

April 21, 1936.

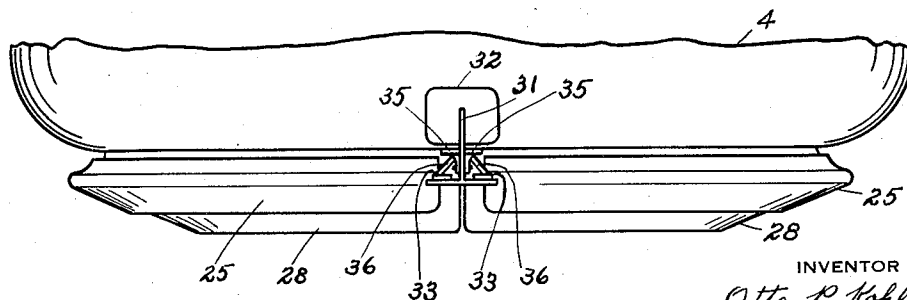
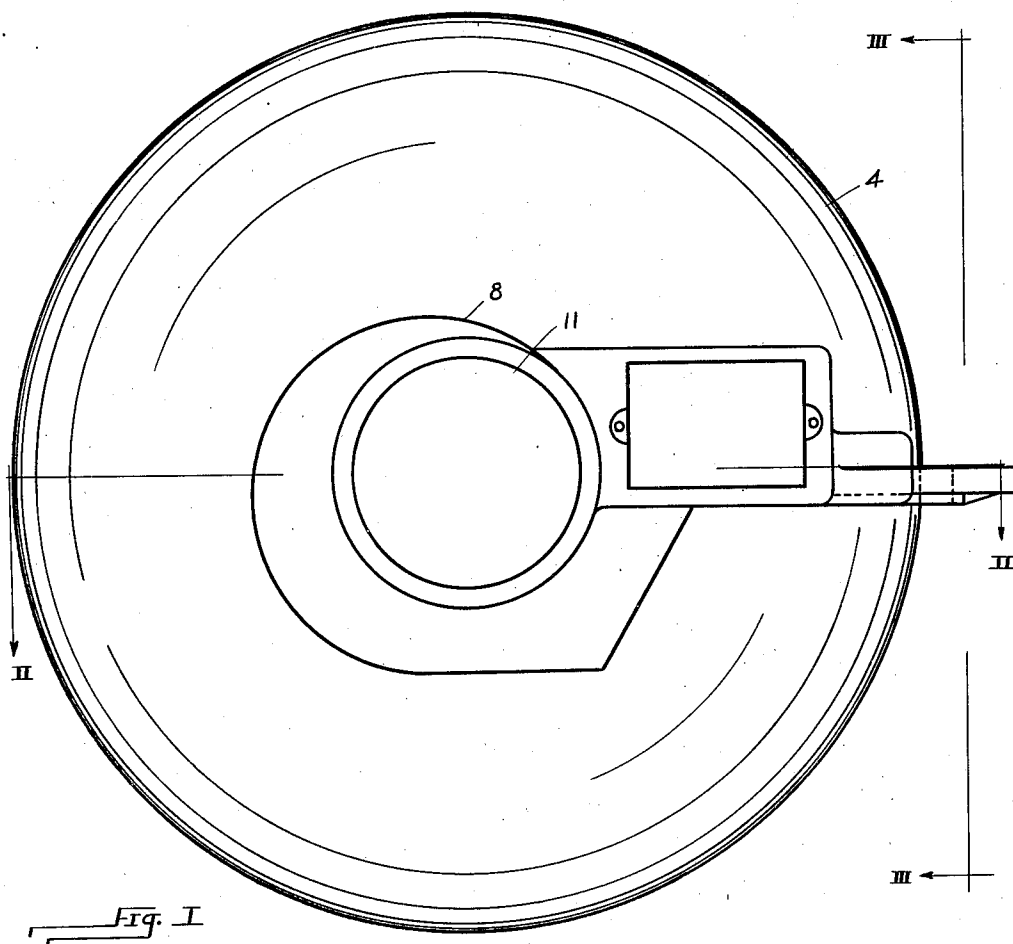
R. H. BROWNLEE ET AL

2,037,695

HAIR DRIER

Filed Feb. 18, 1933

4 Sheets-Sheet 1



INVENTOR
Otto P. Kohler and
Roy H. Brownlee
by Christy Christy and White
their attorneys

April 21, 1936.

