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J. H. T. ROBERTS

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ELECTROTHERAPEUTIC APPARATUS

Filed Feb. 24, 1928

Fig. 1.

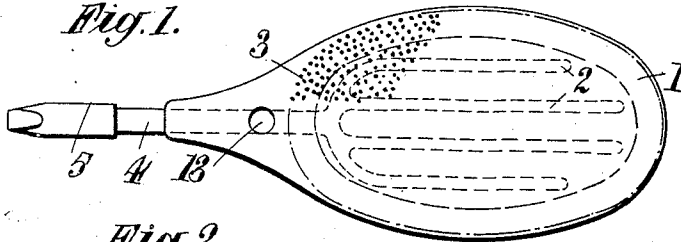


Fig. 2.

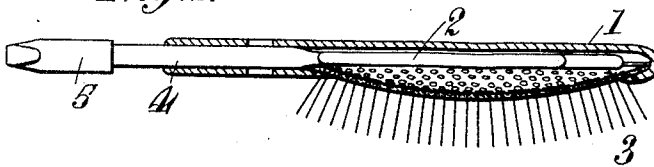


Fig. 3.

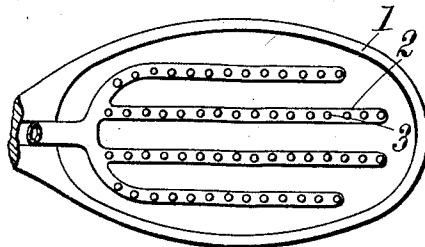


Fig. 4.

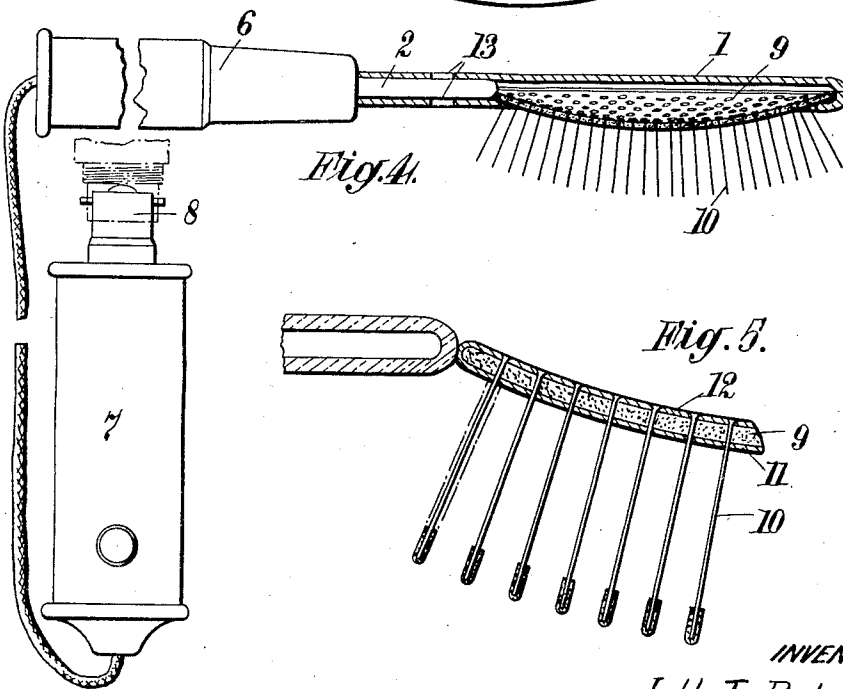
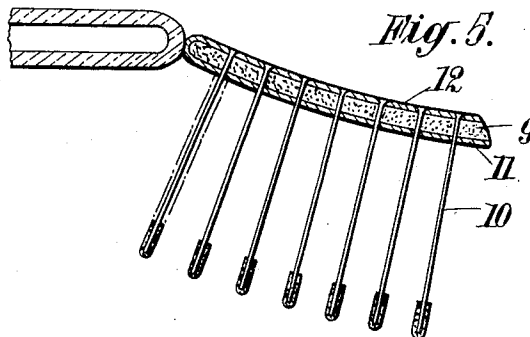


Fig. 5.



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ELECTROTHERAPEUTIC APPARATUS.

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This invention relates to electro-therapeutic apparatus and has reference to apparatus of the kind exemplified by the so-called "violet-ray" sets which usually include some means for the generation of high-frequency high-tension electric current and usually make use of a suitably exhausted hollow-glass electrode or "applicator" for applying the electricity to the affected part. Such apparatus is popularly (although not strictly correctly) called "violet-ray" apparatus and is sometimes, and more correctly, referred to as "high-frequency" apparatus.

