

Aug. 1, 1939.

E. O. FREDERICS  
HAIR WAVING APPARATUS

2,167,831

Filed Dec. 29, 1937

3 Sheets-Sheet 1

FIG. 2.

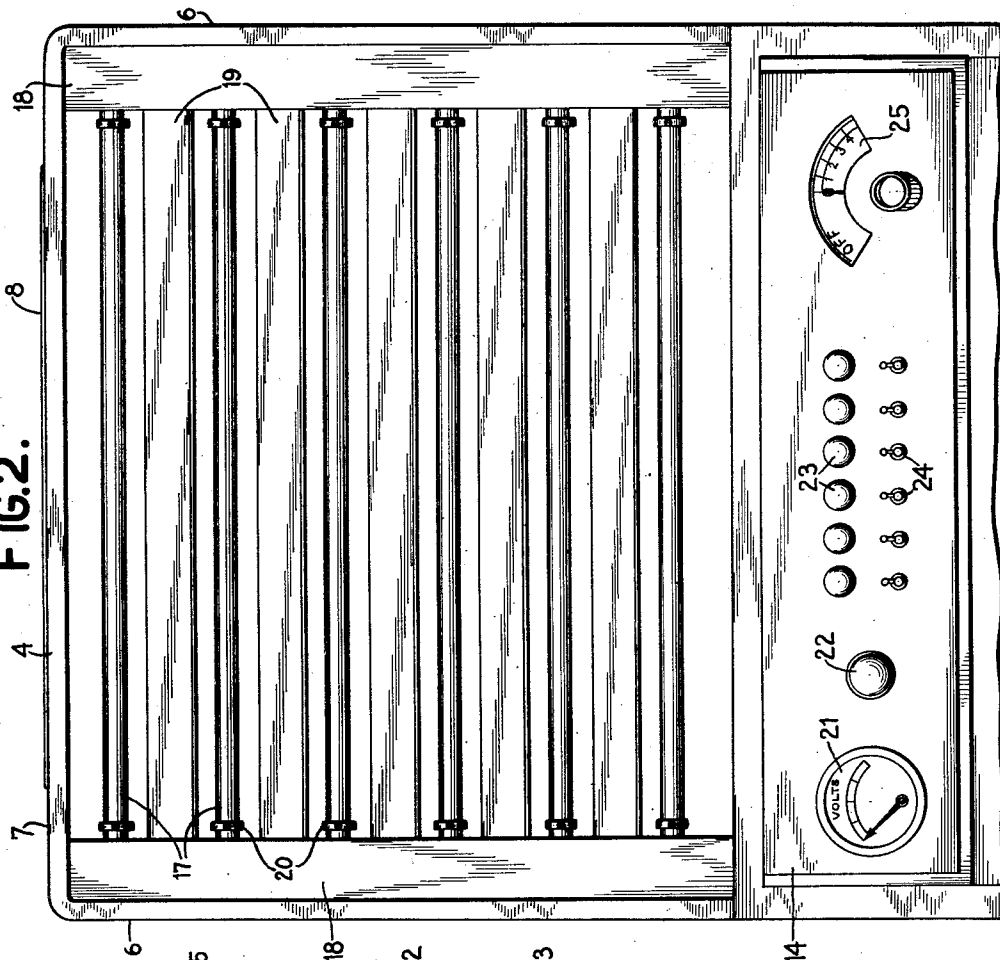
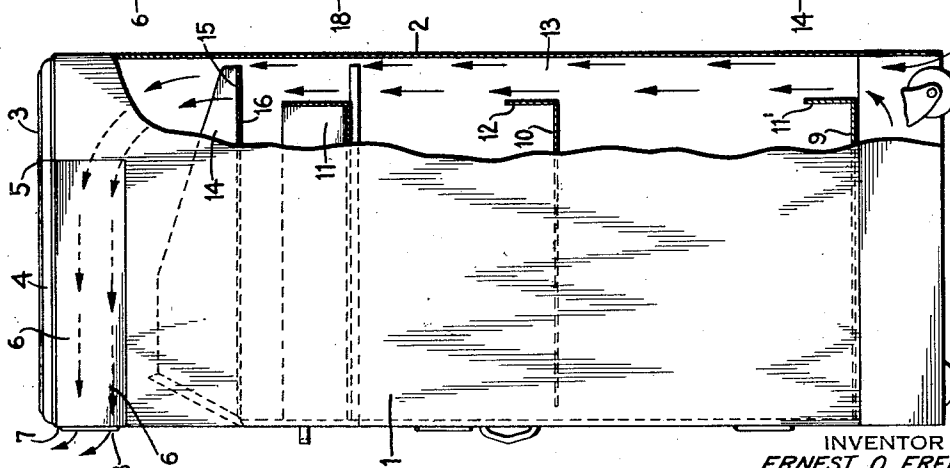


FIG. 1.



