Oct. 31, 1950 W. A. LAWRENCE 2,527,745

HAIR DRYING APPARATUS

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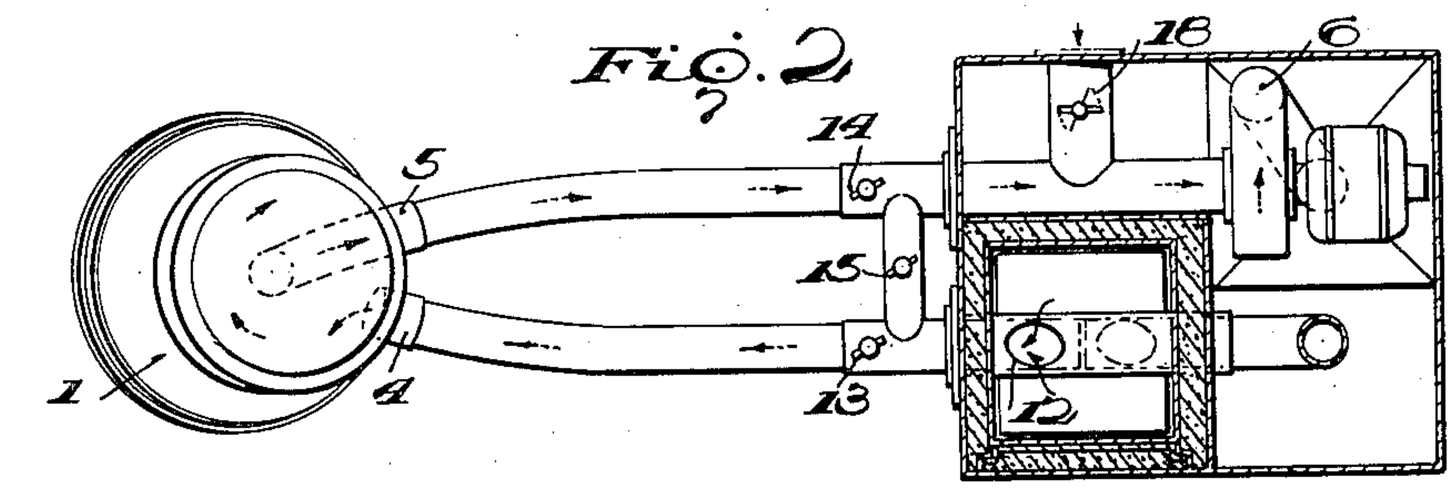
Fig. 2.



