Nov. 16, 1926. 1,607,195

C. G. GROSS

ELECTRIC HAIR DRIER

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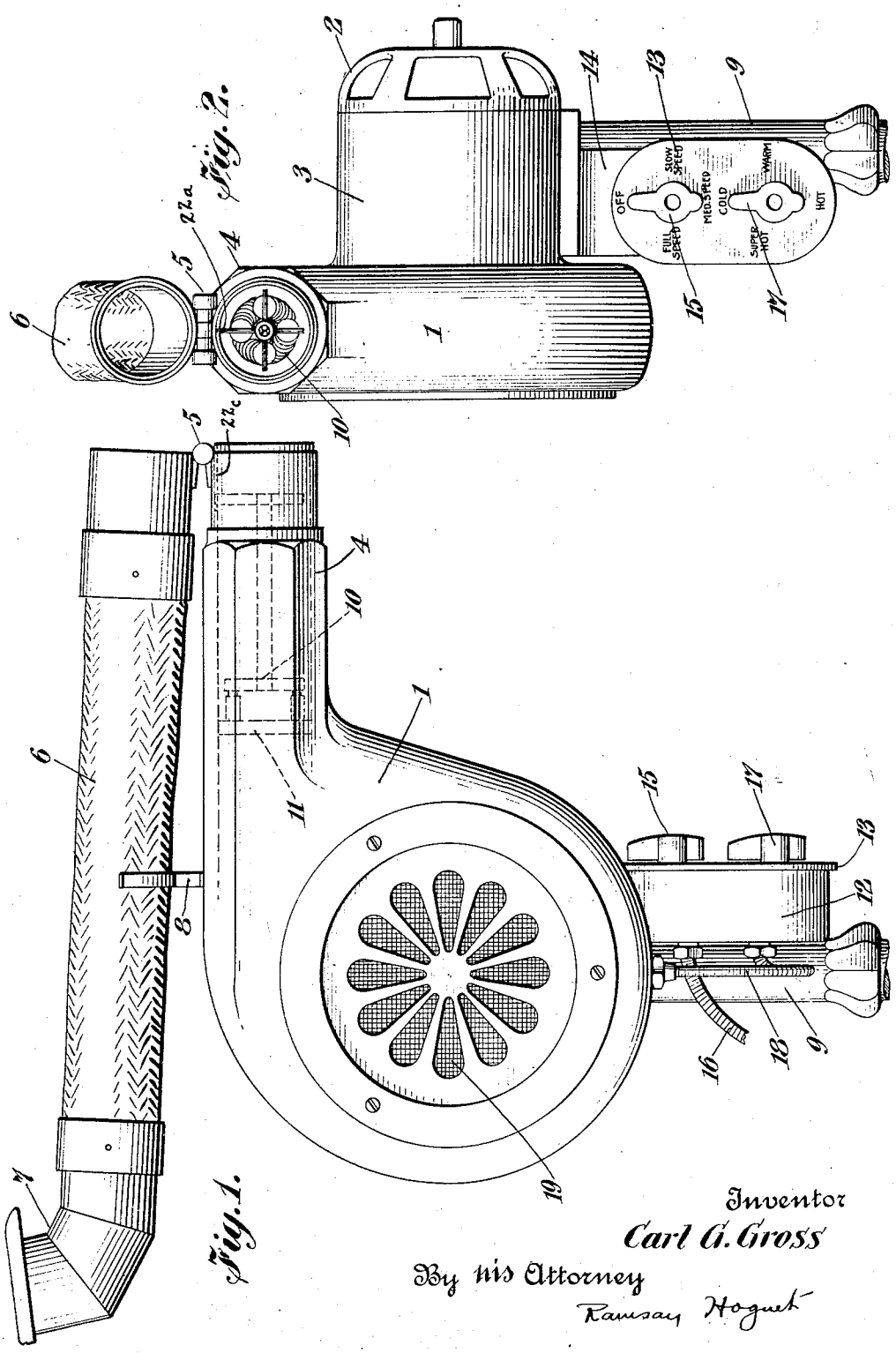

Fig. 2.

Fig. 1.

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Fig. 3.