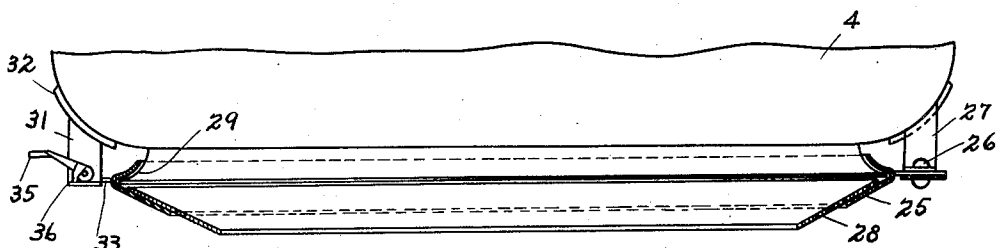
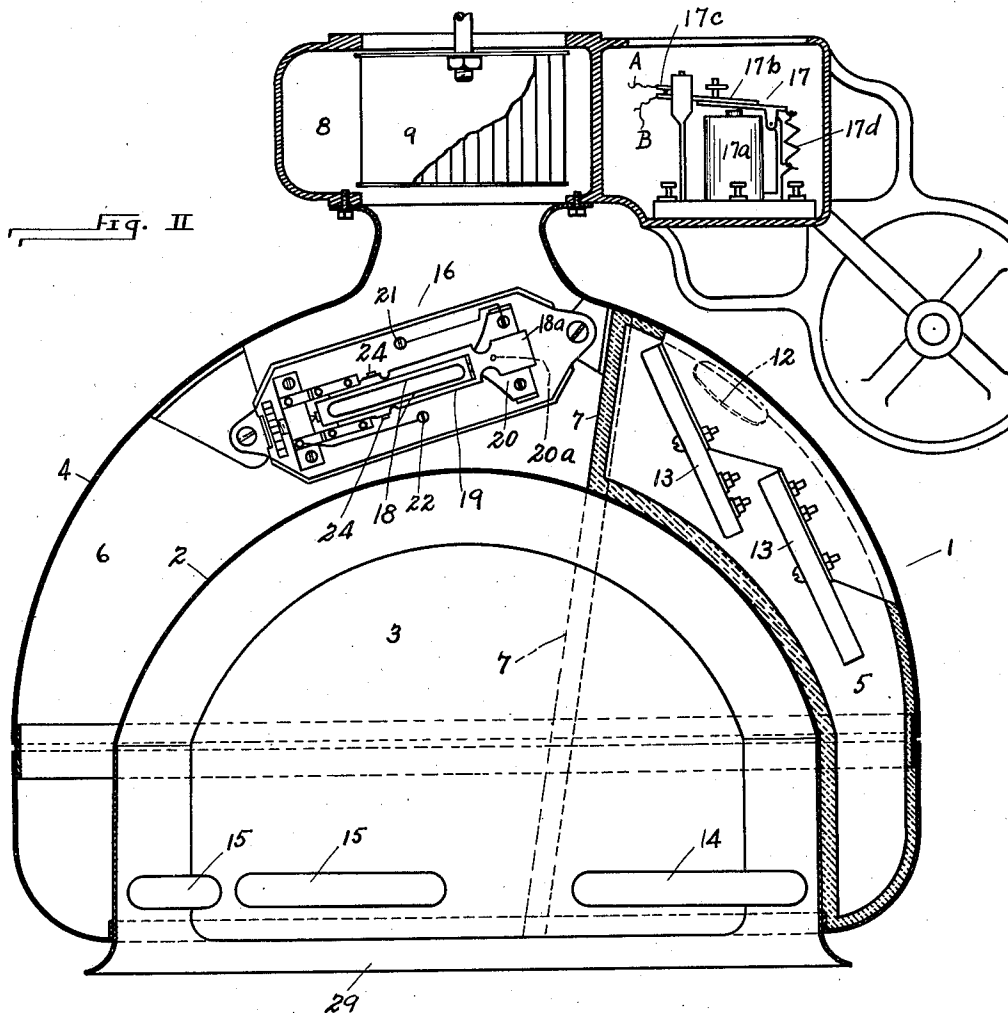
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HAIR DRIER

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4 Sheets-Sheet 2



INVENTOR
Otto P. Kohler and
Roy H. Brownlee
by Christy Christy and W. Kerton
their attorneys

April 21, 1936.