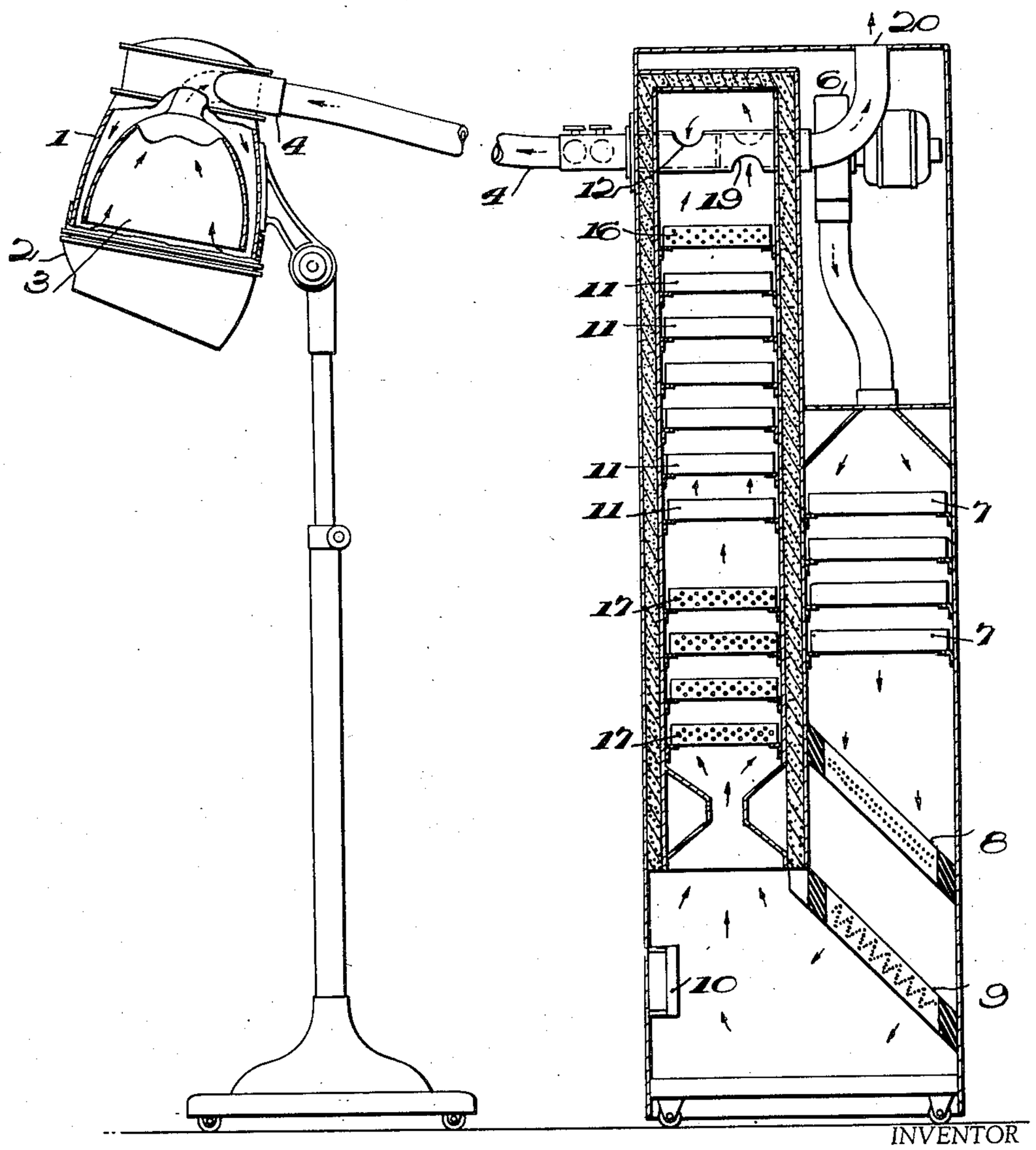


Fig. 1.

