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CHEMICAL HEATING PAD, PARTICULARLY USEFUL
IN PERMANENT WAVING OF HUMAN HAIR
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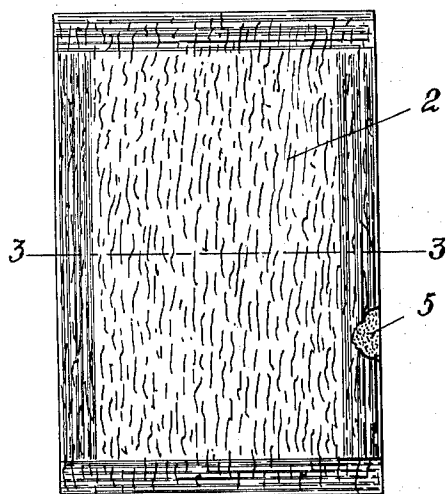


Fig. 1.

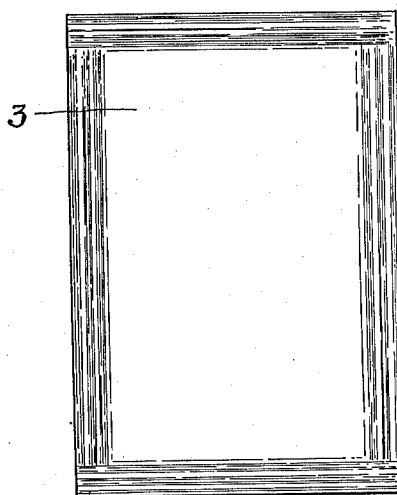


Fig. 2.

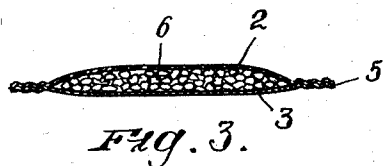


Fig. 3.

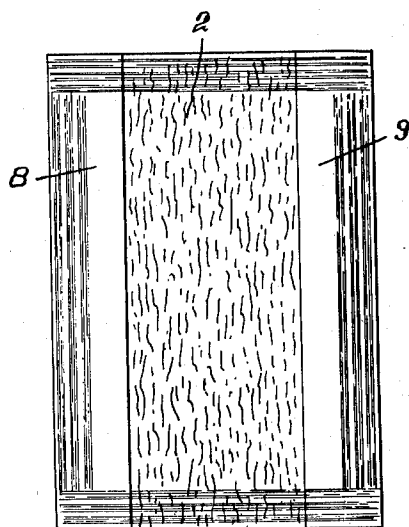


Fig. 4.

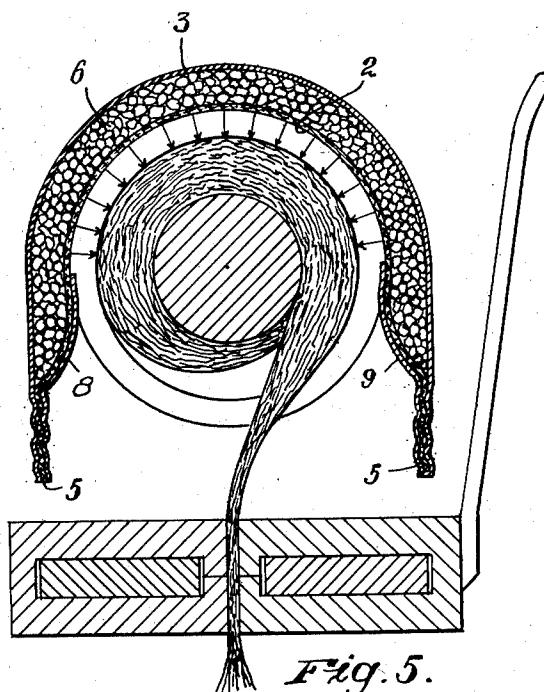


Fig. 5.

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CHEMICAL HEATING PAD, PARTICULARLY
USEFUL IN PERMANENT WAVING OF
HUMAN HAIR

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3 Claims. (Cl. 132—36.2)

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This invention relates to chemical heating pads and particularly to pads adapted for use in permanent waving of human hair.