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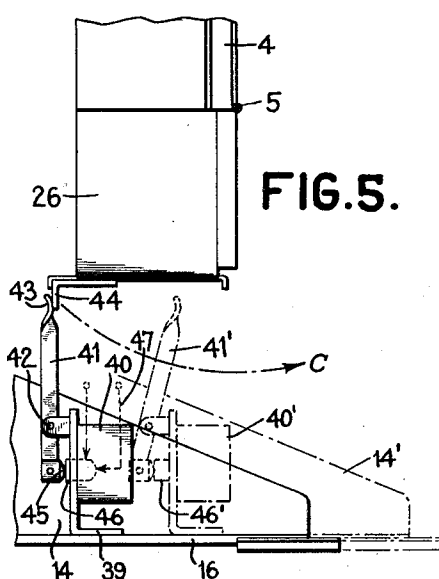


FIG. 5.

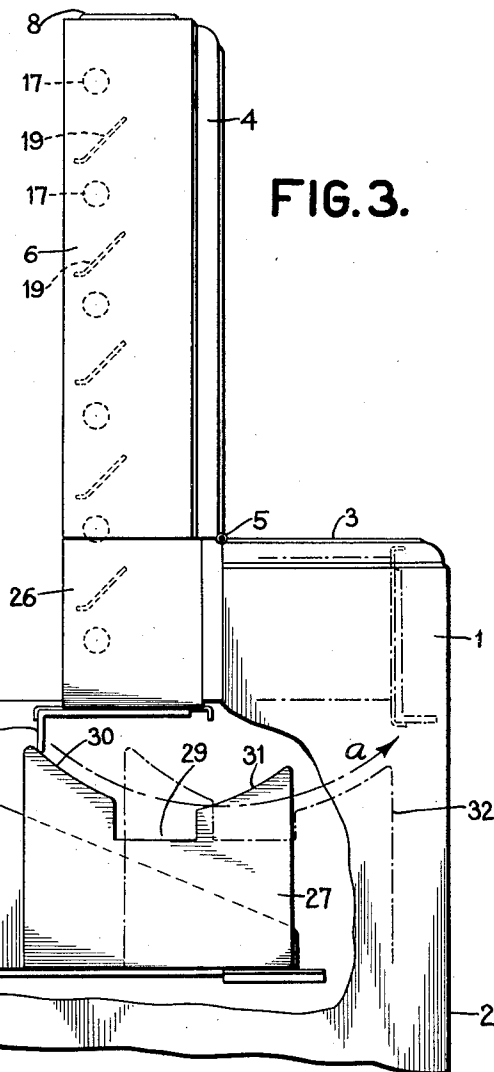


FIG. 3.

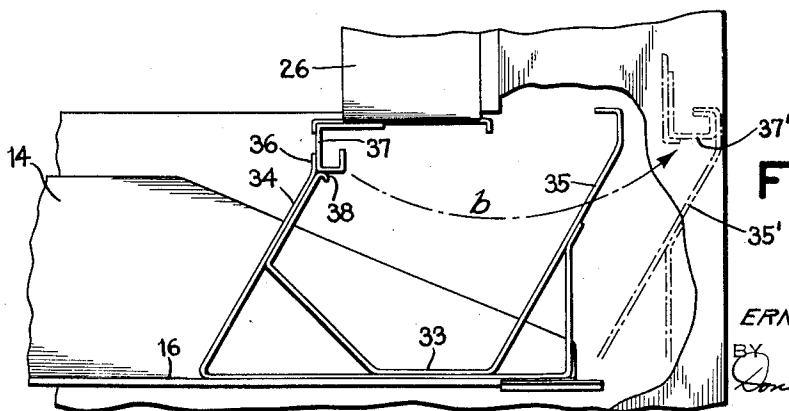


FIG. 4.