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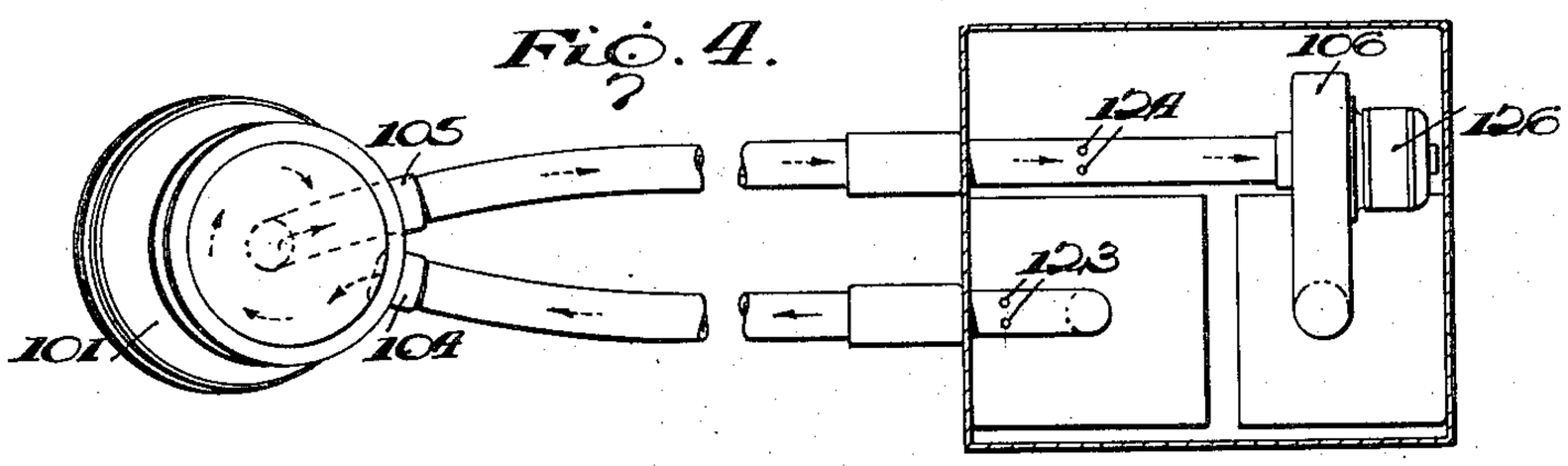
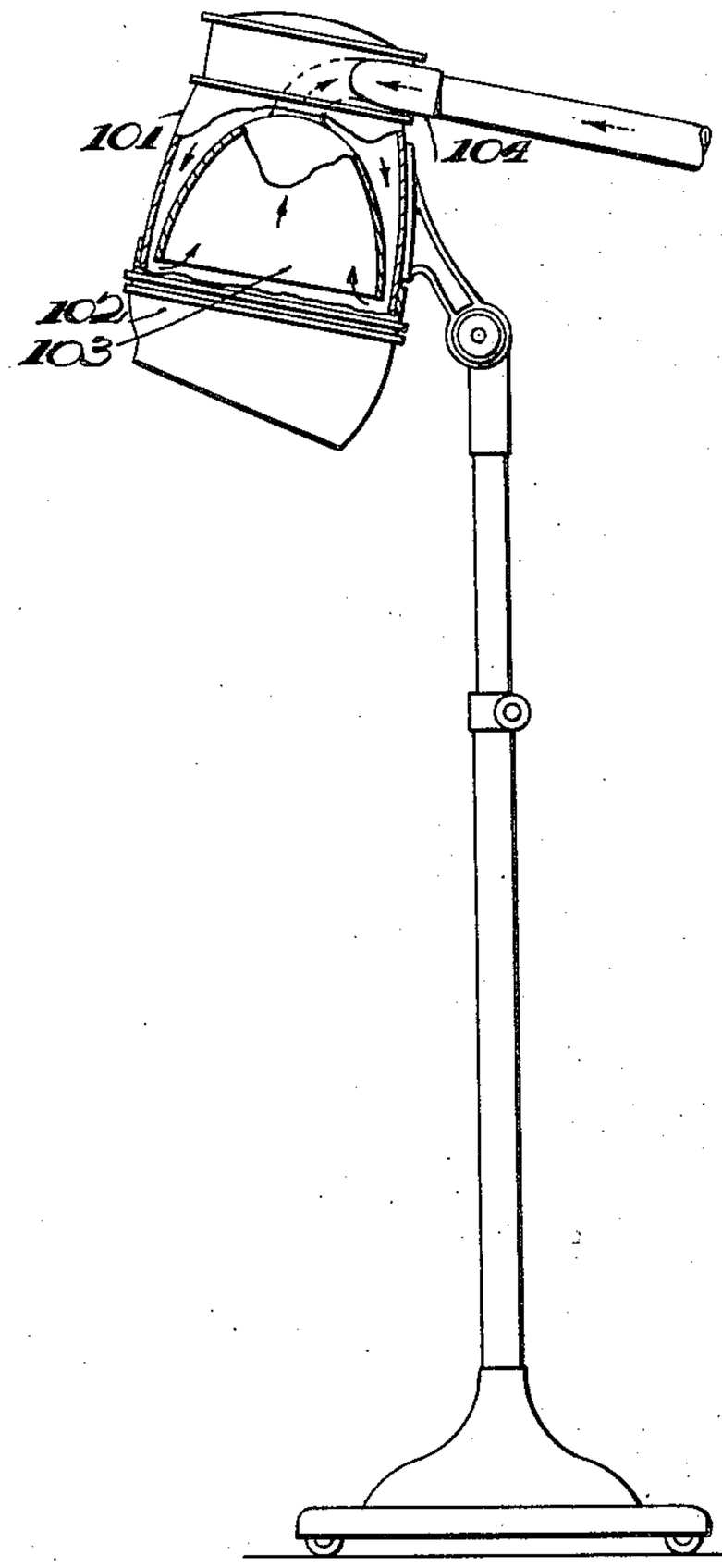
Fig. 4.