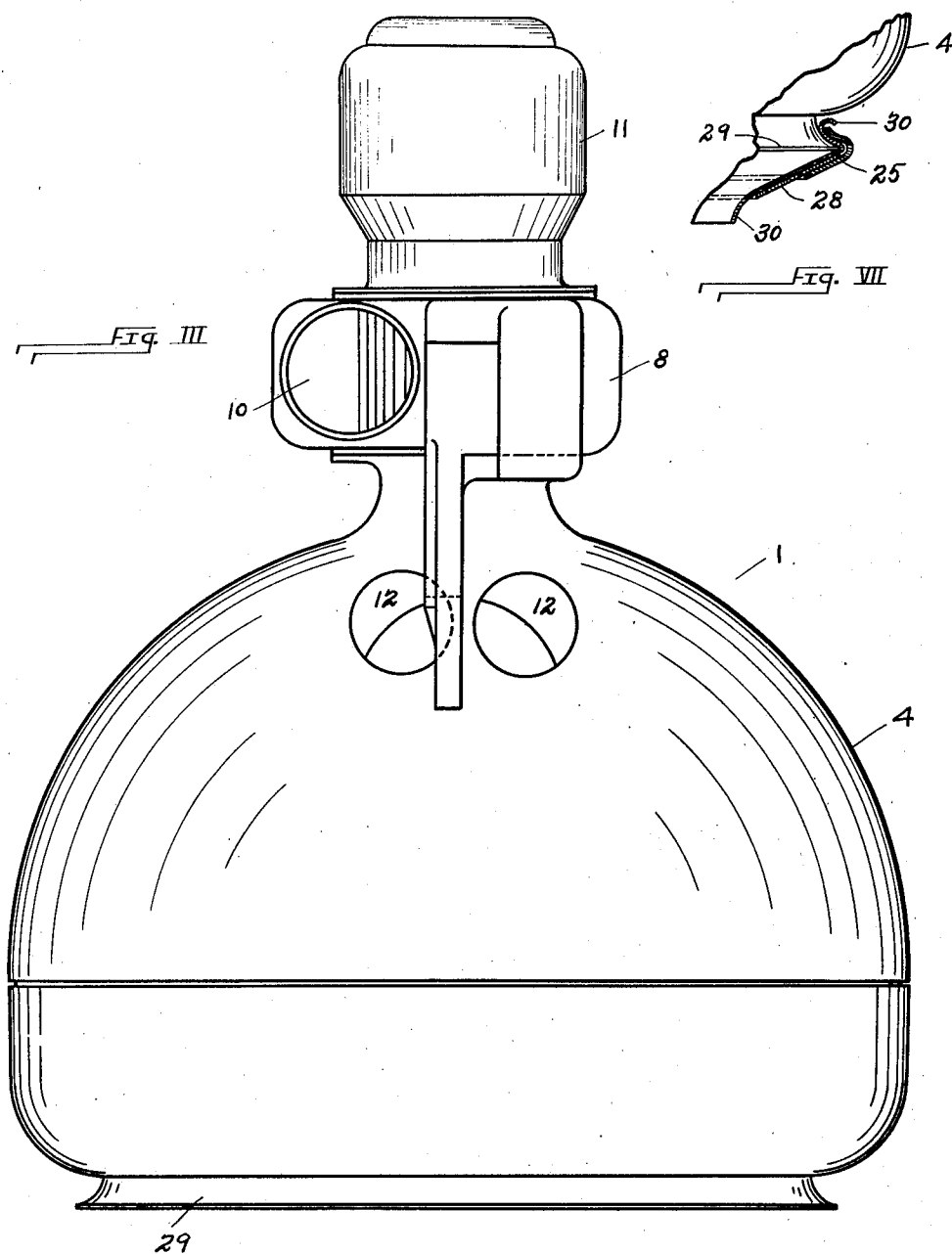
R. H. BROWNLEE ET AL

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HAIR DRIER

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4 Sheets-Sheet 3



INVENTOR

Otto P. Kohler and
Roy H. Brownlee
by Christy Christy and Wharton
their attorneys

April 21, 1936.