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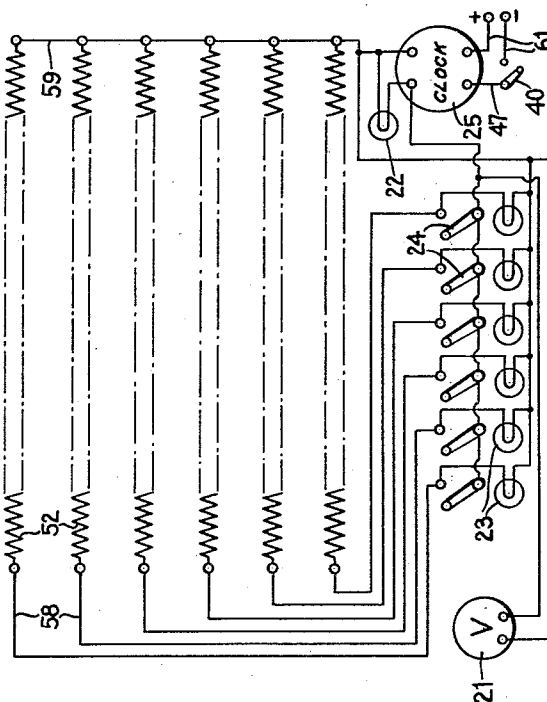
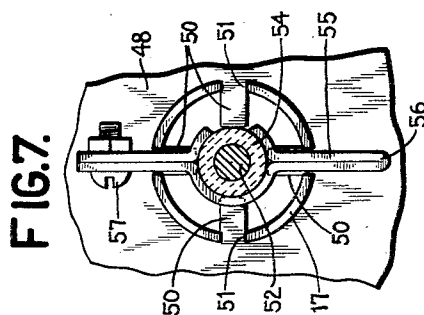
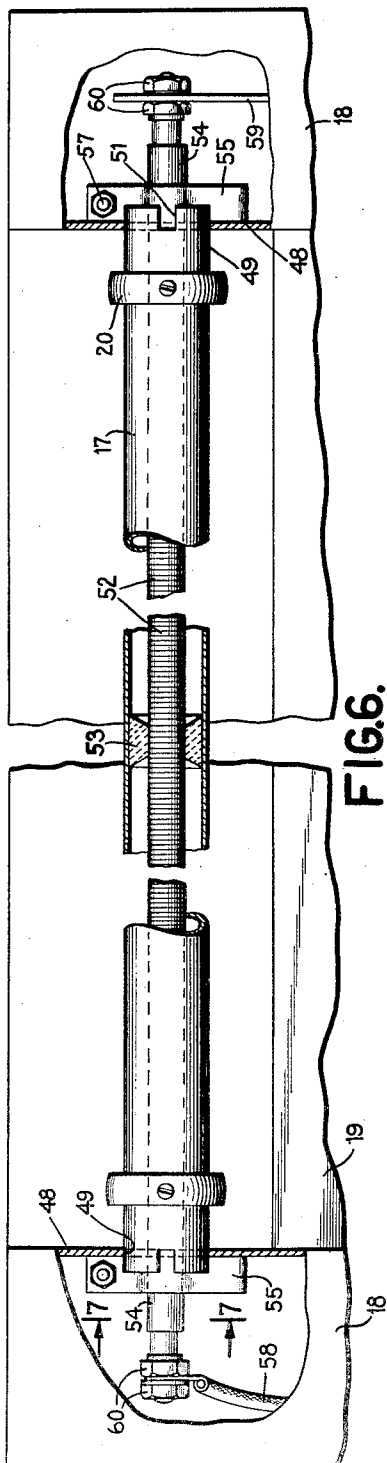
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**2,167,831**

## HAIR WAVING APPARATUS

Filed Dec. 29, 1937

3 Sheets-Sheet 3



## UNITED STATES PATENT OFFICE

2,167,831

## HAIR WAVING APPARATUS

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Application December 29, 1937, Serial No. 182,214

17 Claims. (Cl. 132—36)

The invention relates to apparatus for use in the permanent waving of hair, and more particularly to apparatus for storing heat in devices which are applied to hair wound in coils for permanent waving.

In the permanent waving of hair, individual locks or tufts of hair are wound upon rods and moistened or surrounded with a pad which is moistened with a suitable lotion. The wound coils are then heated to vaporize the lotion and permanently set the hair. The usual type of heating device includes a plurality of electric heaters with individual electrical connections for heating the individual tufts of wound hair. Such a heating arrangement, employing overhead wires, is cumbersome and requires the person whose hair is being waved to remain in one place during the heating interval. The proximity to the scalp of a large number of heating units also produces considerable discomfort.