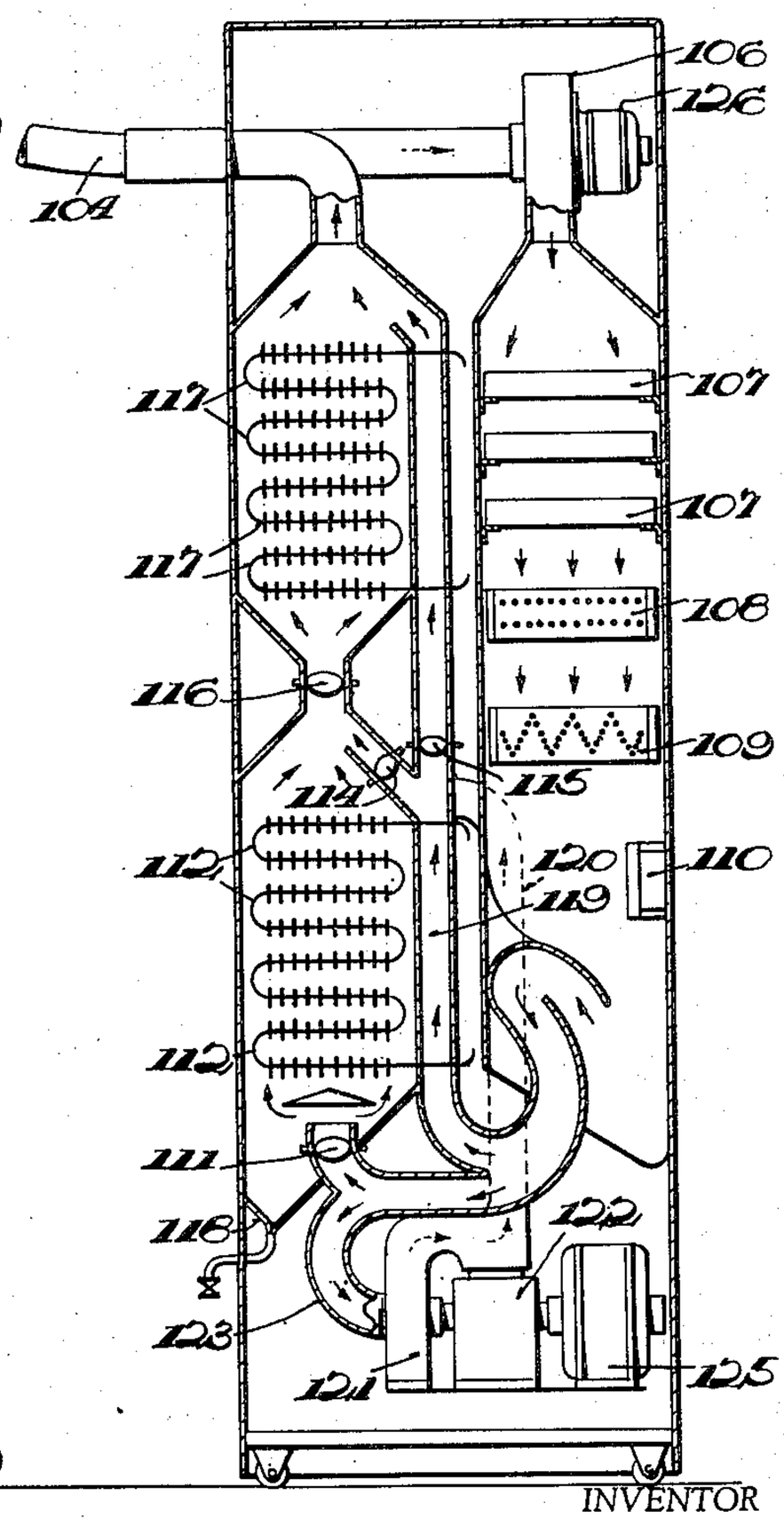


Fig. 3.

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UNITED STATES PATENT OFFICE

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HAIR DRYING APPARATUS

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Application June 6, 1947, Serial No. 752,870

2 Claims. (Cl. 34—77)

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This invention relates to the process and apparatus for drying hair, in beauty shops, barber shops or other places, following shampooing, washing, chemical or other treatments in which moisture or other volatile liquids or vaporizable substances are to be reduced or evaporated.

Instead of the usual types of apparatus, through use of which the hair is dried by the circulation or recirculation of atmospheric air, either heated or at surrounding temperatures, the improved process and apparatus covered by this specification provides means of humidity extraction from the circulated air through means of control of wet and dry bulb temperatures and adjustment or reduction of barometric pressure within the helmet enclosing the subject's hair which is being treated or dried.

The apparatus comprises a helmet assembly with air supply and return connections from and to a special air dehumidifying and conditioning apparatus included in this specification.

One form of the invention is illustrated in the accompanying drawing in which

Figure 1 is a vertical section of the assembled apparatus; and

Figure 2 is a plan section; both figures showing Type I unit in which an adsorptive medium of silica gel, activated alumina, or like medium is used for moisture extraction from the dryer air circuit.

