Sept. 13, 1949. F. O. CONILL 2,481,645

MEANS FOR DRYING HAIR

Filed July 19, 1947 4 Sheets-Sheet 1

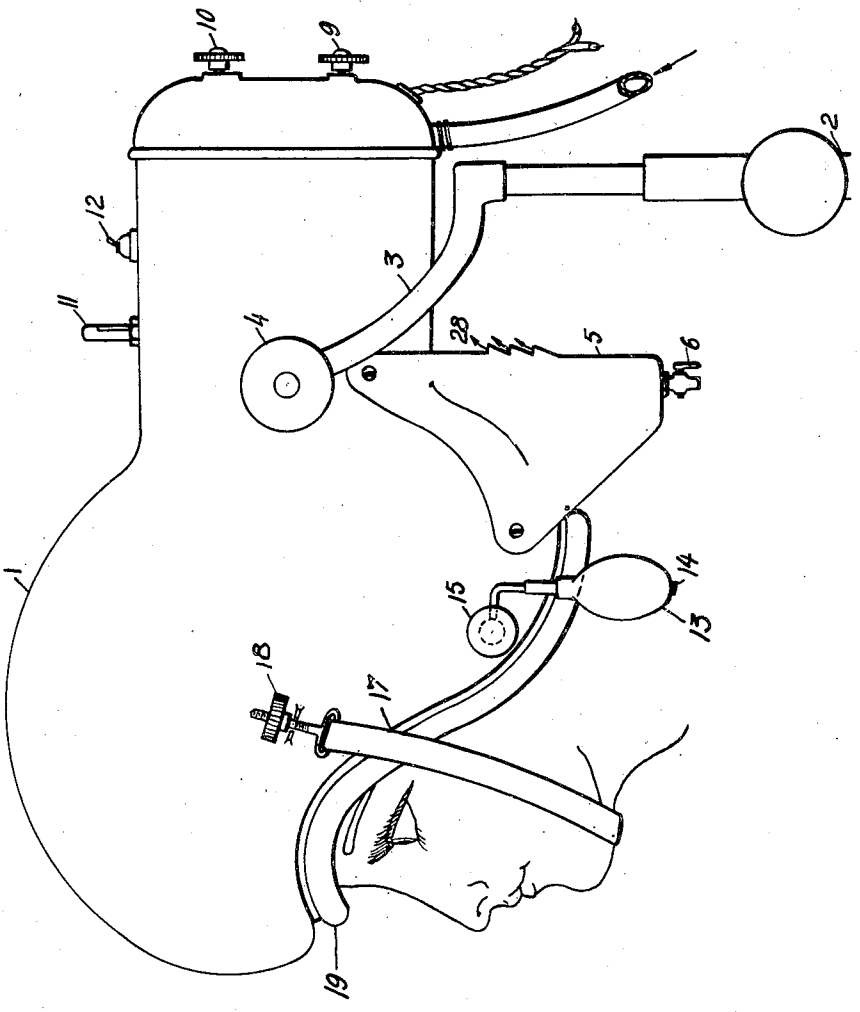


Fig. 1

Inventor:
Fernan Oscar Conill

Sept. 13, 1949. F. O. CONILL 2,481,645

MEANS FOR DRYING HAIR

Filed July 19, 1947 4 Sheets-Sheet 2

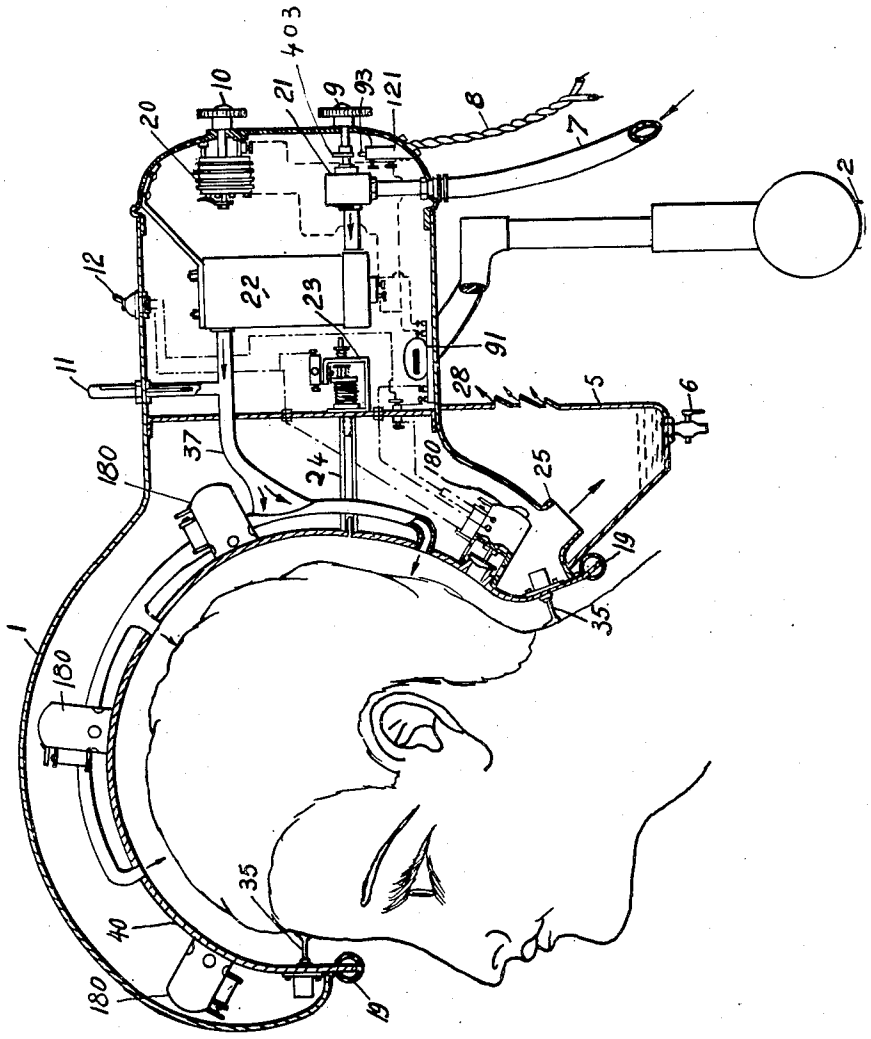


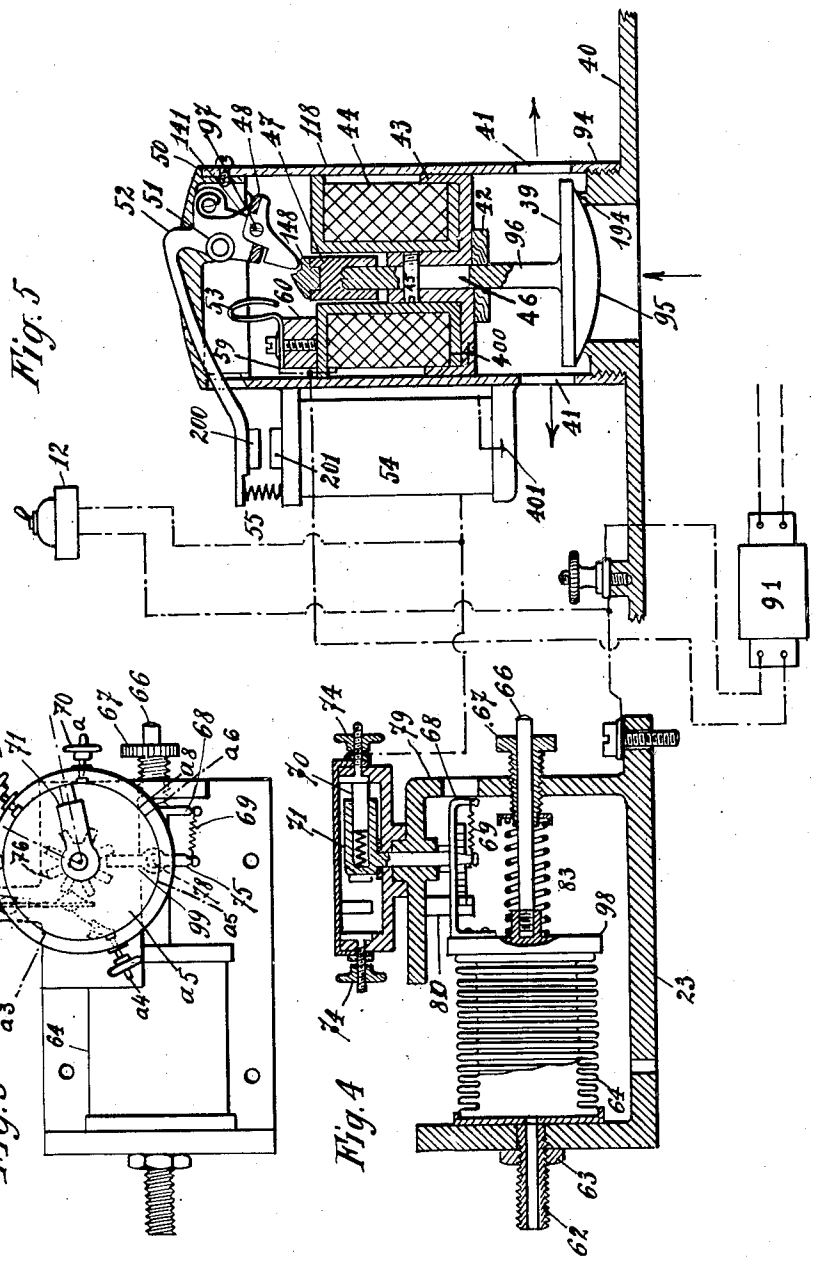
Fig. 2

Inventor:
Truman Oscar Conill

Sept. 13, 1949. F. O. CONILL 2,481,645

MEANS FOR DRYING HAIR

Filed July 19, 1947 4 Sheets-Sheet 3



Inventor:
Fernan Oscar Conill

Sept. 13, 1949. F. O. CONILL 2,481,645

MEANS FOR DRYING HAIR

Filed July 19, 1947 4 Sheets-Sheet 4

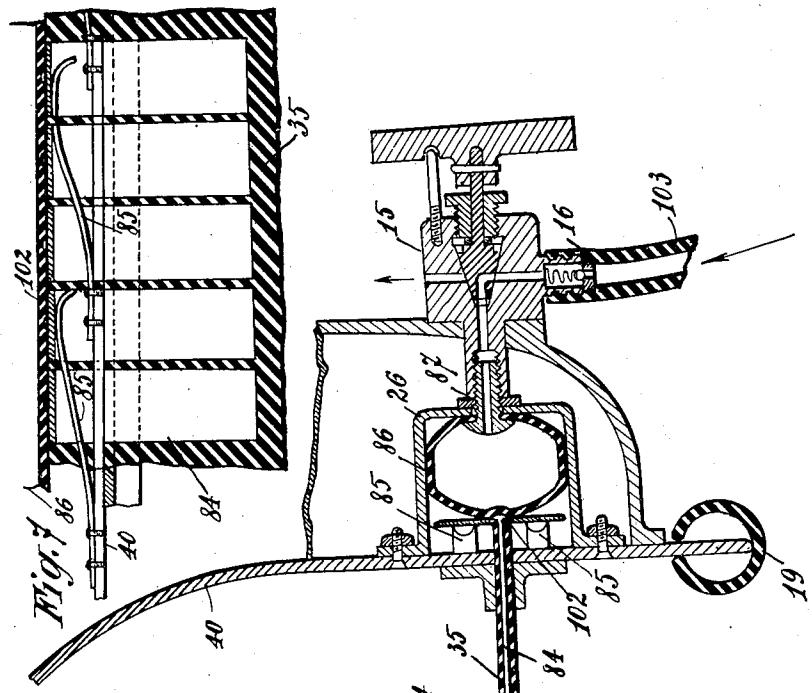


Fig. 1

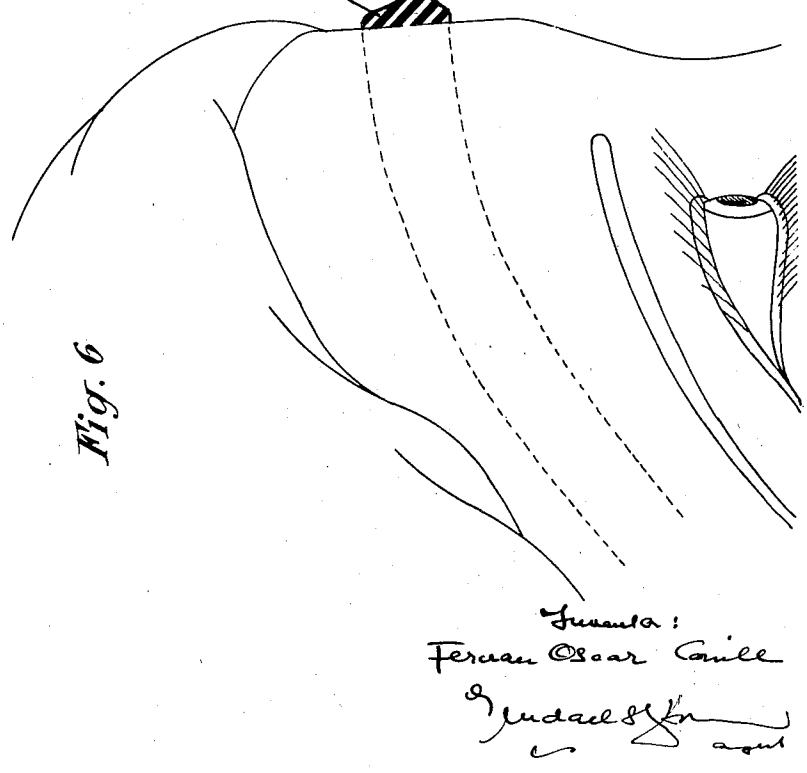


Fig. 6

Inventor:
Fergus Oscar Conill
by Judah & Son
Agents

Patented Sept. 13, 1949 2,481,645

UNITED STATES PATENT OFFICE

2,481,645

MEANS FOR DRYING HAIR

Fernan Oscar Conill, Cannes, France

Application July 19, 1947, Serial No. 762,059
In France June 8, 1940

7 Claims. (Cl. 34—51)

1