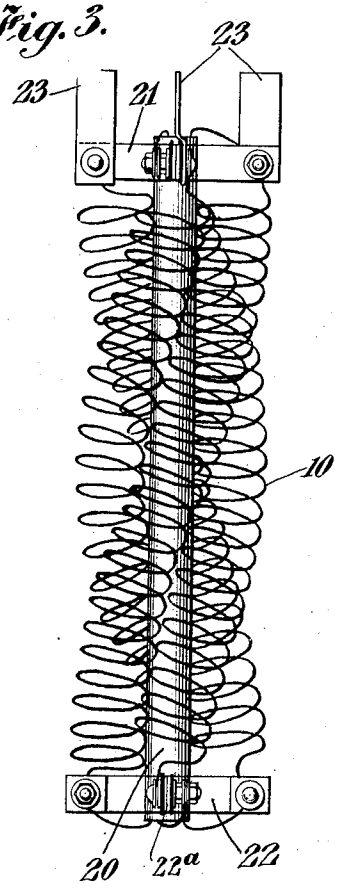

Fig. 4.

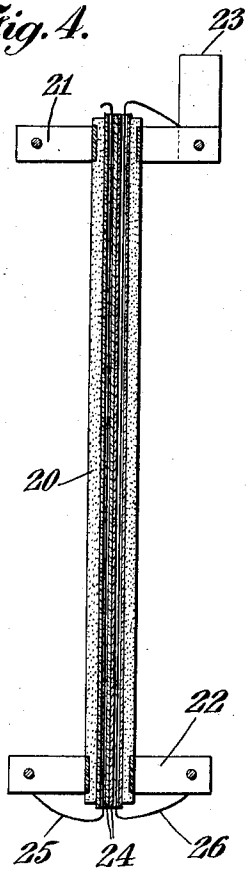

Fig. 5.

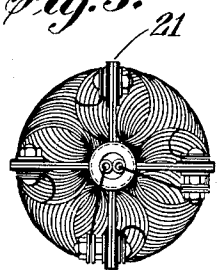

Fig. 6.

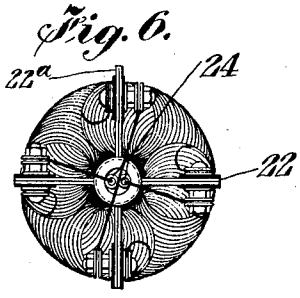

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Fig. 8.

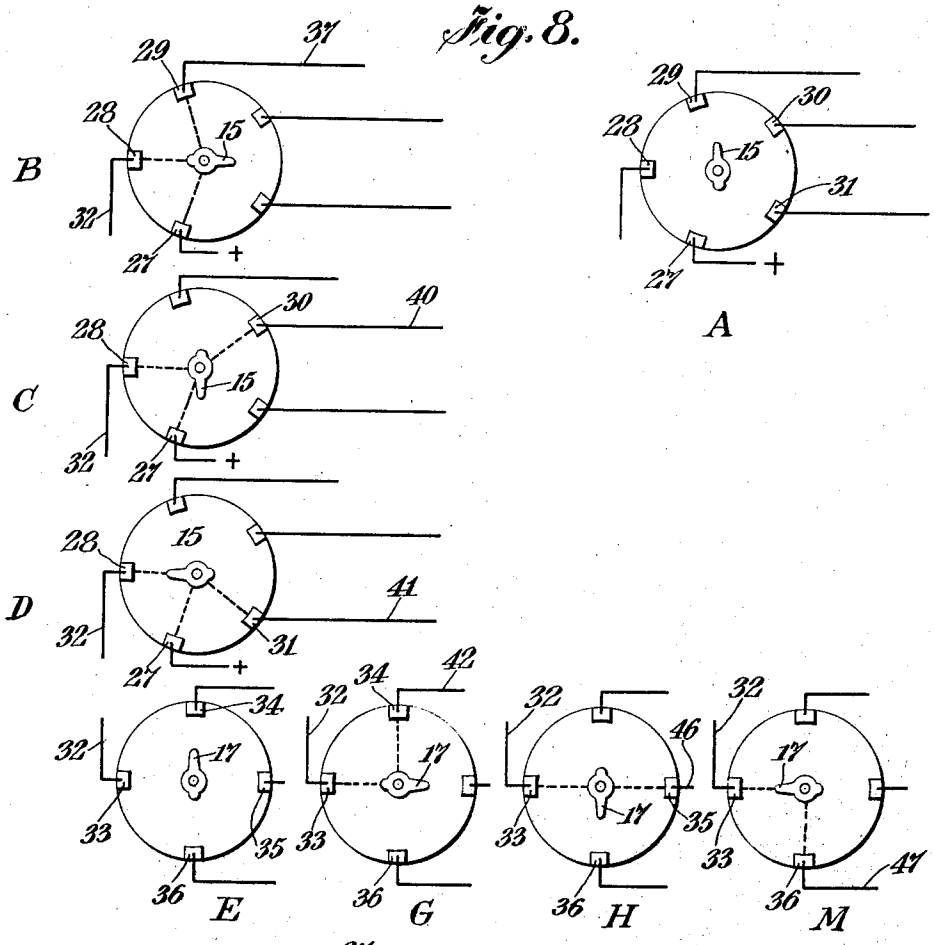
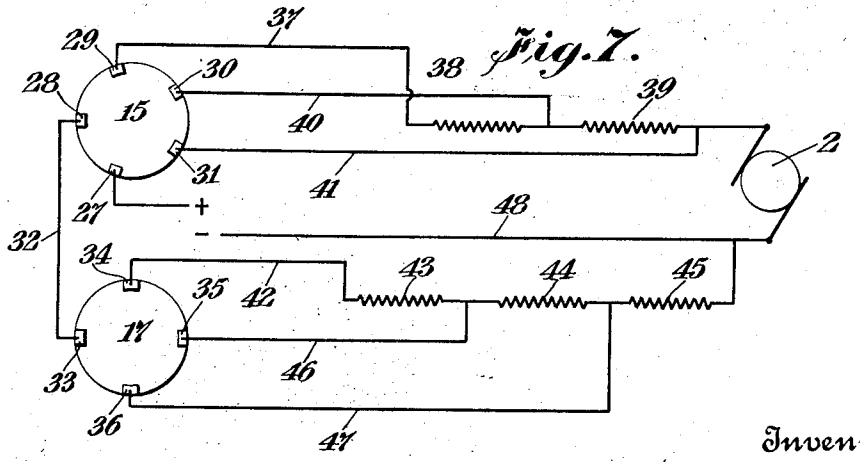