In order to overcome these difficulties it has been proposed to use devices in the nature of clamps incorporating heat storage elements of high heat capacity which can be preheated and then applied to the wound coils to produce a so-called permanent wave. It is an object of my invention to provide improved apparatus for heating clamps or wavers of this character. A further object is to provide heating apparatus adapted to be installed in the cover of a cabinet structure incorporating means for cooling the heating elements when the cover is closed as well as when it is raised into operating position.

Another object is to provide hair waving apparatus comprising a unit for preheating wave clamps, embodying a horizontal baffle structure providing means for controlling the direction of flow of cooling air from the rear of the cabinet in which the unit is mounted. A more specific object is to provide apparatus of this description embodying an electric control panel mounted on the horizontal baffle or panel drawer in such a way as to be movable in response to movement of the cover of the cabinet so that the heating unit and its control panel will be brought into operating position together.

A further specific object is to provide an improved mounting for wave clamp heater elements which will permit ready replacement thereof. Other objects and advantages will appear as the description proceeds.

In the drawings which illustrate a preferred embodiment of the invention:

Fig. 1 is a side elevational view of heating ap-

paratus embodying the invention, a portion of the side wall being broken away to show the cooling air passages therein.

Fig. 2 is a front elevational view showing the upper part of this apparatus to an enlarged scale, the cover being shown in its raised or operating position.

Fig. 3 is a side elevational view of the apparatus shown in Fig. 2, the side wall of the cabinet being partly broken away to show the means for moving the control panel drawer forwardly and rearwardly.

Fig. 4 is a fragmentary side elevational view similar to Fig. 3, parts of the structure being broken away to show the means for locking the control panel drawer in its forward and rearward positions.

Fig. 5 is a fragmentary side elevational view of the cabinet cover showing the cooperating electric switch mounted on the control panel drawer.

Fig. 6 is an elevational view, partly broken away in section, of one of the heater units and shows also a portion of the cabinet cover structure to illustrate the manner of mounting the heater unit therein.

Fig. 7 is a sectional view taken along the lines 7—7 of Fig. 6 showing the heater retaining clip in elevation; and

Fig. 8 is a diagram of the electric wiring connections.

Referring first to Fig. 1, there is shown a heater cabinet comprising side walls 1, a back wall 2 and a top wall 3 to which a cover 4 is hinged at 5. The cover 4 comprises side walls 6 and a front wall 7, this front wall being provided with an opening or series of louvers 8. The side walls 6 of the cover join the side walls 1 of the cabinet to form a completely enclosed structure.

The lower part of the cabinet may be used for storage purposes, and in the embodiment shown the cabinet is provided with a bottom 9, shelf 10 and drawer 11. It will be noted, however, that the rear portions of these shelf and drawer members are terminated short of the back wall 2, the rearward edges of the bottom 9 and shelf 10 being flanged upwardly as at 11' and 12 respectively to provide an air passage 13 at the rear of the cabinet. Likewise the control panel drawer 14 is arranged so as to permit the circulation of cooling air past its rearward edge or through apertures 15 formed by perforating its bottom 16. It will be observed that the bottom 16 of the control panel drawer forms a horizontal baffle below the cover 4 which contains the

heating unit. Thus, the cooling air which enters from the bottom of the cabinet and flows up through the passage 13 must pass entirely through the length of the heating unit, entering from the rear and finally passing out through the louvers 8 in the front wall of the cover. This ventilating arrangement permits the cover 4 to be closed before the heating unit has cooled off, and prevents damage which otherwise might result from closing the cover immediately after the machine has been used.