R. H. BROWNLEE ET AL

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HAIR DRIER

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4 Sheets-Sheet 4

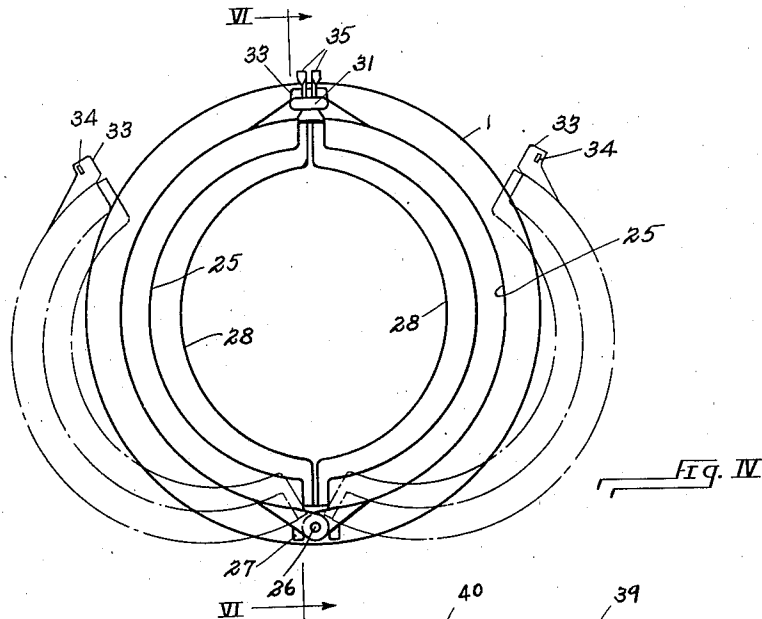


Fig. IX

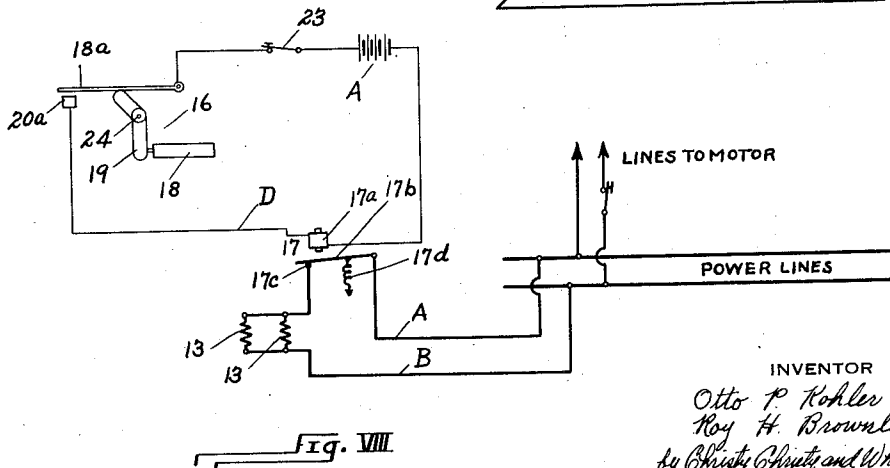
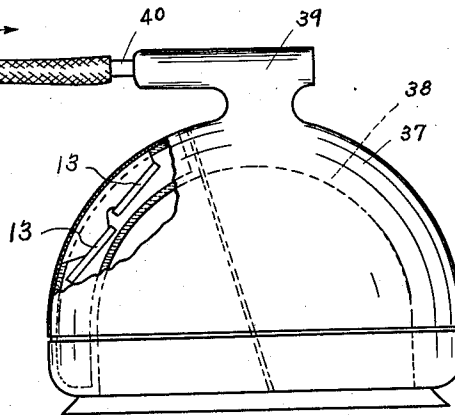


Fig. VIII

INVENTOR
Otto P. Kohler and
Roy H. Brownlee
by Christy Christy and Wharton
their attorneys

UNITED STATES PATENT OFFICE

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HAIR DRIER

Roy H. Brownlee and Otto P. Kohler,
Pittsburgh, Pa.