Primary objects of this invention are to provide a chemical heating pad which will eliminate operation hazards, minimize likelihood of scalp burns, and which will give more uniform heating results and be more foolproof in the sense that failure of operators to follow precise instructions will not necessarily prevent generation of temperatures sufficiently elevated and of sufficient duration to accomplish the designed purpose of the pad in use. A further object of the invention is to provide a pad which may be properly activated and applied to the tress with fewer manual operations, thus saving time in the waving operation. A further object of the invention is to provide a pad which may be properly activated by a simple operation of dipping in an activating solution.

Chemical heating pads have fallen into two general groups: those with perforate and those with imperforate working surfaces. The perforate type, for example pads comprising envelopes having perforated foil or paper walls for the working surface, have the marked drawback of messiness. During handling the contents tend to sift through the perforations onto the outside of the pad and thence to the hands of the operator, to the hair or elsewhere. Significant amounts of contained chemicals may thus be lost during shipment and handling, so that the remaining amount may become less than that necessary to develop the designed operating heat. The perforations are also objectionable from the standpoint of providing paths of too easy escape for steam developed internally of the envelope after activation by moistening, with the result that the steam escapes from the pad in concentrated jets through the perforations, sometimes with such force as to cause serious scalp burns.

The present invention, recognizing the deficiencies of pads with perforate faces, is accordingly directed to pads falling within the second group and has an imperforate working face.

By providing pads with imperforate working faces, such as of paper, sifting of the enclosed chemicals has been prevented but such pads are resistant to activation because of the dense nature of the imperforate working face. The opera-

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tion of moistening the contents then becomes a very important operation. Usually this operation involves application of an absorbent fabric such as flannel, saturated with the activating solution, most always an aqueous solution, to the thin imperforate working face, and working the solution from the flannel with the fingers through the imperforate but water permeable working face. To prevent the face from disintegrating during this physical manipulation it must have considerable wet tensile strength, and this characteristic merely accentuates the difficulty of forcing the solution through the face. Ingress of an amount of solution sufficient for proper activation of the chemical is thus wholly dependent upon the operator's care and patience. If the operator carelessly shortens the time or amount of manipulation, only heat of inadequate temperature or duration may develop with resulting unsatisfactory performance.

A further defect of present-day imperforate pads is that their working faces tend to hold the solution in their pores so that the pad often "water wings" when the steam is internally generated, ballooning the pad, disturbing its placed relation on the tress, and sometimes causing, because the pad is clamped to the coiled tress, sudden puncture of a weak spot in the envelope releasing an uncontrolled and concentrated mass of steam with almost explosive force accompanied by discharge of the contained chemicals. These minor explosions are obviously highly dangerous.

Chemical heating pads of this invention in their preferred form are provided with working faces of unwoven, felted cellulosic fibers which have such high absorbency value and thickness that they are capable of practically instantaneously absorbing an amount of activating solution more than sufficient to activate the contained chemicals to the desired extent, and have porosities which avoid the water wing effect. If some manipulation is contemplated, adequate strength may be provided by reinforcing the porous face with reticulated fabric or the like. As thus constructed, by merely dipping the pad into the solution, the working surface will pick up in a very short period of time more than the required amount of solution and rapidly transfer to the contents, with little or no manipulation, an amount of that solution adequate for satisfactory

activation. With a pad that can thus absorb and transfer all the solution necessary, it is not essential that the working face have the wet-strength to withstand the extensive manipulation necessary to force solution from an extraneous absorbent through a face that does not hold all the solution necessary, and accordingly the working face can have a porosity in ranges wholly impractical where extensive manipulation is contemplated. Thus the porosity of absorbent material working faces of this invention may be just short of that necessary to prevent sifting of the chemical and in such ranges of porosity that the "water wing" effect is not present.

Typical chemical heating pads of this invention are shown in the accompanying drawings, in which

Fig. 1 is a face view of one form of chemical heating pad of this invention;

Fig. 2 is a back view of the pad shown in Fig. 1;

Fig. 3 is a section taken along the line 3—3 of Fig. 1;

Fig. 4 is a face view of a modified form of heating pad embodying the invention; and

Fig. 5 is an enlarged sectional view diagrammatically showing the pad of Fig. 4 positioned over a coiled tress during the waving operation.