The hair-drying devices in current use are based on the principle of evaporating liquids by means of super-heated air directed onto the hair. Since such evaporation is a function both of the temperature and the amount of the air thus discharged, a limit is reached which it is impossible to exceed; consequently, in the best types of current hair-drying devices, the time required for drying is from 30 to 50 minutes according to the individuals and the amount of hair being treated.

My invention makes it possible to reduce to a substantial extent, the time needed for drying so as to bring it down to from 3 to 6 minutes only, through the use of a new method which consists of sweeping the wet hair with compressed dry air, and causing a sudden expansion of the latter; the air then has a high velocity imparted to it, and carries away with it, in being exhausted, any liquid contained in the hair.

My invention further has for its object to provide a hair-drying helmet or head-piece adapted to carry into practice the above indicated method. The dry and heated compressed air is introduced into the helmet which overlies in an air-tight manner the head of a person to whom the treatment is applied, then said air is allowed to suddenly expand, its pressure being reduced to atmospheric pressure, and the above operation is repeated a great many times per minute. The result is that any liquid contained in the hair is evacuated outwardly of the helmet, and the heated air completes the drying operation.

In order to provide a clear comprehension of the invention, there has been shown in the accompanying drawings by way of example one embodiment of a hair-drying helmet according to my invention. In the drawings:

Fig. 1 is a side-view of my helmet in operative condition.

Fig. 2 is a vertical cross-section of the helmet shown in Fig. 1.

Fig. 3 is an overhead view of the electro-pneumatic distributor controlling the exhaust valves.

Fig. 4 is a fragmentary section of the distributor shown in Fig. 3.

Fig. 5 is a fragmentary vertical section of an exhaust valve.

Fig. 6 is a fragmentary vertical section of a pneumatic device for providing an air-tight seal between the helmet and the head.

Fig. 7 is a diagrammatical vertical section of a detail of the device shown in Fig. 6.

2

In all of the figures similar elements have been designated by the same reference numerals.

My apparatus comprises two essential parts; an external helmet 1 and an internal helmet 40, the latter constituting the drying helmet proper, while the outer helmet 1 only serves as a support for the helmet 40 and the various mechanical members of the apparatus.

The helmet 1 is held in place on the head by means of an ordinary support 2 comprising an angularly adjustable fork member 3 and a securing bolt 4; a flexible band 17 adjustable by means of a knurled nut 18 for instance, maintains the helmet in place when air-pressure is applied internally of it. The helmet 1 also mounts a three-way valve 15 the purpose of which will be indicated later, said valve being connected for instance with a rubber air-injection bulb 13 provided with a valve 14. Moreover a container 5 comprising apertures 28 and a drain-cock 6 serves as a condensation chamber in which the greater amount of liquid evacuated with the air may be collected.