Application February 18, 1933, Serial No. 657,338

6 Claims. (Cl. 34—26)

This invention relates to apparatus for drying hair.

One object of the invention is to provide hair-drying apparatus, in which heated air is passed over the head of a subject, which apparatus comprises electric heating elements for heating the air and a hydrostatic control for such heating elements to cut off the current supply thereto when the drying operation has progressed to a certain predetermined degree.

Another object of the invention is to provide hair-drying apparatus in which a helmet, arranged to embrace the upper portion of the head of a subject, is so air-sealed to the head of the subject that a partial vacuum, effective to produce air circulation through the apparatus, may be supported within the space formed by the wall of the helmet and the head of the subject.

Other objects of the invention are to provide simple and efficient means for effecting the more general objects stated above, and to provide a helmet assembly which as a whole is slightly and is artistically proportioned.

A further object of the invention is to provide sanitary and highly flexible means for actually contacting the head to provide a vacuum-supporting seal, thus contributing to the comfort of the person on whose head the drying operation is performed.

In the accompanying drawings Figure I is a plan view of the hair-drying helmet, and the operating means immediately associated therewith; Figure II is a central vertical section through the helmet and associated operating means, taken on the line II—II of Figure I, but omitting the operating motor of the apparatus; Figure III is an elevation, looking in the direction of the arrows III—III of Figure I; Figure IV is a bottom plan view of the helmet, showing the means for producing a seal between the helmet and the head of a subject, and showing in dotted lines the position of the clamping segments in extended position for the introduction of a head into the helmet; Figure V is a front elevation of the sealing assembly; Figure VI is a cross-sectional view through the sealing assembly taken on the line VI—VI of Figure IV; Figure VII is a detail sectional view illustrating the arrangement of the head clamping elements with a replaceable sanitary element in position thereon; Figure VIII is a wiring diagram of the electrical connections for the automatic control means associated with the heating element or elements of the apparatus, and Figure IX is a view partly

in central vertical section and partly in elevation, illustrating a modified form of apparatus in which the helmet is adapted for attachment to the suction end of any vacuum-creating apparatus such as a vacuum cleaner.

In the accompanying drawings, the helmet of the hair drying apparatus is designated generally by reference numeral 1. Interiorly, helmet 1, as shown particularly in Figure II of the drawings, is divided by a wall 2 into a head-receiving chamber or space 3 and an outer space defined by the inner wall 2 and outer wall 4, and containing heating chamber 5 and exhaust chamber 6 separated by a baffle wall 7.

In communication with exhaust chamber 6 is a fan chamber 8, which contains an operating fan 9, preferably of the sirocco type, and which has therein an exhaust port 10. Fan 9 is shown as driven by a motor 11 mounted above fan chamber 8. Assuming that fan 9 is operated to create a partial vacuum in exhaust chamber 6, and in the spaces and chambers in communication with it, and assuming that the helmet is so seated on and sealed to the head of a subject as to support a partial vacuum within the helmet, circulation of air through the apparatus takes place in the following described manner. Under the influence of the partial vacuum within the helmet, air enters heating chamber 5 by way of intake ports 12. In heating chamber 5 the air is heated by passing over one or more electric heating units 13, and passes from heating chamber 5 into the space 3 surrounding the head of the subject by way of ports 14. It may be noted that, as the helmet is mounted upon the head of a subject, ports 14 for admitting heated air to the head surrounding space 3 are positioned at the nape, so that the incoming heated air comes first into contact with the lower rearward portion of the head. After passing over and around the head of the subject, the air issues from the space 3 into exhaust chamber 6 by way of ports 15, which, as the helmet is properly mounted on the head of a subject, lie adjacent the brow. The air after entering exhaust chamber 6, passes the length thereof, and by way of fan chamber 8 to exhaust port 10.

It may be noted that the arrangement is such that the air in its most highly heated condition comes in contact initially with the portion of a head of hair which is most difficult to dry, and issues from the head-containing space at that region of the head where the hair is least difficult to dry.