Referring now to Fig. 2, which is a view looking toward the underside of the cover 4 when in its raised position, the heating unit is shown as consisting of a series of heater tubes 17 horizontally arranged one above the other. The heater tubes 17 extend between the side walls 6 within the cover 4. The side walls 6 may conveniently be provided with hollow columnar extensions, or posts, 18 to which the heater tubes 17 are secured and within which the electric bus connections may be carried. I prefer to provide a series of inclined ventilator vanes 19 which are mounted between the heater tubes 17, being suitably secured to the posts 18. The vanes 19 deflect the hot air away from the handles of the wave clips attached to the heater tubes 17, keeping them cool. Collars 20 may be attached to the heater tubes 17 near their points of engagement with the posts 18 to prevent attachment of the wave clips to the heater tubes 17 at a point too close to the posts 18. Heater tubes 17 may be formed of a metal of high heat conductivity and capacity, such as aluminum, and are of such dimensions as to permit wave clips to be clamped directly thereto. The heater tubes may, of course, be designed to conform with any desired type of heating clip such that the heat storage parts of the clip fit closely around the heater tubes to be heated thereby. The design and construction of the wave clips themselves form no part of the invention. The wave clips may be left on the heater tubes 17 when the cover 4 is lowered to close the cabinet.

On the control panel there is mounted a voltmeter 21, main pilot light 22, a series of pilot lights 23 each in circuit with one of the heating elements, a corresponding series of switches 24 and a control clock 25, the wiring connections for which will be described later.

Referring to Fig. 3, I shall now describe the means which I have provided for moving the control panel drawer 14 forwardly and rearwardly responsive to movement of the cover 4 between its open and closed positions. The side walls 6 of the cover are extended beyond the hinge 5 as at 26, this extension being offset inwardly by an amount sufficient to permit it to pass within the side walls 1 of the cabinet when the cover is lowered. Secured to the panel drawer 14 in any convenient manner is a notched plate 27 arranged for cooperation with a bracket 28 secured to the extension 26 of the cover 4. The upper edge of the plate 27 forwardly of the notch 29 formed therein may be arcuately formed, as at 30, on a radius struck from the axis of the hinge 5 with the parts in the position shown in which the panel drawer 14 is moved outwardly to bring the control panel into view beyond the front of the cabinet. The upper edge of the plate 27 rearwardly of the notch 29 may be arcuately formed as at 31 on a radius struck from the axis of the hinge 5 when the panel drawer 14 is in its rearward position as indicated by the dot-dash lines 32. The purpose of this construction

will be described later. The path of movement of the bracket 28 during closing of the cover 4 is indicated by the arrow *a*.

Referring to Fig. 4, I shall now describe the means associated with the cover and panel drawer for holding these parts in their opened and closed positions. For this purpose spring means are provided, which, as shown, consists of a bracket 33 secured to the panel drawer 14. The bracket 33 has a pair of upwardly extending arms 34 and 35. The forward arm 34 has a finger 36 for engagement with a bracket 37 secured to the extension 26 of the cover 4 at some point removed laterally from the bracket 28 previously described with reference to Fig. 3. The bracket 34 also has a rounded projection 38 for engagement with another part of the bracket 37 as shown in Fig. 4. The dot-dash lines 37', 35' in this view indicate the respective positions of the bracket 37 of the cover and the rearward arm 35 of the bracket secured to the panel drawer 14 when the cover is lowered to bring the panel drawer 14 into its rearward position. The operation of the locking devices thus provided will be described later. The path of movement of the bracket 37 during closing of the cover is indicated by the arrow *b*.

Referring now to Fig. 5, I shall describe the means associated with the cover 4 and panel drawer 14 for opening and closing the main electric circuit in response to the closing and opening of the cover 4. Mounted in any convenient manner on the panel drawer 14, as by means of a bracket 39 secured to the bottom 16 thereof, is a switch 40 having an actuating arm 41 pivotally mounted thereon at 42. The upper end of the actuating arm 41 engages, at 43, a bracket 44 secured to the extension 26 of the cover 4 at some point removed laterally from the brackets 28 and 37 described with reference to Figs. 3 and 4 respectively. The other end of the actuating arm 41 engages, at 45, a spring-pressed plunger 46, adapted to open and close an electric circuit 47 in response to movement of the actuating arm 41. The position occupied by the panel drawer and switch when the cover is closed is indicated by the dot-dash lines at 14', and 40', 41' respectively. In this position the plunger 46 is pressed outwardly by a spring (not shown) into the position shown at 46', thereby breaking the circuit 47. The path of movement of the bracket 44 during closing of the cover is indicated by the arrow *c*.