Fig. 7.



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Patented Nov. 16, 1926. 1,607,195

UNITED STATES PATENT OFFICE.

CARL G. GROSS, OF MOUNT VERNON, NEW YORK, ASSIGNOR TO EASTERN LABORATORIES, INC., OF NEW YORK, N. Y.

ELECTRIC HAIR DRIER.

Application filed November 13, 1924. Serial No. 749,691.

My invention relates to electric hair driers of the type where an air stream is supplied by a blower and the air warmed by causing it to pass over and through an electric heating element.

One of the disadvantages heretofore found in other driers of similar type has been the inability to vary the volume of air and the degree of heat in relation to each other, except within narrow and unsatisfactory limits.

My invention provides a wide range of variations in air volume and heat in which one may be changed independently of the other and where the shutting off of the motor also stops the flow of current to the heating element so that no damage to that element or waste of current can result if the heating switch should be left on after the motor is stopped.

Furthermore, the form of my heating element permits of maximum surface with minimum frictional resistance and consequently a more effective heating of the air with lower current consumption and motor capacity.

Other advantages and benefits will appear in the following description and drawings:

Fig. 1 is a side elevation, with the supports broken away, of the assembled drier;

Fig. 2 is an end elevation thereof;

Fig. 3 is a side view of the heating elment;

Fig. 4 is a vertical section through the supporting tube;

Fig. 5 is a top plan view of Fig. 3.

Fig. 6 is a bottom plan view of Fig. 3.

Fig. 7 is a diagram of the circuits.

Fig. 8 is a series of diagrams of switch positions and connections for various operating conditions.

In the form which I have selected to illustrate my drier, I show in Fig. 1 a blower housing 1 in which there is mounted a common form of blower connected to a variable speed motor 2 having a housing 3 in which there is an air intake having screened openings 19. The blower housing 1 is of metal and in one piece and it may include the motor housing 3 if desirable. By making the blower housing in one piece, I secure greater rigidity and stability which give marked increase in quietness of running and appearance to an extent not found elsewhere.

Integral with the blower housing 1 is an outlet extension 4. Hinged to this extension at 5 is a tube 6 having a nozzle 7 which, in this instance, is adapted to deflect the air stream from the straight line of the tube 6 and which may equally well deflect in directions other than that shown. When not in use this tube rests upon a holder 8 fixed to the housing 1 but when in use the tube is swung about the hinge 5 to form a prolongation of the outlet extension 4.

The assembled apparatus is mounted upon an upright or standard 9 of common form, the mounting being such that free movement is possible in a horizontal plane while the housing 1 is so mounted that it swings in a vertical plane about the axis of the blower shaft. Consequently, the nozzle 7 may be brought to any position desired while the machine is in use.