The automatic means for controlling current to

heating elements 13 comprise a hygrometric device 16 and a relay 17. The hygrometric device 16 is so arranged that when its variable element expands under the influence of moisture, it maintains in deenergized condition the solenoid of a relay, which serves to make and break electrical connection to the heating elements. Contraction of the variable element of the hygrometric device completes the relay circuit, and causes the circuit-supplying current to the heating elements to be broken.

As shown, the hygrometric device, which is in itself of well known form, comprises a metal casing 19, which contains the expansible and contractible member 18 of wood, or other suitable material, and which comprises a metallic plate member 18a arranged to make and break contact with an underlying contact plate 20, having connection at binding post 21 to a source of current. Current may pass by way of plate 20 to plate 18a, the sheath 19 for the expansible and contractible element, and by binding post 22 to complete a circuit through the hygrometric device. In the wiring diagram shown in Figure VIII of the drawings connection to the relay is made at binding post 22.

The wiring diagram shown in Figure VIII represents a simple arrangement in which a dry battery is used in connection with hygrometric device 16 and relay 17 to control the passage of line current to the heating elements. Referring to the diagram, the dry battery is represented by reference letter A and the line wires by reference letters B and C. The relay circuit D has therein a manually operable switch 23, and also has therein the hygrometric device 16, represented diagrammatically in this figure of the drawings. Assuming the manually operable switch 23 to be closed, relay circuit D is shown as broken at hygrometric device 16, due to the expansion of expansible and contractible element 18, which expansion serves to rotate the metal frame or sheath 19 on pivot points 24, and thereby raises contact 18a out of electrical contact with a boss 20a on contact plate 20. When, however, member 18a contracts, due to a lessened degree of moisture, contact member 18a comes into contact with the boss on contact plate 20, and completes the circuit D through the solenoid 17a of the relay. Relay solenoid 17a being energized its armature 17b is drawn from contact 17c, to which it is normally held by spring 17d. The line circuit connection through heating elements 13 is thus broken.

It should be understood that line circuit may be utilized to operate relay 17, by wiring arrangement within the skill of any competent electrician. The wiring circuit comprising a dry battery is, however, herein shown as being simpler in illustration than a wiring which utilizes current from the line for actuation of the relay.

It should be understood that it is highly desirable if fan 9 is to be operated as a blower, and necessary if fan 8 is operated as a suction-creating element, that the helmet be sealed to the head of the subject. In the latter instance it is necessary that the inner space bounded by the helmet wall and the head of the subject be so closed in that it is capable of supporting an adequate vacuum effect, or drop in pressure through the helmet, created by the fan 9. Special means are therefore provided for sealing the helmet in position on the head of a subject. The means for sealing the helmet in position comprise segments 25, which have a common pivot 26 mounted in

the bracket 27 at the rear of the helmet. Each segment 25 carries a compressible liner member 28, which is desirably of soft rubber or rubber composition, and is permanently attached to its associated segment. When, therefore, the segments 25 are in closed position, the compressible members 28 lie closely adjacent, and possibly in regions against, the head of the subject. As shown the lower, or head-receiving opening of the helmet is provided with an annular flange having an outstanding lip 29, and each of the clamping segments 25 is formed to embrace this lip, and to closely engage it in closed position of the segments.

To condition the helmet for use, segments 25 are swung into their outwardly adjusted, or open, position. A liner of soft paper, or other suitable soft flexible material, is placed against the inner face of the segments and the compressible members carried by them to extend above and below the segments and compressible members, to form a curtain free at its lower edge. This paper liner 30 has no permanent attachment to the structure, since a new paper liner is applied to the segments for sanitary reasons prior to each hair-drying operation. Segments 25 are then brought into their inwardly adjusted, or closed, position, carrying with them the permanently attached compressible members 28, and the sanitary liners 30. In this position the segments are fastened together by suitable locking means. As will be readily seen in Figure VII of the drawings, the liner 30 is clamped to lip 29 by the segments 25, when the segments are in closed position.