I shall now describe the operation of the mechanism illustrated in Figs. 3, 4 and 5. It should first be explained, however, that the particular location of the notched plate 27, bracket 33 and switch 40, and of the cooperating brackets 28, 37 and 44, as respects the lateral position of each pair of cooperating elements with relation to the others, is immaterial to the operation of this mechanism except, of course, that they should be so arranged as not to interfere with one another. For example, a notched plate such as the member 27 may be provided at each side of the panel drawer 14, conveniently being secured to the side walls of this drawer; and the bracket 33 and switch 40 can then be secured in place to the bottom wall 16 of the panel drawer 14 at points intermediate its side walls. Let us first consider that the parts are in the respective positions shown in full lines in Figs. 3, 4 and 5 with the cover 4 in its open, or operating, position, and that the panel drawer 14 in its forward position,

i. e., to the left as viewed in these figures. It will be seen that with the parts in this position the panel drawer 14 cannot be moved to the right without closing the cover 4 by reason of the engagement of the bracket 37 of the cover with the finger 36 on the forward arm of the bracket 33 secured to the panel drawer. Movement of the panel drawer 14 to the right is also restrained by the engagement of the bracket 28 of the cover with the arcuate surface 30 of the plate 27 secured to the drawer. Lowering of the cover 4 is restrained by the engagement of the bracket 37 (Fig. 4) with the rounded projection 38 at the end of the forward arm 34 of bracket 33. This arrangement constitutes a spring clip which is self-disengaging upon pulling the cover 4 forwardly to spring the bracket 37 past the projection 38. This is permitted by the flexing of either the projection 38 or the forward arm 34 of the bracket 33. During the initial closing movement of the cover 4, the engagement of the bracket 28 with the arcuate surface 30 continues to prevent movement of the panel drawer 14 to the right. After the bracket 28 passes beyond the end of the arcuate surface 30 it enters the notch 29 of the plate 27 and is brought into engagement with the rear side wall of that notch. During the next increment of the closing movement of the cover the engagement of the bracket 28 with the side wall of the notch 29 carries the drawer 14 to the right until it reaches the position shown at 32 in Fig. 3 where the bracket 28 leaves the notch 29 and swings along the arcuate surface 31. Before the bracket 28 passes beyond the end of the arcuate surface 31, the bracket 37 comes into engagement with the rearward arm 35 of the bracket 33 (Fig. 4). Thus, at all times the drawer 14 is prevented from moving forwardly from its closed position except as permitted by subsequent opening of the cover 4. The rearward arm 35 of bracket 33 preferably is resilient so as to permit the rectangular end of bracket 37 to spring into the position shown at 37' in Fig. 4. During the movement of the cover 4 and drawer 14 into their closed positions, the bracket 44 (Fig. 4) travels to the right a greater distance than does the switch 40 associated with the panel drawer 14. Therefore the arm 41 is permitted to swing to the right about the pivot 42 in response to the pressure exerted by the spring-pressed plunger 46, breaking the electric circuit 47.

Referring to Figs. 6 and 7, I shall now describe the manner in which the heater tubes 17 and electrical resistance elements are mounted in the cover 4. The side walls 48 of the posts 18 are apertured at 49 to receive the ends of the heater tubes 17. The apertures 49 are of generally circular shape but have inwardly projecting tongues 50 (Fig. 7) arranged to extend through notches 51 in the ends of the tube 17. This engagement prevents the tube 17 from turning. An electrical resistance heating element 52 extends through the center of the tube 17 and is supported in spaced relation to the tube by a refractory collar or other insulating support 53, and by similar supporting members 54 surrounding the resistors 52 adjacent the walls 48 of the posts. The supporting members 54 engage the ends of the tongues 50. The clips 55 are formed to surround the members 54 and to engage the outside of the side walls 48 of the posts. They may be of a flat metal strip doubled over at 56 with its ends bolted together at 57. The clips 55 also may be arranged to extend through a pair

of the notches 51 in the ends of the heater tubes 17 so that when the clips are put in place and the bolts 57 tightened, the heating elements 52 will be held both against longitudinal movement and against rotation with respect to the posts 18. The core of the resistance element 52 is threaded at each end for attachment of the bus connections 58 and 59 by means of nuts 60, 60. The clip construction which has been described permits convenient tightening of the nuts 60 by reason of preventing the rotation of the resistance element 52. With this construction it is also very easy to remove a worn out resistance element and replace it with a new one. This is done by removing the heating unit from the cover so as to expose the bus connections, removing the outer nuts 60 adjacent the bus bar 59, loosening the bolt 57 of the corresponding retaining clip 55 and removing the flexible bus connection 58 at the other end of the resistance element after which it can be withdrawn from the heater tube 17.