In the extension 4 is placed the heating element 10 which is suitably mounted in contact clips held in a support 11 which is wired to the switch unit in which are the motor and heating switches.

These switches are conveniently mounted as a unit in a box 12, closed by a cover 13 and supported by a bracket 14 which is placed as shown so that the switches are within easy reach of the operator. The upper switch 15 controls the motor and has a power lead 16 and motor leads not shown. The switch 17 controls the heating element and has concealed leads to the motor switch 15 and leads 18 to the heating element. As stated these switches control the motor speed and the heating element independently of each other but being close together, they provide a great advantage in convenience and ease of control. On the cover 13 of the box 12 just described are indicated the various switch positions for different speeds and degrees of heat, the movement of these switches being in a clockwise direction for successive movements.

The heating element 10 (Figs. 3–6 incl.) consists of a hollow supporting tube 20 of porcelain or other refractory material having spiders 21 and 22 which carry the terminals for the resistance wire and the contacts 23; these contacts 23 entering corresponding clips on the support 11 (Fig. 1) as heretofore explained. The supporting tube 20 carries within it two small insulating tubes 24 in which are portions 25 and

26 of the wire serving as leads between the main resistance coils which are in series. These resistance coils are wrapped about the supporting tube 20 as shown, thus giving a large area in small space, and it will be noted at 10 in Fig. 2 that this heating element gives even distribution of the air stream through the heating element with maximum heating effect and low air resistance. Furthermore in order to assure the heating element 10 forming the proper contacts in the support 11, one of the arms 22^a of the spider 22 is made somewhat longer than the others so that it enters a guide 22^c in the extension 4 (Figs. 1 and 2) and permits of the proper seating of the heating element.

The circuit diagram and switch positions are shown in Figs. 7 and 8. In Fig. 7 the switches 15 and 17 and the motor 2 correspond to similar numbers in Figs. 1 and 2. The motor switch 15 has, in this case, five contacts, 27, 28, 29, 30 and 31. The contact 27 is for the incoming current as marked. Contact 29 is for the slow motor speed and carries the lead 37 to the motor 2 through the two series resistance 38 and 39. Contact 30 is for the medium motor speed and has lead 40 to the motor through the resistance 39. Contact 31 is for the full motor speed and has lead 41 directly to the motor. Therefore it is seen that switch 15 provides three different motor speeds.

The two switches 15 and 17 are connected by the common lead 32 leading between contacts 28 and 33 respectively so that current to switch 17 feeds through switch 15.

The heating switch 17 has three contacts 34, 35 and 36 in addition to the feed contact 33 just mentioned. Contact 34 is for warm air and has lead 42 to the common wire 48 through the three series resistances 43, 44 and 45. Contact 35 is for hot air and has lead 46 to the common wire 48 through the two resistances 44 and 45 while the super-hot contact 36 has lead 47 through resistance 45 to the common wire 48. It is thus seen that switch 17 provides three degrees of heat, depending upon whether three, two or only one unit of resistance is used. Of course, these heating resistances 43, 44 and 45 correspond to the wire arrangement in the heating element shown in Fig. 3.

In the operation of my machine it is clear that air will be drawn into the blower housing through the openings 19, forced over and through the heating element 10 and out through the tube 6 and nozzle 7. For the control of speeds and heat reference is made to Fig. 8 where A, B, C and D are switch positions for motor control and E, F, G and H are switch positions for heat control. It will be remembered from Fig. 7 that contact 28 of switch 15 and contact 33 of switch 17 are connected by lead 32.

In position A of Fig. 8 there is no junction with contact 27 or any other and consequently no current flows to the motor or to the heating switch. This is the "off" position. Turning switch 15 to the right—position B—junction is made with contacts 27, 28 and 29 and current will flow, as indicated by the dotted lines, to the lead 32 and the heating switch and lead 37 to the resistance 38 and 39 giving the slow motor speed. Similarly in position C by turning switch 15 further in a clockwise direction junction is made between contacts 27, 28 and 30 giving the medium motor speed and in position D by further clockwise turning of switch 15, there is junction between contacts 27, 28 and 31, and the full motor speed. A still further turn brings the switch to the off position A. Therefore there are three motor speeds given by switch 15.

It will be remembered that (1) both motor and heating switches are off in position A and (2) current flows to the heating switch 17 when the motor switch 15 is in position B, C, or D.