The locking means for the segments comprise a T-shaped supporting plate, or strap 31 attached by plate 32 to the outer surface of the helmet wall. Each of the segments 25 has at its forward end an extending foot 33 having therein a locking notch 34, these feet being positioned to overlie the platform provided by the base of T-strap 31. Pivotaly mounted in the upwardly-extending leg of T-strap 31 are a pair of thumb levers 35, each of which carries a leg 36 arranged to operate with the cross piece, or platform, of the T-strap. With both segments 25 in their inwardly adjusted head-engaging position, they may be locked in position by means of thumb levers 35, the legs 36 of which press feet 33 on the segments closely against the platform of T-strap 31.

Under the influence of vacuum within the helmet, the soft, flexible liner 30 is pulled up tight against the head to form a seal adequate for maintaining, by vacuum, air flow through the helmet. Since, however, the liner 30, rather than the compressible members 28, is depended upon to produce the vacuum supporting seal, there is present, during use of the apparatus, a thin film of cooling air, entering the helmet past the liner. While useful in avoiding discomfort during the drying operation, such minimized air flow is not sufficient either to prevent air flow through the heating chamber and head space, or to detract substantially from the drying effect of such heated air. In fact the normal head position in the helmet is such that the head will lie back against compressible elements 28 adjacent the nape, so that the thin slip stream of air merely serves to modify the temperature at the ears and brow of the subject.

It should be noted particularly that the arrangement of segments, compressible members, and flexible liner, forms a vacuum-supporting seal which is highly flexible. While serving the purpose of forming an adequate seal, the assembly

thus permits sufficient movement of the head within the helmet to avoid discomfort arising from a rigidly fixed head position during the drying operation. Since the requisite degree of vacuum is supported by the curtain of soft flexible material, without positive head engagement, the subject may at will withdraw her head from the helmet.

With the head of a subject in helmet 1, the operation of fan 9 is started by completing a connection to motor 11. Air is thereby drawn, by way of intake ports 12, into heating chamber 5, and over the heating elements 13. Entering the head chamber 3 by way of ports 14 the air passes over and around the head of the subject, and by way of ports 15 into exhaust chamber 6, over hydrostat 16, and through fan chamber 8 to exhaust port 10. This vacuum effect draws up the flexible curtain provided by liner 30, to adequately air-seal the helmet to the head of the subject. If desired relay switch 23 (see Figure VIII) may be left open initially, so that the general connection made to the heating elements will not be broken at the relay, and current may pass to the heating elements. After moisture from the head has had sufficient time to act upon hygrometric device 16, manually-operable relay switch 17 may be closed, and the heating control may be automatic. It is possible, however, merely to complete the general connection to the heating elements, at the same time as the connection to the fan motor, and permit the action of the hygrometric device to act initially to deenergize relay 17, thereby breaking the relay circuit, and completing the local circuit to the heating elements.

At the completion of the drying operation, when the moisture supplied to the hygrometric device from the hair has fallen below the point for which the hygrometric device is designed, or at which it is set, contraction of element 18 of the hygrometric device causes the relay circuit to be completed, and thereby, as explained, interrupts the circuit to the heating elements. This automatic control is of value, for the reason that a continued heating of the head, after moisture has been removed from the hair, is injurious to the hair, due to the removal of natural oils caused by the baking effect following the removal of moisture.

Figure IX of the drawings illustrates a modified and simplified form of helmet, which is adapted for attachment to the intake hose of a vacuum cleaner. In this modified form the helmet 37 may be identical in general structure with the helmet shown in Figures I to VII inclusive of the drawings, having the same arrangement of heating chamber, head-receiving chamber, and head-sealing means. In this form, however, the exhaust chamber 38 of the helmet discharges into an outlet chamber 39, which is provided with a tubular connection 40 adapted for slip attachment, or other suitable attachment, to the intake hose 41 of a vacuum cleaner.

It should be understood that this modified form of helmet may be attached to the ordinary household cleaner, for the reason that the air used in the helmet is received initially from the atmosphere, and is then passed from the helmet to the vacuum cleaner. There is, therefore, no danger of soiling the head of a subject with matter which might have been deposited upon the interior walls of the cleaner structure, even though the air supply should be shunted in using the exhaust of the vacuum cleaner to blow air into a drying helmet. Further, no structural changes need be

made in the ordinary form of household cleaner in order that it may be used with this vacuum helmet.