Within the helmet 1, and between that helmet and the helmet 40, there are mounted:

A compressed air supply valve 21;

An electric switch 121;

An air heating thermostat 20;

An electric air-heating device 22;

An electric control distributor 23 for controlling the exhaust valve 180 rigid with the helmet 40, said valves being provided in as large a number as practicable (four in the example shown) because the rate of flow of the air being greater near those valves as the air is discharged, the drying action is accelerated thereat;

A thermometer 11 for checking the heating temperature;

An electric switch 12 controlled from outside and through which it is possible to maintain a valve open during adjustment of the temperature in the circulating air;

A transformer 91 having a stepdown ratio 110/6 for controlling the valves under a voltage of 6 from the external 110 volt network.

The helmet 40, apart from the valves 18 further comprises a member 35 for providing a tight seal between the helmet and the head and controlled in a manner described hereunder, as well as a tube 19, made of rubber for instance adapted to protect the head from contact with the metallic portions of the helmet.

The compressed-air supply valve 21, controlled from a button 9 is connected on the one hand

with a compressed-air supply conduct 7, and on the other hand with the heater 22.

The electric switch 121, controlled from a button 93 is suitably connected with the 110 volt network through the lead 8.

The heating thermostat 20 is connected with the switch 121 through the medium of the heater 22 and is controlled from a button 10.

The heater 22 connects on the one hand with the valve 21 and on the other hand with the interior of the helmet 40 through the pipe 37.

The distributor 23 (Figs. 3 and 4) comprises: a bellows 64 axially guided by a rod 66 slidable in a threaded adjusting-rod 67 and provided with a spring 83, said bellows communicating with the interior of the helmet 40 through a pipe 24 connected with the externally screw-threaded union 62 and retained with a nut 63.

An arm 68 rigid with the part 98 of the member 64 carries at its center a rod 75 pivoted at 78 adapted to be maintained by a spring 69 in engagement against an abutment stop 99. The distributor shaft 71 has secured thereon a sprocket wheel 76 having a number of sprocket teeth equal to that of the valves 18, rigid with the helmet 40. A spring 77 secured at 80 and exerting pressure between a pair of teeth of the sprocket 76 maintains the distributor 71 at all times in contact with any one of the terminals *a*, *a1*, *a2*, etc., to which are connected by means of pressure nuts 74 the energizing leads for the electro-magnets 54 (see Fig. 5) of each of the valves 18, said contact being ensured through a spring-urged member 70 such as a carbon friction element.

It will be seen that whenever sufficient air-pressure prevails within the bellows 64, the arm 68 rigid therewith will be displaced; the rod 75 will thereby cause rotation of the sprocket 76, thus successively making contact with the various distributor terminals. Now, as said distributor controls the electro-magnets 54 of each of the exhaust valves 18, and since each time contact is made with a terminal the valve of which the related electro-magnet 54 has been energised is caused to open, the pressure prevailing within the helmet drops down to atmospheric pressure, the bellows 64 is restored to its initial position through the action of a spring 83, the pressure level within the helmet at which the exhaust valve is caused to be open being a function of the degree of compression exerted by said spring, and which may be adjusted by means of the adjusting-rod 67.

Each one of the electrically-actuated exhaust valves 18 (see Fig. 5), comprises a valve-casing 118 threadedly secured at 94 onto the helmet 40, having exhaust ports 41 formed therein, and containing a valve member and a solenoid. Outwardly of the casing there is secured an electro-magnet 54.

The valve member includes a domed head 95 of suitable shape made of rubber for instance, providing an excellent seal because of its resilient engagement upon its valve seat 194. It comprises a shank 96 of non-magnetic metal such as bronze, movable axially of the solenoid and having a slot 46 formed therein through which extends a pin 45 rigid with a guide 43. Said shank carries near its base a rubber flange serving as a stop for the valve when open, and at its top a soft iron cylinder 47 surmounted in turn with a body of hard steel 148. The valve is thus mounted for axial movement without being capable of rotating about its axis.