The preferred electric wiring connections are shown in the diagram, Fig. 8. The resistance elements 52 are connected together in parallel, with a bus 59 at one end, and leads 58 at the other, through the series of independent circuit switches 24. A pilot light 23 is also arranged in each heater circuit. The main pilot light 22, the voltmeter 21 and the clock 25 are arranged in the main heater circuit for operation independently of the individual switches 24. The leads 61 from this main circuit are connected to a suitable source of electric energy.

The timing clock 25 may be of any suitable construction known to the art and its function is to actuate a circuit breaker in the main circuit so as to turn off the heating elements after a predetermined time interval has elapsed. The selection of the time interval depends upon the voltage and the amount of heat which is to be stored in the wave clips for the production of a particular type of wave. To aid in the selection of the proper clock setting a table may be provided correlating voltages with the various types of waving operations and hair textures. As soon as the time clock 25 is set, the main pilot light 22 will light and will remain lighted until the set time has elapsed, after which it will go out, indicating that the wavers are ready for use.

It will be understood that various modifications may be made in the structure which I have described specifically. The terms and expressions which I have employed are used as terms of description and not of limitation and I have no intention of excluding such equivalents or variations of the invention described as may fall within the purview of the claims.

I claim:

1. Hair waving apparatus comprising a cabinet and a cover hingedly connected thereto, heater elements mounted in said cover for movement therewith into and out of operating position, an air inlet in said cabinet located below and to the rear of said heater elements, and an opening in the front of said cover arranged to permit air to be drawn into said air inlet and past said heater elements, thence out at the front of said cover when the cover is in closed position.

2. Hair waving apparatus comprising a cabinet and a cover hingedly connected thereto, a series of parallel heater elements mounted in said cover for movement therewith into operating position with said elements horizontally arranged one above the other and into closed position with said elements arranged side by side, and an air passage

through said cabinet and cover arranged to permit air to circulate through a portion of the cabinet and through the cover past said heater elements when the cover is closed, said passage comprising an inlet in said cabinet and an outlet in said cover.

3. Hair waving apparatus comprising a cabinet and a cover hingedly connected thereto, said cover having side and front walls, a series of parallel heater elements extending between said side walls within said cover, an air outlet in said front wall of said cover, a horizontal baffle in said cabinet below the position occupied by said heater elements when the cover is closed, and an air passage at the back of said cabinet leading past said baffle to a point on the opposite side of said heater elements from said outlet.

4. Hair waving apparatus comprising a cabinet and a cover hingedly connected thereto, said cover having side and front walls, a series of parallel heater elements extending between said side walls within said cover, an air outlet in said front wall of said cover, a horizontal baffle in said cabinet below the position occupied by said heater elements when the cover is closed, said baffle being perforate at the back of said cabinet, and an air passage leading past said baffle to a point on the opposite side of said heater elements from said outlet.

5. Hair waving apparatus comprising a cabinet and a cover hingedly connected thereto, said cover having side and front walls, a series of parallel heater elements extending between said side walls within said cover, an air outlet in said front wall of said cover, a horizontal baffle in said cabinet below the position occupied by said heater elements when the cover is closed, said baffle being arranged for horizontal movement rearwardly toward and forwardly away from the back of said cabinet, means associated with said cover and baffle for causing said forward movement of the baffle to take place responsive to movement of said cover to its open position and for causing said rearward movement to take place responsive to movement of said cover to its closed position, and an air passage at the back of said cabinet leading past said baffle.

6. Hair waving apparatus comprising a cabinet and a cover hingedly connected thereto, said cover having side and front walls, a series of parallel heater elements extending between said side walls within said cover, an air outlet in said front wall of said cover, a horizontal baffle in said cabinet below the position occupied by said heater elements when the cover is closed, said baffle being arranged for horizontal movement rearwardly toward and forwardly away from the back of said cabinet, means associated with said cover and baffle for causing said forward movement of the baffle to take place responsive to movement of said cover to its open position and for causing said rearward movement to take place responsive to movement of said cover to its closed position, and an air passage at the back of said cabinet leading past said baffle, said baffle carrying at its forward end a control panel for said heater elements.

7. Hair waving apparatus comprising a cabinet and a cover hingedly connected thereto, electric heater elements mounted in said cover for movement therewith into and out of operative position, an inclined control panel for said heater elements mounted for horizontal sliding movement with respect to said cabinet, and means associated with said cover and panel for causing said panel to move forwardly when said cover is raised into op-

erative position and to move rearwardly when said cover is lowered.