As already mentioned, in apparatus of this kind it is customary to employ suitably exhausted glass-tube electrodes. These electrodes take various forms, some of the commonest forms being surface or simple bulb-like or tubular electrodes, combs, rakes and so on. In the case of the comb, the electrode is usually made in the form of a straight glass tube from which project at right-angles, and at distances of perhaps half-an-inch, a series of short glass side-pieces resembling the individual teeth of a comb.

The chief object of the present invention is to provide a new apparatus of the kind referred to, such apparatus taking the form of an electro-therapeutic hair brush.

In certain constructional details, hair brushes in accordance with the present invention may comprise features that are common to electrical hair brushes of known form as, for example, in the use of bare or partly-insulated metal bristles and a convex rubber mounting therefor, but a characteristic of the present invention is the use of high-frequency high-tension current as distinct from low-frequency high-tension current (such, for example, as produced from a battery with interrupter and induction coil) this fundamental distinction being exemplified by the necessity of providing for a complete circuit for the low-frequency current of prior constructions whereas the high-frequency current or "electrical discharge" used according to my invention requires no special provision of that kind.

The electro-therapeutic hair brush according to the present invention comprises bris-

tles or their equivalent as hereinafter described, an electric discharge tube, means whereby high-frequency high-tension electric current is conveyed, preferably through the handle, to the back of the brush and means whereby this current is caused to spread an electro-therapeutic discharge over substantially the entire bristle area of the brush.

The electro-therapeutic effect may take place merely by distributed proximity of the applicator to the bristles (and the head of the user) or by electrical conductivity from the applicator thereto and in the latter case the bristles may advantageously take the form of metal pins carried by a rubber or other resilient sheet rendered superficially conducting as between all the pins by a metal sheet or coating as hereinafter more fully described with reference to the preferred constructional embodiment of the invention.

In order that the invention may be clearly understood and readily carried into effect, I will now describe the same more fully with reference to the accompanying drawings in which:—

Figure 1 is a plan or face view of the main portion or body of an electro-therapeutic hair brush in accordance with the present invention, and Figure 2 is a longitudinal sectional view of the same.

Figure 3 is a fragmentary view of a modified form of the brush, the "bristles" in this form being constituted by prong-like extensions on a branched applicator.

Figure 4 is a sectional elevation of a complete outfit including the brush proper in its preferred constructional form.

Figure 5 is a fragmentary enlarged view corresponding with Figure 4 but showing also insulating covering which may be used upon the whole or the ends of the bristles.

The "bristles" of a brush in accordance with the present invention may be bristles as ordinarily understood or bristles in the form of rigid pins or partially exhausted prongs or partially exhausted tubing, and the means for producing in through or near them an electro-therapeutic discharge may be mount-

ed or inserted upon or within the back of the brush in any convenient manner.

In the construction shown in Figures 1 and 2, there is mounted within the brush back or case 1 an applicator 2 suitably branched to carry the electricity substantially over the surface of the part of the brush in which the roots of the bristles 3 are embedded. The portion or shank 4 of the applicator passes through a hole in the neck of the brush and terminates in a hollow metal cap or connector 5 for insertion in an applicator handle as seen in Figure 4. In this form of the brush, the bristles are preferably of comparatively short length so that when the brush is applied to the head, the high frequency branched applicator tube comes into fairly close proximity to the skin.

Figure 3 illustrates a modified form of the hair brush, the "bristles" in this case being constituted by short glass tubes in prong-like formation on the branches of an applicator tube mounted in a brush back. The mounting of the applicator tube in this construction is preferably resilient, as for example by being composed of a rubber pad in which the tube is partly buried or to which it is attached, so that when the prongs are pressed against the head of the user they are sufficiently yielding to cause no discomfort or inconvenience. The prongs themselves may if desired be tipped or enveloped in insulating material such for example as rubber or ebonite.

Referring now to Figures 4 and 5, the reference numeral 6 represents an applicator handle and the numeral 7 represents a generator of high-frequency high-tension current from ordinary electric lighting current, one end 8 of the generator being adapted for insertion in an electric lamp socket. If desired the elements 7 and 6 may be united into a single structure.