The helmet assembly 1, with flexible replaceable sanitary hood 2, form an enclosure for the subject's head. An inner shell or helmet 3, fits within outer helmet 1, affording an annular air passage for the air supply to the subject's head, which is delivered through flexible tubular connection 4. Return of damp air from subject's head is upward through inner helmet by way of flexible tubular suction connection 5, from the top of inner helmet 3. Return damp air from the helmet passes through return connection 5, to fan 6, which forces the air downward through removable mechanical air filters 7, thence the air passes through screens 8 and 9 which, together, form an electrostatic type filtration unit, the electrostatic charge being imparted by electrostatically charging screen 8, and the collecting screen attracting dust or other foreign particles, being 9. After filtration, the air continues by an ultra-violet ray lamp assembly 10, for exposure to sterilizing rays. Following exposure to ultra-violet rays the air passes upward through containers 11, of the moisture adsorptive silica gel, activated alumina or other medium and, by means of valve port opening 12, through butterfly valve 13, returns as filtered, dry sterilized and conditioned air to the helmet for hair drying and recirculation. Valve 13 in the conditioned air supply to helmet, valve 14 in the moist air return and cross or by-pass valve 15, form together a means of regulating the air supply, air return, rates of drying, velocity and pressure within the helmet, as well as the humidity in the return. Opening valve 15, by-passes part of the air so that, instead of passing through the helmet, a portion returns directly to the fan; under which condition rate of drying is decreased and discomfort of coolness from excessive rate of drying is avoided. A further adjustment for prevention of excessive coolness of subject's head is afforded by thermostatically controlled electrical air tempering heater 16, which is interposed in the air circuit above the before mentioned adsorptive trays 11.

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For re-activation of the adsorptive media contained in the removable trays 11, there are provided sets of removable electrical resistance heating coil elements 17. Prior to energizing heating coils 17, for re-activation of absorptive material in 11, valves 12, 13, 14 and 15 are closed and valves 18 and 19 opened. Valve 18 opens the outside air supply to the fan which circulates outside air through the unit by way of heaters 17. Hot air from heaters 17, passes through adsorptive medium trays 11, drives off adsorbed moisture in the air effluent by way of valve port 19, opened for the purpose, and through discharge tube 20 leaves the circuit and passes to the outside atmosphere.

In addition to manual control, thermostats are provided for temperature control of re-activation heating coils 17 and for air tempering heater 16. In addition to manual control of valves 13, 14 and 15 a humidistat may be added for adjustment of by-pass air and rate of drying; also to adjust fan speed and shut down machine when subject's head is dried and there is no longer any moisture differential within the circuit.

Another form of the invention is illustrated in the accompanying drawing in which

Figure 3 is a vertical section of the assembled apparatus and Figure 4 is a plan section; both figures showing the Type II unit in which refrigerated cooling coils are used for lowering of the dew point and accomplishment of dehumidification or moisture extraction from the dryer air circuit.

The helmet assembly 101, with flexible replaceable sanitary hood 102, form an enclosure for the subject's head. An inner shell or helmet 103, fits

within outer helmet 101, affording an annular air passage for the air supply to the subject's head. Dry and conditioned air is delivered through flexible tubular connection 104. Return of damp air from subject's head is upward through inner helmet by way of suction connection 105, from the top of inner helmet 103. Return damp air from the hair enclosing inner helmet passes through return connection 105, to fan 106, which forces the air downward through removable mechanical air filters 107, thence the air passes through screens 108 and 109 which, together, form an electrostatic type filtration unit; the electrostatic charge being imparted by electrostatic charging screen 108, and the collecting screen attracting dust or other foreign undesirable particles being 109. After filtration, the air continues by an ultra-violet ray lamp assembly 110, for exposure to the lamp's sterilizing rays. Following exposure to ultra-violet rays the air passes upward through refrigerant evaporative dehumidifying coils 112, by way of regulating valved connection 111. The moisture in the air is condensed and removed by contact, cooling and condensation on cooling coils 112 and drainage is effected through a collecting pan 118, having an outlet with valve. Following cooling and dehumidification by passage through refrigerant evaporator coils 112, the air continues upward through regulating valve 116 and on through refrigerant condensing coils 117. The cool air is warmed and the relative humidity reduced in passing through the condenser coils by absorbing the latent heat and heat of compression from the refrigerant in its process of condensation within the coils. Passage 113 allows a portion of the air from the filters and ultra-violet ray lamp to circulate through the compressor fan 121, and pass around compressor cylinder head and back through duct 120 to the air circuit below control valves 114 and 115. Utilization of the waste heat of the compressor cylinder permits tempering the air leaving condenser coils by introduction of compressor heated air through control valve 114, or further introduction, via control valve 115, into air effluent from condenser coils 117. 125 is the compressor motor and 126 the circulating fan motor. Valves 111, 114, 115 and 116 either by fixed, manual, temperature, or humidistatically actuated means, are available for optimum control of dehumidification and temperature control of air from the conditioning unit; which is delivered through flexible connection 104 to helmet assembly 101, for further and continuous air drying. 124 is a wet and dry bulb connection for humidity control operation and may be used to shut down machine automatically when the hair has been dried and there is no moisture pick up in the return air. 123 is a wet and dry bulb connection for humidity control operation based upon pyschrometric requirements of the conditioned air to the helmet.