As shown in the drawings, the pad of Figs. 1 to 3 comprises an envelope having a front wall 2 formed of an imperforate, absorbent material pervious to moisture, and having a back wall of an impervious material 3. These two materials are sealed at their edges by a heat sealing thermoplastic resin adhesive, indicated by the reference 5. Sealed within the envelope is the desired amount of exothermic composition 6.

The back material is preferably non-absorbent metal foil such as aluminum foil, 1 mil thick, although other suitable materials are parchment paper, resin treated paper, or metal foil laminated to paper. Preferably, the back wall should be of sufficient thickness and/or of such nature that it will have sufficient moldability to hold the pad in position about the tress of the hair, though this is not essential.

The exothermic composition 6 may be any one of the chemicals commonly used in chemical heating pads and which are activated upon application of water or some other solution to generate heat.

The adhesive 5 is of the heat-sealing type and can be applied either to the back or face material or both, which may then be pressed together at a temperature above the softening point of the resin without application of moisture and without activating or disintegrating the enclosed exothermic composition. The seal is effected with cooling. The thermo-plastic resin should maintain the seal at the temperatures normally encountered in machineless permanent waving operations, i. e., from about 200° to 220° F., so that the pad will not separate during the waving operation. We have found that resins of the polyvinyl type, especially vinyl chloride acetate copolymer resins having softening points exceeding 212° F., are particularly suitable. Properly plasticized cellulose derivative resins may also be used.

As is usual in heat-sealing, the edge may be flat or ridged in any manner found to secure the most effective seal.

The face material is preferably essentially a cotton felt which may or may not be reinforced by internal or external lamination or other assembly with stranded fibers, such as an open

mesh reticulated gauze or other textile fabric. The thickness and kind of felt is such that when immersed in water at 70° F., for 10 seconds and allowed to drain for 10 seconds at 70° F., it retains an amount of absorbed water at least equal to 0.2 grams per square inch, a suitable range being from 0.20 to 1.00 gram per square inch. In addition to such water holding capacity, the felt has a porosity in the range which will prevent the water wing effect. Since the porosity of suitable materials is very high, standard methods of porosity test are not sufficiently accurate for the purpose of defining the limits of suitable porosity for the purposes of this invention. Accordingly A. S. T. M. air permeability test known under the tentative designation D 726-43T is modified so that porosity is defined as the average number of seconds required for the displacement of 400 ml. of air through an area of one square inch of four thicknesses of the material. As thus measured, preferred felts of suitable porosity are those having an air permeability value (porosity) of about 5 seconds as determined on a Gurley Densometer. These particular materials may have a caliper running between about 6 and about 15 mils and have a water absorbing capacity exceeding 0.2 grams per square inch.

In general, porosity as above defined is preferably within the range of from 0.5 to 10 seconds although if slight sifting of the chemical composition is permissible, the range can go as low as 0.1 seconds and can go as high as 100 seconds, particularly when the pad contains a relatively slow-starting and gentle-acting exothermic composition. Suitable materials may be designed or selected which will assume the desired porosity properties under conditions of use. For example, the presence of fillers or sizings in the absorbent material may decrease the porosity of the fabric in the dry state. However, if these materials are affected by the activating operation, the fabric may assume the desired properties. In selecting such materials, therefore, their porosities should be evaluated either before the filling or sizing materials have been added or after they have been removed or disrupted as by the pad activating step. Without regard to added materials, other physical changes in the fabric may also be induced by the activating operation which will bring the porosity properties of the absorbent material within the desired range. Materials that soften and decrease in density upon treatment with the activating solution should be evaluated for porosity after these physical changes have taken place.

With the face thus constructed with careful attention to the water-holding capacity and porosity of the fabric, a pad is provided which is practically foolproof when activated by a dipping operation as shown by the following experiment:

Pads each having over-all dimensions of 1½ by 2¾ inches and containing 5.5 grams of an exothermic composition were dipped in water for various lengths of time, and the time required for the pad to start steaming after the start of dip, the peak temperature obtained and the time the temperature remained above 220° F. were noted. The temperatures were measured by placing each pad, after removal from the dipping solution and after pressing the absorbent face of the pad against a dry absorbent surface, on an iron rod weighing 32 grams, 3½ inches long by ¾ inch in diameter with a ¼ inch hole concentrically bored through the length of the rod

for a distance of 2½ inches. The thermometer was placed in the bore for recording the temperature.