The applicator 2 is a nearly exhausted tube, preferably of glass, terminating at one end in the metal plug 5 for insertion in the handle 6 and is removably secured by screwing or otherwise, or permanently secured, by cement or other suitable material, in a hole in the neck of a hair brush-back carrying numerous bristles 10. The purpose of the nearly-exhausted glass discharge tube applicator is partly to enable the discharge to be visible and so to conform to established public taste in the matter of high-frequency apparatus and partly, by reason of its electrical resistance and the electrical "condenser effect" which is obtained, to modify or tone down the nature of the electro-therapeutic effect obtained between the brush and the head. It may be observed here that the high-frequency high-tension current from the generator 7 has a path of entry to the brush by way of the applicator 2 but has no return or exit path, such as would be absolutely essential if low-frequency electricity were being employed.

It may be explained at this point that the basis upon which the therapeutic value and possibilities of high-frequency electricity are founded is as follows:—If alternating (or intermittent) electric current is applied to the human body at low frequency (up to a few hundreds per second) the sensation (if a sufficiently high voltage to pass any appreciable current through the high resistance of the body is used) is very unpleasant or extremely painful. Consequently it is possible to apply only limited voltages so as to limit the amount of current passing through the body. This is the basis of ordinary so-called "medical electricity" as supplied by a medical or "shocking" coil (which consists, in principle, of a step-up transformer excited by means of a vibratory or other interrupter in the primary circuit).

It was discovered some years ago, however, that if the alternations of the current are of an extremely high frequency (of the order which would be known to-day as "radio" frequency) quite an appreciable current may be passed through the human body (that is, quite a high voltage may be applied to drive the current) with little or no sensation, at least without the convulsive and painful sensations which are caused by any considerable amount of current passed at low-frequency. In fact, the sensation due to high-frequency current, if any sensation at all, amounts to a slight and pleasant tingling sensation. Upon this important physiological discovery has been based the whole science of high-frequency (or so-called "violet ray") therapeutic treatment, and the various high-frequency (so-called "violet ray") devices on the market to-day are almost invariably based upon the principle of the oscillatory and high-frequency discharge of an electrical condenser incorporated therein.

Electric hairbrushes which have hitherto been brought forward have all been adapted and contemplated to be used with low-frequency high-tension current (or with direct current, which may be regarded as current of zero frequency) and as only limited voltages can be used with such current (for the reasons explained above) these voltages have not been high enough to produce what may properly be called an electric "discharge" (including "corona" discharge, "brush" discharge and the various types of discharge commonly associated with the electricity produced by the old-fashioned electric "influence" machines). Consequently the electricity which can safely and comfortably be used with devices of previous types is not of sufficiently high voltage to jump across an air-gap and can only flow when the electric hairbrush is in actual contact with the body or head and also when there is a return path provided to complete the circuit.

Now the important and fundamental dif-

ferences between low-frequency electricity, as hitherto used, and high-frequency electricity as used for electric hair brushes according to the present invention can be readily appreciated. With high-frequency electricity the voltage used may be very much higher than that of low-frequency electricity and the high-frequency electricity discharges itself, in the manner of a "brush" discharge or otherwise, to any adjacent object, thus finding its way to "earth" without the necessity for any definite return path being provided.

A further important and characteristic feature of high-frequency electricity is that it is especially able to transfer its energy through or across substances which are ordinarily non-conductors. This explains why, in the present invention, the high-frequency electricity may be conducted through a nearly evacuated glass tube. The "conductor" in this case consists of the rarefied gas inside the tube and the energy is transferred across the insulating glass wall, between the conducting gas inside and any conductor which is placed outside, by means of a "condenser" action, the glass acting as the di-electric; a feature of this kind, if used with previous electric hairbrushes (that is, with low-frequency electricity) would for practical purposes prevent any transference of electrical energy through or across the insulator.

The bristles 10 are all connected together electrically so that the high-frequency electricity may have access to them all. This electrical connection may be effected by making the back of the brush of metal or by providing a metal sheet therein so that normally, or at least when the brush is pressed against the head, the roots of the bristles make sufficient contact with the metal sheet. Alternatively and in the preferred form as shown in Figures 4 and 5, the bristles are inserted from the back through the front of a convex sheet of rubber 9 whereof the front or back or the front and back is or are coated or faced (before or after being furnished with bristles) with metal paint or metal foil or the like conducting material indicated at 11 and 12 respectively in Figure 5, the applicator making contact at its tip with the metal paint or other conducting material. The convexity of the rubber 9 imparts an added resiliency to the bristles. The bristles themselves may be composed of any suitable material; they may for example be composed of metal which may be left bare or be tipped or enveloped with rubber, ebonite, glass or other insulating material.