The conditioning unit is to be capable of operating a single drying helmet or by increase in size, may be utilized to operate a number of helmets at one time in parallel as required.

The helmet assembly forms an enclosure for the subject's hair and is provided with a specially designed, readily changeable, plastic, sanitary flexible seal around the subject's head and is so arranged that dry or otherwise conditioned air may be circulated under pressures, above, equivalent to or below atmospheric conditions. This helmet is provided with an air inlet flexible tube connection for a supply of air which has been

properly dried, purified, conditioned for optimum temperature, humidity and subjected to the desired pressure control. The helmet includes an air outlet flexible tubing connection for return of air containing moisture and volatiles evaporated from the hair drying process. The pressure of the return air to the conditioning unit may be regulated to pressures above, equal to or below atmospheric conditions as desired, by means of adjustable damper controls establishing differentials in pressure within the power fan operated air circuit. The rate of drying is controlled, by adjustment within the system, of the air pressure, dry and wet bulb temperatures and rates of circulation. So that desired high rates of drying may be accomplished without sense of chill to the subject's head, there is provided within the air circuit a means of raising and controlling the air temperature.

The air conditioning unit which furnishes the air supply and return from the drying helmet is optionally one or the other of two types.

Type I.—Comprises an air conditioning unit employing an adsorptive medium of silica gel, activated alumina or like medium for moisture extraction from a fan powered air circuit. The apparatus includes heating elements of electrical type and air by-passes for use in reactivating and expelling the moisture from the adsorptive medium for its re-use.

Type II.—Comprises an air conditioning unit of the electrically driven compressor refrigerant type of unit in which the evaporator section is used in the air circuit for humidity extraction and the condensing section is utilized for necessary reheating, in combination with suitable by-passes for temperature and humidity control of the air to the drying air supply to the helmet.

Types both I and II, if desired by the user, include means of air purification, optionally of the air filter (glass wool throw away type), wet type (cleanable) or electrostatic type plus (also if desired by user) an ultra-violet ray section in the air stream for sterilization.

What is claimed is:

1. In an apparatus for drying hair, an air conditioning cabinet, a vertical partition in said cabinet extending from a point adjacent the top wall of said cabinet to a point adjacent to but above its bottom wall and defining two vertical chambers in said cabinet communicating at their lower extremities, air filters and dust collecting means in the upper portion of one of said chambers, a fan in the upper portion of said chamber to draw air from outside said cabinet and force it downwardly through said chamber over said filters and said dust collecting means, evaporator and condenser units in the second of said chambers over which the air from said first chamber is forced upwardly by said fan, a double walled helmet, a conduit extending from the top of said second chamber communicating with one of said compartments of said helmet, a second conduit communicating between the other of said compartments of said helmet and the intake of said fan in said first chamber, and control means in said conduits for regulating the flow of conditioned air to said helmet.

2. In an apparatus for drying hair, an air conditioning cabinet, a vertical partition in said cabinet extending from a point adjacent the top wall of said cabinet to a point adjacent to but above its bottom wall and defining two vertical chambers in said cabinet communicating at their lower extremities, air filters and dust collecting means

in the upper portion of one of said chambers, a fan in the top of said chamber to draw air from outside the cabinet and force it downwardly through said chamber over said filters and said dust collecting means, evaporator and condenser units in the second of said chambers over which the air from said first chamber is forced upwardly by said fan, a compressor for compressing refrigerant in said evaporator, a supplemental branched conduit communicating between said chambers and with said compressor and including a vertical conduit extending upwardly through said second chamber and bypassing said evaporator and condenser units, valve means in said branched conduit for controlling the flow of conditioned air therethrough, a double walled helmet, a conduit extending from the top of said second chamber communicating with one of said compartments of said helmet, a second conduit communicating between the other of said compartments of said helmet and the intake of said fan in said first chamber and control means in said conduits for

regulating the flow of conditioned air to said helmet.

WILLIAM ARTHUR LAWRENCE.

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