The following results were obtained:

Dipping Time, in Seconds	Time Interval in Seconds between Start of Dip and Start of Steaming	Peak Temperatures Attained, in Degrees F.	Time in Minutes Temperature Remained Above 200° F.
1	61	221	6
2	57	217	6
3	53	218	6
4	47	218	6
6	59	219	6
8	53	214	6
10	60	218	6

From this table it can be seen that all three criteria by which a beautician judges a pad, i. e. (1) the time required for the pad to start steaming, (2) the heat developed, and (3) the length of time the pad remains hot, are uniform within the practical dipping time range of one to ten seconds. The slight variations recorded in the scientific test are well within usual experimental error when testing two pads under identical conditions and would not be noticeable to a beautician.

With this pad, thereto, no fumbling with absorbent pads or manipulation is necessary and the beautician can be assured of uniform and satisfactory performance merely by dipping the pad. Elimination of separate absorbent pads is a great boon to the operator, because of the time-saving involved. The usual messy pile of wet absorbents, difficultly separated and applied to the pad, is dispensed with.

Because the pad has considerable thickness and bulk, necessary for providing adequate water-holding capacity, diffusion of electrolytes to the hair with resulting contamination and possible objectionable chemical action is not encountered, even though the pad is applied directly to the hair without interposition of a shield. Were a perforate pad or a pad having a thin imperforate face dipped, even if done exceedingly carefully to properly control the activation, some sort of an absorbent or equivalent material to serve as a shield would still be necessary to prevent diffusion of electrolytes directly onto the hair either through the perforations or through the thin pervious face. Furthermore the performance of the preferred pad of this invention is practically independent of the dip interval within the commercially desirable range of one to ten seconds.

While cotton felt with or without a lamination of woven fabric has been described as having the physical characteristics, as above defined, necessary for use in fabricating the improved pads of this invention, other absorbent fibrous sheets of a cellulosic nature may be utilized, including certain bibulous papers of similar or even less caliper down to 1 or 2 mills. Some such papers have all the necessary qualities except that of wet-strength or water-holding capacity. If, however, the porosity of such papers falls within the preferred porosity range heretofore

defined, wet-strength deficiency may be overcome by providing a reticulated fabric reinforcement, and inadequate water-holding capacity may be corrected by application of a saturated absorbent material to the face with manipulation. Because of proper porosity, the amount of manipulation required is greatly reduced and ballooning is entirely eliminated.

In Fig. 4, we have shown a modified form of pad wherein the back imperforate wall has been folded over the front longitudinal marginal portions of the face material 2. This modification is sometimes desirable in order to provide baffles 8 and 9 which protect the scalp by directing the egress of steam to the central un baffled area which is further removed from the scalp. The effect of the baffles is shown in Fig. 5, the arrows indicating the direction of application of steam towards the tress. For purposes of clarity a space is shown in Fig. 5 between the face 2 and tress, although as hereinbefore stated, in actual use the face 2 would be in direct contact with the tress.

In the case of the pad of Fig. 4, the adhesive material is applied in the same manner around the edges of the pad, the baffle portions 8 and 9 lying over but not being attached to the face material 2 except along the marginal edge portions of the pad as indicated.

We claim:

1. A chemical heating pad adapted for use in permanent waving of human hair having at least a portion of one face thereof formed of an imperforate but moisture-pervious, absorbent sheet comprising unwoven, felted cellulosic fibers and an exothermic composition contained within said pad beneath and contacting said sheet, said sheet having a moisture absorbency and retentivity such that when immersed in water at 70° F. for 10 seconds and allowed to drain for 10 seconds at 70° F., it retains an amount of absorbed water at least equal to 0.2 grams per square inch and said sheet, when free of contained water-soluble materials, having a porosity as defined in the accompanying specification of 0.1 to 10 seconds.

2. A chemical heating pad as claimed in claim 1 wherein said sheet consists essentially of cotton fibers.

3. A chemical heating pad as claimed in claim 1 wherein the said porosity is about 0.5 to 10 seconds.

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