In the upper part of the valve box 118 there

are arranged: a spring plate 53 insulated from the mass and a pawl 48 resting upon the body 148. Said pawl is pivoted at 97 on a control lever 52 which in turn is pivoted at 51 on the top cover 50 of the box 118. The lever 52 carries a part 200 which may be attracted by a related part 201 of the electro-magnet 54. The lever 52 and the pawl 48 are held in valve-closing position by springs 55 and 141. One terminal of the solenoid is earthed to the mass at 400 and its other terminal is connected at 59 with the insulated spring plate 53. One terminal of the electro-magnet is earthed at 401 and its opposite terminal is connected with the distributor 23 at 74.

The member 35 effecting the sealed engagement of the helmet with the head is formed by a band 84 reinforced with steel strips (as shown in Figs. 6 and 7) embedded in rubber provided with a flange 104 having a contour which is variable according to the zone of the head with which it is engaged. Thus it may be wide along the forehead and narrower about the ears. Said band carries at its opposite end a steel flange 102 disposed within a box 26 and urged inwardly of said box by springs 85. Between the band 84 and the end wall of the box 26 there is interposed a rubber air-tube 86 communicating with the three-way valve 15, provided with a valve 16 around which is adapted a rubber-tube 103 provided with an air-bulb 13. It will be seen that by inflating the air-tube 86 by suitably setting the three-way valve and using the rubber air-bulb 13, the band 84 may be applied against the head as required. When on the other hand it is desired to remove the helmet it is simply necessary to set the three-way valve 15 in a suitable position so that the air being evacuated from the air-tube 86, the springs 85 will urge the flange 102 inwardly of the box 26 carrying the head-band 84 with them and releasing it from around the head.

The electric circuit connections between the various elements of the device are briefly as follows, the 110 volt line being indicated in the figures in dashes and the 6 volt line in dots and dashes.

The switch 121 connects with the 110 volt line supplying on the one hand the heating device 22 through the medium of the thermostat 20, and on the other hand the transformer 91. With the transformer 91, on the 6 volt side thereof, there is connected a line supplying the distributor 23 through the medium of the switch 12, a line connecting the distributor with the exhaust valve, only one of those lines relating to the valve 18 shown in section in Fig. 2 being illustrated in this figure, and this line being also illustrated in Figs. 4 and 5.

The apparatus then operates as follows: first of all to position the helmet on the head it is simply necessary after having put it on, to adjust it by means of the flexible band 17 and a nut 18, then apply the member 35 against the head to ensure air-tight engagement of the helmet, by inflating the air-tube 86 of the device for controlling the member 35, by means of the bulb 13, and close the three-way valve 15, after the member 35 has been satisfactorily applied as required.

In removing the helmet, those operations are reversed, that is the air-tube 86 is deflated by a suitable setting of the three-way valve 15; it then only remains to release the band 17 and remove the helmet.

When the helmet is in place upon the head, the valve 18 being closed, dry air compressed by any suitable means is discharged by opening the valve

21 into the heating device 22 which is then energized, because in opening that valve, a cam 403 secured on the shaft of the valve cams the rod 93 (Fig. 2) thereby closing the general 110 volt switch 121. The temperature of said air may then be supervised by means of the thermometer 11. To enable air to circulate while its temperature is being adjusted, a valve opened by closing the switch 12; during that time the helmet is inoperative. After the temperature is adjusted, the switch 12 is opened to close the valve and at that time the device starts operating, because the pressure of the air is built up between the helmet and the head, and may operate the distributor 23, which successively opens, at a pre-determined rate, the various valves 18, enabling the output of the transformer 91 in the 6-volt circuit to energize the respective electro-magnets 54 of each of said valves, said electro-magnets then attracting their levers 52 which unlatch the valve shanks through the pawl 48. The pressure of the air in contact with the hair and which has been humidified, suddenly drops to atmospheric pressure, and said air, exhausting through the aperture 25 (Fig. 2) and the apertures 28 of the container 5, is stripped of its moisture in flowing through said container, which may be drained from time to time by means of a drain-cock 6.

Each valve is automatically closed when in its opening movement the cylinder 57 engages the spring plate 53. At that moment current flowing through the mass 400 and the wire 59 of the 6 volt output circuit of the transformer 91 and the winding of the solenoid 44 energizes the latter which then energetically attracts, by induction effect, the cylinder 47 inwardly of the solenoid 44. The valve thereby applied against its seat and latched thereon by the pawl 48 which because of the rocking of the lever 52 has been applied against the body 148 provided at the top of the cylinder 47 which in turn assumes a position overlying the upper end of the valve shank 46. It will thus be seen that the valves are adapted to open and close automatically.