Since this modified form of helmet, adapted to household use, should be a relatively inexpensive article, the hygrometric device and relay control for the heating elements have not been shown in conjunction therewith. It should be understood, however, that if desired a hydrostat and relay control, similar to the control shown in the preceding figures of the drawings, may be applied to this modified form of helmet also.

What we claim as our invention:

1. In hair-drying apparatus the combination of a helmet arranged to embrace the upper head region of a subject, means causing air flow into the helmet over the head of a subject and outwardly to discharge, an electric heating element disposed in the air stream flowing to the head of the subject, and controlling means for controlling current supply to said element comprising a hygrometric device disposed in the air stream flowing from the head of the subject to discharge and arranged to complete a circuit to the heating element only when the moisture content of the said air stream exceeds a predetermined value.

2. In hair-drying apparatus the combination of a helmet arranged and equipped to embrace the upper head region of a subject and to contact the head by flexible means adequate to support an effective degree of vacuum within a space bounded by the helmet wall and by the head of the subject, suction-creating means connected with the helmet for creating a partial vacuum to cause air flow into and through the helmet over the head of the subject to discharge, an electric heating element disposed in the air stream flowing to the head of the subject, and controlling means for controlling current supply to said element comprising a hygrometric device disposed in the air stream flowing from the head of the subject to discharge and arranged to complete a circuit to the heating element only when the moisture content of the said air stream exceeds a predetermined value.

3. In hair-drying apparatus the combination of a helmet arranged to embrace the upper head region of a subject, head-embracing means comprising an adjustable structure at the head-receiving end of the helmet and carrying a compressible gasket and a soft flexible paper curtain held by said compressible gasket for effectively air-sealing the helmet to the head of a subject, means causing air flow into the helmet over the head of a subject and to discharge, an electric heating element disposed in the air stream flowing to the head of the subject, and controlling means for controlling current supply to said heating element comprising a hygrometric device in the air stream flowing from the head of the subject to discharge and arranged to complete a circuit to the heating element only when the moisture content of the said air stream exceeds a predetermined value.

4. In hair-drying apparatus the combination of a helmet arranged to embrace the upper head region of a subject, head-embracing means comprising an adjustable structure at the head-receiving end of the helmet and comprising a compressible gasket and a soft paper curtain held along one edge by said compressible gasket for air-sealing the helmet to the head of a subject with an engagement adequate to support an effective vacuum within a space mounded by

the helmet wall and by the head of the subject, suction-creating means connected with the helmet for creating a partial vacuum to cause air flow into and through the helmet over the head of the subject, an electric heating element disposed in the air stream flowing to the head of the subject, and controlling means for controlling current supply to said heating element comprising a hygrometric device in the air stream flowing from the head of the subject to discharge and arranged to complete a circuit to the heating element only when the moisture content of the said air stream exceeds a predetermined value.

5. In hair-drying apparatus the combination of a helmet arranged to embrace the upper head region of a subject, means causing air flow into the helmet over the head of a subject and outwardly to discharge, an electric heating element disposed in the air stream flowing to the head of the subject, controlling means for controlling current supply to said element comprising a hygrometric device disposed in the air stream flowing from the head of the subject to discharge and arranged to complete a circuit to the heating element only when the moisture content of the said air stream exceeds a predetermined value, and additional means manually operable inde-

pendently of the said hygrometric device for controlling current supply to the said electric heating element.

6. In hair-drying apparatus the combination of a helmet arranged and equipped to embrace the upper head region of a subject and to contact the head by flexible means adequate to support an effective degree of vacuum within a space bounded by the helmet wall and by the head of the subject, suction-creating means connected with the helmet for creating a partial vacuum to cause air flow into and through the helmet over the head of the subject to discharge, an electric heating element disposed in the air stream flowing to the head of the subject, controlling means for controlling current supply to said element comprising a hygrometric device disposed in the air stream flowing from the head of the subject to discharge and arranged to complete a circuit to the heating element only when the moisture content of the said air stream exceeds a predetermined value, and additional means manually operable independently of the said hygrometric device for controlling current supply to the said electric heating element.

OTTO P. KOHLER.
ROY H. BROWNLEE.