The heating switch 17, in position E, is off for there is no junction between any of the contacts, and the air is at cold, or room temperature. In position G there is junction between the contacts 33 and 34 and consequently current will flow in from lead 32 to lead 42 and the three resistances 43, 44 and 45 and the warm degree of heat results. The next clockwise position of switch 17—position H—joins contacts 33 and 35 giving the hot degree of heat through lead 46 to the two resistances 44 and 45. Likewise further turning of the switch—position M—joins contacts 33 and 36 and lead 47 to resistance 45 and gives the super-hot degree of heat. The next turn of the switch returns it to position E and the heating element is cut out.

It is clear from the foregoing description that the two switches provide three degrees of motor speed and four degrees of heat and that any speed may be combined with any degree of heat to produce twelve combinations. For instance three speeds—B, C and D—may be combined with E (room temperature) or with each of the higher temperatures of G, H or M. Furthermore the temperature may be varied either by the switch 17 or by keeping this switch constant and varying the volume of air by switch 17 so that I can (1) vary volume alone (2) vary volume and temperature (3) vary volume at constant temperature or (4) vary temperature at constant volume. This permits of a flexibility of operation beyond that yet obtained and is secured through my use of a two-unit switch conveniently located and one which not only procures the advantages described but also includes the safety factor of preventing current flow to the heating ele-

ment when the motor is shut off thereby avoiding the possibility of damage to that element.

I claim:

1. In an electric hair drier, a motor, means operated by the motor to produce an air stream, a heating element in the path of the air stream, and a double switching mechanism, one part of said mechanism having a plurality of contacts for varying the speed of said motor and the other part of said mechanism having a plurality of contacts for varying the heat of said heating element, said second named part being independent of said first named part in its operation but capable of operation only upon operation of said first named part.

2. In an electric hair drier, means operated by a motor to produce an air stream, a resistance heating element in the path of the air stream and a double control switch unit; one of said controls being adapted to regulate the motor speed and the other control being adapted to vary the resistance in said heating element, said second named control being capable of operation only upon operation of said first named control but operable to vary the resistance in the heating elements independently of the motor speed.

3. In an electric hair drier, a switch unit comprising multiple mechanisms, each of said mechanisms having a plurality of contacts, a common connection between all of said mechanisms and one of said mechanisms controlling the current to said connection to render the other mechanism operative or inoperative, said other mechanism being operable independently of the first named mechanism when current is led from said first named mechanism to said other mechanism.

4. In an electric hair drier, a motor circuit, a heating circuit and a double switch mechanism having a motor circuit control part and a heating circuit control part each having a plurality of contacts, a common connection between the two parts so arranged that said heating circuit is operative only when said motor circuit is in operation, said heating circuit being operative and controllable independently of said motor circuit only when the latter is in operation, to vary the heat supplied from said heating circuit.

5. In an electric hair drier, a motor and a heating element, a switch unit having a motor control part and a heating element control part each part having a plurality of contacts, contacting means in each part, a feed connection from the motor control part to the heating element control part, successive positions of said contacting means in said motor control part giving different motor speeds and current flow through said feed connection, and successive positions of the contacting means in said heating element control parts giving different degrees of heat regardless of the motor speed, both motor and heating element being inoperative in the off position of the motor control contacting means.

6. In an electric hair drier, a heating element comprising a hollow tube, supporting arms at the ends thereof carrying terminals for coiled resistance wire helically wound around said tube, and smaller tubes within said hollow tube to carry straight portions of the resistance wire between the terminals; one of said supporting arms being of greater length than the others to form a guide.

7. In an electric hair drier, a conduit for the air stream, a removable current operated heating element in said conduit and coacting guiding means on said heating element and in said conduit to position said heating element.

8. In a regulating system for electric hair driers, a motor, means operated by said motor to produce an air stream, a heating element in the path of the air stream, and a double switching mechanism, one part thereof having a plurality of contacts for varying the speed of the motor and the other part of said mechanism having a plurality of contacts for varying the heat of said heating elements, said second named part of said switching mechanism being interdependent on said first part.

9. In a regulating system for electric hair driers, a motor, means operated by said motor to produce an air stream, a heating element in the path of the air stream, and a double switching mechanism, one part thereof having a plurality of contacts for varying the speed of the motor and the other part of said mechanism having a plurality of contacts for varying the heat of said heating elements, said second named part of said switching mechanism being interdependent on said first part but independent of said first part in its operation.

In testimony whereof, I have signed my name to this specification this 10 day of November 1924.

CARL G. GROSS.