To stop the device, it is simply necessary to cut off the air supply by closing the valve 21. The switch 121 is then also opened.

It should be observed that owing to the sweeping action exerted upon the air in the manner described, the total number of operations may all be effected within a period of time of 3 to 6 minutes, to obtain an entirely satisfactory drying of the hair.

It will of course be understood that the embodiment of the hair-drying device of my invention as described and illustrated has been given merely by way of example and that alterations could be made therein without exceeding the scope of the invention.

What I claim is:

1. In an improved hair drying device in combination a shell adapted to encase the upper part of a human head, means to effect an air-tight seal between said shell and said human head, air inlets spaced throughout said shell, a supply of dry compressed air, electric air heating means, electric supply means and temperature control means for said heater, air connections to direct said air from said supply through said heater through said inlets into said enclosure, a plurality of exhaust outlets through said shell provided with valves, and adjustable spring-biased means responsive to the pressure within said enclosure operative to open said valves successively as said

pressure in said enclosure reaches a predetermined value.

2. An improved hair-drying apparatus comprising in combination an inner shell adapted to encase a human head in spaced relationship with the hair and means to effect an air-tight seal between said inner shell and said head to form an air-tight enclosure entirely surrounding said hair, an apertured outer shell surrounding said inner shell and spaced therefrom having a portion extending away from said inner shell to define a casing therewith, supporting means for said casing, a plurality of inlets into and a plurality of outlets from said enclosure through said inner shell, an exhaust valve associated with each said outlet, adapted to exhaust into the space between said inner and said outer shell, an electric air heater in said casing, and air connections to and from said heater respectively communicating with a compressed air supply connection projecting from said casing and with said inlets, electric supply means and temperature control means associated with said heater, adjustably spring-biased pressure-responsive means responsive to the pressure prevailing in said enclosure, and successively operative actuating means for each of said exhaust valves under the control of said pressure-responsive means operative to open each of said valves in succession when said pressure in said enclosure is in excess of a predetermined value.

3. An improved hair-drying apparatus comprising in combination an inner shell adapted to encase a human head in spaced relationship with said hair, an apertured outer shell surrounding said inner shell and spaced therefrom to define a second enclosure therewith communicating with atmosphere having a portion extending away from said inner shell to define a casing therewith, supporting means for said casing, means providing an air-tight seal between said inner shell and said head including a relatively rigid band extending from said second into said first enclosure lying in a plane generally normal with the surface of the head, a flexible flange terminating said band inwardly adapted to be tightly applied against said head, and a rigid flange along the edge of said band which is in said second enclosure, an annular inflatable air-tube in said second enclosure surrounding said second flange having the radially outer side thereof secured to said enclosure and the radially inner side thereof adapted when inflated to force said seal means into sealing engagement with the head, inflating means to inflate said air-tube, inlets and outlets for said first enclosure through said inner shell and an exhaust valve associated with each said outlet, an electric air-heater in said casing and air connections to supply compressed air to said heater and deliver heated compressed air from said heater into said first enclosure through said inlets, electric supply means and temperature control means associated with said heater in said casing, adjustably spring-biased pressure responsive-means responsive to the pressure in said first enclosure extending into said casing, and actuating means for each of said exhaust valves controlled from said pressure responsive means operative to open each of said valves in succession when said pressure in said first enclosure is in excess of a predetermined amount.

4. In a hair-drying apparatus of the type described in combination an inner shell adapted to encase a human head in spaced relationship with the hair and means to effect a tight seal

