatably coupled structure.

Finally, in order to tightly secure the four members 1A, 1B, 2A and 2B as assembled, a screw is screwed into the hole 15 in the holding part 1, the terminal fixing cap 30 is fixed to the bottom of the part 1 as fitted over the both members 1A and 1B by means of the screw 31 and nut 32, and the mouthpiece 3 is fixed to the open end of duct part 2 as fitted over the both members 2A and 2B by means of the screw 20 through the screen 21.

The structure of the switch device 27 with the push button 6 shall be explained as follows: This switch device is of the rocker type so that, when the lower part of the push button 6 is pushed as in FIG. 7A, cold air may be blown out, when the upper part of the push button 6 is pushed as in FIG. 7B, hot air may be blown out and, when the surface of the push button is set to be substantially flush with the side of the holding part 1 as in FIG. 7C, the switch will be in OFF state.

Now the operation of the hair dryer of the present invention shall be explained. The dryer is to be used in the state shown in FIG. 2.

Referring now to FIG. 8, when the air blowing duct part 2 is rotated anticlockwise in the drawing, a stop projection 34 provided inside the air blowing duct part 2 will butt against the bent projection 10 provided inside the holding part 1 so that any excess rotation of the duct part will be prevented. Further, as shown in FIG. 3, when the inward surface of the duct part 2 as rotated into its non-use position is brought into flat contact with the inward surface of the holding part, the surface of the push button 6 will be urged into parallel position with respect to the inward surface of the holding part so that the switch will be simultaneously set to be in its OFF state.

FIG. 9 is a vertically sectioned view showing the internal formation of the present invention.

While the present invention has been disclosed with reference to a preferred embodiment, it should be understood that the intention is not to limit the invention to the particular embodiment but rather to include all alternatives, modifications and equivalent arrangement covered by the scope of the appended claims.

It will be seen from the drawings and foregoing description that the hair dryer is made up of first and second assemblies, a handle assembly 1 and a nozzle assembly 2 which are generally symmetrical with respect to one another, having a cylindrical portion and a tangentially extending handle and nozzle, respectively. The cylindrical portion of the handle is open sided for nested reception, in coaxial pivoted relation, of the nozzle assembly which is then movable between an L-shaped operating condition and a collapsed condition in which the handle and nozzle lie compactly side by side.

As described, it is one of the feature of the construction that the assemblies are of generally uniform width so that the resulting structure is generally "flat" in both its operating and collapsed conditions as illustrated in FIGS. 2 and 3 and as distinguished from the prior art construction shown in FIG. 1. The generally flat sided construction serves to define an inner cylindrical compartment which is of flat configuration (limited axial dimension) as illustrated in FIG. 9. The motor and fan assembly, with the fan blades arranged peripherally of the rotor, is of conforming flat shape being entirely contained in the central compartment.

The interfitted cylindrical portions of the nozzle and handle assembly provide alined air ducts (see especially FIGS. 8 and 9) which, to the extent possible, are centrally located so that air is fed to the inner edges of the blades and discharged at the outer edges for passage through the nozzle.

While the nozzle assembly, consisting of mating halves 2A and 2B, has a portion which has been conveniently referred to as "cylindrical," such "cylindrical" portion may be more strictly referred to as "annular" in view of the openings well illustrated in FIG. 6. These circular openings define circular inner edges. To cooperate with these circular inner edges the corresponding cylindrical portion of the handle assembly overlies the openings and mates with the edges thereof to provide the relative pivoting movement, between operating and collapsed conditions, which has already been dis-

cussed. It is, finally, one of the features of the construction that a bayonet type connection is provided which consists of notches **8** in the nozzle assembly which register with projections **10** integrally provided on the handle assembly (again see FIG. **6**), with rocking movement of the parts out of register providing the desired locking engagement between them. To define the operating condition, stop surfaces on the two assemblies, indicated, for example, at **34** and **10** in FIG. **8**, bottom upon one another, thus limiting the scissoring movement.