8. Hair waving apparatus comprising a cabinet and a cover hingedly connected thereto, electric heater elements mounted in said cover for movement therewith into and out of operative position, an inclined control panel for said heater elements mounted for horizontal sliding movement with respect to said cabinet, and means associated with said cover and panel for causing said panel to move forwardly when said cover is raised into operative position and to move rearwardly when said cover is lowered, said means also being arranged to prevent movement of said panel independently of said cover.

9. Hair waving apparatus comprising a cabinet and a cover hingedly connected thereto, electric heater elements mounted in said cover for movement therewith into and out of operative position, an inclined control panel for said heater elements mounted for horizontal sliding movement with respect to said cabinet, means associated with said cover and panel for causing said panel to move forwardly when said cover is raised into operative position and to move rearwardly when said cover is lowered, and spring means associated with said cover and panel for holding said cover in raised position and for holding said panel in forward position.

10. Hair waving apparatus comprising a cabinet and a cover hingedly connected thereto, heater elements mounted in said cover for movement therewith into and out of operative position, an inclined control panel for said heater elements mounted for horizontal sliding movement with respect to said cabinet, means associated with said cover and panel for causing said panel to move forwardly when said cover is raised into operative position and to move rearwardly when said cover is lowered, and means associated with said cover and panel for turning off said heater elements when said cover is lowered.

11. Hair waving apparatus comprising a cabinet and a cover hingedly connected thereto, heater elements mounted in said cover for movement therewith into and out of operative position, an inclined control panel for said heater elements mounted for horizontal sliding movement with respect to said cabinet, and means associated with said cover and panel for causing said panel to move forwardly when said cover is raised into operative position and to move rearwardly when said cover is lowered, and means responsive to movement of said cover for turning off said heater elements when said cover is lowered.

12. Hair waving apparatus comprising a cabinet and a cover hingedly connected thereto, said cover having side and front walls, a series of parallel heating elements extending between said side walls within said cover, said heating elements comprising tubular members engaging said side walls and supported thereby and members removably mounted in said tubular members, and means responsive to movement of said cover for turning off said heating elements when said cover is lowered.

13. In hair waving apparatus, a heater supporting frame having spaced side walls, tubular members extending across said frame, said tubular members engaging apertures in said side walls and being notched for engagement with tongues extending inwardly from the sides of said apertures, and heating elements within said tubular members.

14. In hair waving apparatus, a heater supporting frame having spaced side walls, tubular members extending across said frame, said tubular members engaging apertures in said side walls and being notched for engagement with tongues extending inwardly from the sides of said apertures, heating elements within said tubular members, supporting members associated with said heating elements, said supporting members engaging said tongues to maintain said heating elements in spaced relationship to said tubular members.

15. In hair waving apparatus, a heater supporting frame having spaced side walls, tubular members extending across said frame, said tubular members engaging apertures in said side walls and being notched for engagement with tongues extending inwardly from the sides of said apertures, heating elements within said tubular members, supporting members associated with said heating elements, said supporting members engaging said tongues to maintain said heating elements in spaced relationship to said tubular members, and retaining clips surrounding said supporting members and engaging the outsides of said side walls to removably secure said heating elements against longitudinal movement.

16. In hair waving apparatus, a heater supporting frame having spaced side walls, tubular members extending across said frame, said tubular members engaging apertures in said side walls

and being notched for engagement with tongues extending inwardly from the sides of said apertures, heating elements within said tubular members, supporting members associated with said heating elements, said supporting members engaging said tongues to maintain said heating elements in spaced relationship to said tubular members, and retaining clips surrounding said supporting members, each of said retaining clips engaging at least one of the notches in said tubular members to hold the heating elements against rotation.

17. In hair waving apparatus, a heater supporting frame having spaced side walls, tubular members extending across said frame, said tubular members engaging apertures in said side walls and being notched for engagement with tongues extending inwardly from the sides of said apertures, heating elements within said tubular members, supporting members associated with said heating elements, said supporting members engaging said tongues to maintain said heating elements in spaced relationship to said tubular members, and retaining clips surrounding said supporting members, each of said retaining clips engaging at least one of the notches in said tubular members to hold the heating elements against rotation and engaging the outside of one of said side walls to removably secure said heating elements against longitudinal movement.

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