between said inner shell and said head to define an air-tight first enclosure therebetween, an apertured outer shell surrounding said inner shell spaced therefrom to provide a vented second enclosure therewith, a portion of said outer shell defining a projecting casing with said inner shell, inlets and outlets for said first enclosure and an electro-magnetically actuated exhaust valve associated with each said outlet, an electric air heater in said casing and air-connections to supply compressed air to said heater and deliver said heated compressed air from said heater to said first enclosure through said inlets, electric supply means and temperature control means associated with said heater in said casing, adjustably spring-biased pressure-responsive means responsive to the pressure in said first enclosure projecting into said casing including an actuating arm movable when the pressure in said first enclosure has exceeded a predetermined value as determined by adjustment of said spring biasing means, electric circuit connections for energizing said electro-magnetically actuated valves and a rotary switch interposed in said circuit connections having a number of contact-making positions equal to that of said valves, the connections being such that only one of said electro-magnetic valve-actuating means is placed in circuit for each of said positions, said actuating arm being adapted each time it is moved by said pressure in said first enclosure to shift said rotary switch to a successive contact-making position thereof, and means for successively positively restoring said valves to closed position.

5. In an improved hair-drying apparatus in combination an inner shell adapted to encase a human head in spaced relationship with the hair and means to effect an air-tight seal between said inner shell and said head to form air-tight first enclosure entirely surrounding said hair, an apertured outer shell surrounding said inner shell and spaced therefrom having a portion extending away from said inner shell to define a casing therewith, inlets and outlets for said first enclosure through said inner shell, an exhaust valve associated with each outlet adapted to exhaust into said second enclosure, an electric air-heater in said casing and air connections to supply compressed air to said heater and deliver the heated compressed air from said heater through said inlets to said first enclosure, electric supply means and temperature control means, associated with said heater in said casing, adjustably spring-biased pressure-responsive means, responsive to the pressure prevailing in said first enclosure and projecting into said casing, actuating means for each of said exhaust valves controlled from said pressure-responsive means, operating said valves in succession when said pressure in said first enclosure is in excess of a predetermined amount, and means for successively restoring said exhaust valves to closed position, a sump arranged under said second enclosure adapted to collect liquid entrained by said air discharged from said first and second enclosure, an outlet from said second enclosure to said sump, and an outlet from said sump to the atmosphere, and a drain-cock for said sump.

6. In an improved hair-drying apparatus of the type described in combination means forming a first airtight enclosure around said hair, means

to deliver a blast of heated compressed air into said enclosure, a plurality of spaced outlets for said enclosure, an electro-magnetically actuated exhaust valve in each outlet and means for actuating each of said valves in succession as soon as the air-pressure in said enclosure has exceeded a predetermined amount, each of said valves including in combination a casing secured around said outlet projecting outwardly of said enclosure, a solenoid winding secured in said casing coaxially therewith, a valve including a resilient dome shaped head portion seated on said aperture and a shank portion of non-magnetic metal directed away from said enclosure extending axially of said solenoid, means to prevent rotation of said valve member, a resilient abutment flange surrounding said valve shank near the base of said valve member, a soft iron cylinder element mounted at the upper free end of said shank in inductive relationship with said solenoid, and a hard steel element surmounting said cylinder, a lever pivoted in the top of said casing and projecting outwardly thereof, a latching pawl pivoted to said lever in said casing adapted to engage said hard steel element to latch said valve in closed condition, spring means urging said lever and said pawl to valve closing condition, an electro-magnet secured to said valve casing externally thereof and an armature element at the outer end of said lever cooperating with said magnet to be attracted thereby to unlatch said valve member, circuit connections made successively effective by said valve actuating means to energize both said electro-magnet to unlatch said valve and said solenoid in such a way that said cylinder is raised to open said valve, and a spring plate in each valve box adapted to be engaged by said elements at the top of said valve shank at the end of the upward stroke thereof operative to short-circuit both said solenoid and said electro-magnet.

7. In an improved hair-drying apparatus of the type described in combination means forming first air-tight enclosure around said hair, means to deliver a blast of heated compressed air into said enclosure, a plurality of spaced outlets for said enclosure, electro-magnetically actuated exhaust valves in said outlets and means for actuating each of said valves in succession as soon as the air pressure in said enclosure has exceeded a predetermined amount, and means for positively closing each of said valves, means for electrically heating said air to be delivered into said enclosure and means including a step-down transformer for electrically supplying said electro-magnetically actuated valves and said air-heating means.

FERNAN OSCAR CONILL.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
909,261	Volney	Jan. 12, 1909
1,720,301	Suter	July 9, 1929
1,747,342	Adams	Feb. 18, 1930
1,784,139	Gunter et al.	Dec. 9, 1930
2,037,695	Brownlee et al.	Apr. 21, 1936