It is one of the features of the construction, contributing both to appearance and function, that the handle assembly **1** and nozzle assembly **2** are similar in size and generally symmetrical to one another; that is, they are approximate mirror images. However, it will be noted that the portion of the handle assembly which has been referred to above for convenience as "cylindrical" and which is in coaxial overlapping engagement, is somewhat smaller in profile than the corresponding portion of the nozzle assembly **2**, and it will be apparent that this part of the device need not be precisely circular to accomplish its intended function.

We claim:

1. A hair dryer comprising, in combination, a hollow handle assembly made up of a cylindrical portion and a tangentially extending handle, a hollow nozzle assembly made up of a cylindrical portion and a tangentially extending nozzle, one of the cylindrical portions having a cylindrical sidewall and the other being open-sided for the nested fitting together of the two cylindrical portions in coaxial relationship, a motor and fan assembly mounted within the cylindrical sidewall for discharge of air through the nozzle, the two assemblies being generally symmetrical and coaxially pivoted together for relative scissoring movement between an operating condition in which the handle and nozzle are in "L" configuration and a collapsed condition in which the handle and nozzle lie compactly side by side.

2. The combination as claimed in claim **1** in which the motor and fan assembly is of flat configuration with the blades of the fan being radially disposed about the periphery of the motor and having such limited axial dimension as to permit accommodation within the nested cylindrical portions.

3. The combination as set forth in claim **2** in which the nested cylindrical portions are centrally provided with registering air inlet ports for admission of inlet air which is acted upon by the blades and discharged through the nozzle.

4. The combination as claimed in claim **1** in which the thickness in the axial direction of the cylindrical portions, nozzle and handle is approximately the same to produce a dryer which is generally flat sided defining a cylindrical compartment of flat configuration, the motor and fan assembly being of conforming shape and entirely contained in the compartment.

5. The combination as claimed in claim **1** in which a switch for the motor is provided in the surface of the handle which faces the nozzle, the switch having an operator which extends beyond such surface when the switch is in the "on" condition, with the result that when the handle and nozzle are collapsed the nozzle bears upon the operator to restore the switch safely to its "off" condition.

6. The combination as claimed in claim **5** in which the switch is of the rocker type rockable in opposite directions from a central flush off condition.

7. The combination as claimed in claim **1** in which each of the assemblies consists of mated, cup-shaped right and left-hand halves to form a hollow central space, each assembly having respective fasteners so that the halves of the outer one of the assemblies may be assembled over the inner assembly to nest the latter.

8. A hair dryer comprising, in combination, a hollow nozzle assembly made up of a cylindrical portion and a tangentially extending nozzle, the cylindrical portion having a cylindrical sidewall, a motor and fan assembly axially centered within the cylindrical sidewall for discharge of air through the nozzle, and a hollow handle assembly made up of a cylindrical portion and a tangentially extending handle, the two assemblies being generally symmetrical and with the cylindrical portion of the handle assembly being open sided so as to snugly and coaxially nest within it the cylindrical portion of the nozzle assembly, the two assemblies being coaxially pivoted together for relative scissoring movement between an operating condition in which the handle and nozzle are in "L" configuration and a collapsed condition in which the handle and nozzle lie compactly side by side.

9. The combination as claimed in claim **8** in which the cylindrical portion of the nozzle assembly is centrally open to define an annulus having a pair of circular inner edges and in which the cylindrical portion of the handle assembly overlies and mates with the inner edges for relative pivoting of the two assemblies.

10. The combination as claimed in claim **9** in which the inner edges of the nozzle assembly are notched and in which the cylindrical portion of the handle assembly has registering projections to provide a bayonet type connection to keep the cylindrical portions assembled together while permitting relative rocking movement.

11. The combination as claimed in claim **8** in which interengaging stop surfaces are provided on the two assemblies to limit scissoring movement into operating condition thereby to define the "L" configuration.

* * * * *