The conductive layer or coating on the rubber sheet in so far as the front face of the rubber is concerned may be chosen to add to the attractiveness of the brush and with this object in view the coating may for example consist of gold paint or silver paint or bronze powder or tin foil faced if desired with var-

nish or celluloid or the like. The reference numeral 13 (Figs. 1 and 3) indicates an inspection hole through which the user can see when the electric discharge is operating, by observing the purplish glow in the applicator tube.

The term "hair brush" as used herein and in the appended claims is to be construed as a brush similar to a hair brush whether or not it is actually used for brushing the head or hair or for electric massage or therapeutic treatment of any other part of the body. Similarly the term "bristles" is to be construed as meaning ordinary bristles or the equivalent of ordinary bristles as hereinbefore described.

In the accompanying drawings the electro-therapeutic hair brush is shown adapted to be inserted in a well-known manner into a portion of the conventional high-frequency generating apparatus. It will be understood, however, that the high-frequency generating apparatus (or some portion of it as shown in Figures 4) may be permanently incorporated or combined with the hair brush. In this case the "back" of the brush may be provided with a suitable cover or housing in which the high-frequency generating apparatus (or the portion of it so used) may be mounted and enclosed, this portion of the apparatus being, of course, suitably modified in design or re-arranged in construction for the purpose in view.

What I claim is:—

1. An electro-therapeutic hairbrushing outfit comprising a generator of high-frequency high-tension current, a "violet-ray" applicator of the electrical resistance and condenser type, a handle therefor in electrical connection with said generator, a brush back on the other end of said applicator, and bristles in electrical condition with said applicator.

2. An electro-therapeutic hairbrushing outfit comprising a generator of high-frequency high-tension current, a "violet-ray" applicator of the electrical resistance and condenser type, a handle therefor in electrical connection with said generator, a brush back on the other end of said applicator, brush bristles, a resilient sheet of material carrying said bristles and carried by the brush back, and means for conveying the high frequency current to said bristles collectively.

3. An electro-therapeutic hairbrushing outfit comprising a generator of high-frequency high-tension current, a "violet-ray" applicator of the electrical resistance and condenser type, a handle therefor in electrical connection with said generator, a brush back on the other end of said applicator, metal pin-like bristles, a convex rubber pad carrying said bristles and carried by the brush back, and a conducting sheet of material in

contact with said applicator and with said bristles.

4. An electro-therapeutic brush comprising a partially exhausted glass tube "applicator" of the electrical resistance and condenser type, a metal cap at one end thereof insertable in a "violet-ray" applicator handle, a brush back secured to the other end of said applicator tube, bristles carried by said brush back, and means for causing high-frequency high-tension current entering by way of said tube to electrically discharge over substantially the entire bristle area of said brush.

5. An electro-therapeutic brush comprising a partially exhausted glass tube "applicator" of the electrical resistance and condenser type, a metal cap at one end thereof insertable in a "violet-ray" applicator handle, a brush back secured to the other end of said applicator tube, a resilient rubber pad carried by said back, metal bristles mounted in said pad, and an electrically conducting sheet on said pad electrically connecting the bristles with one another, the tip of the applicator tube being in electrical connection with said conducting sheet.

6. An electro-therapeutic brush comprising a partially exhausted glass tube "applicator" of the electrical resistance and condenser type, a metal cap at one end thereof insertable in a "violet-ray" applicator handle, a brush secured back to the other end of said applicator tube, a resilient rubber pad carried by said back, metal bristles mounted in said pad and a coating of metallic paint on said pad, the applicator being in electrical contact with said coating.

7. An electro-therapeutic hair brush comprising "bristles" or their equivalent, an electric resistance and condenser applicator device whereby high-frequency high-tension electric current is conveyed to the back of the brush and means whereby this current is caused to spread an electro-therapeutic discharge over substantially the entire bristle area of the brush.

8. An electro-therapeutic hair brush outfit comprising a generator of high frequency high tension electric current, a brush handle in electrical connection with said generator, a brush back, a so-called "violet ray" applicator device of the glass tubular partially exhausted electric resistance and condenser type embodied in the brush back, a metal cap on one end of said tube insertable in said handle, a rubber pad carried in said brush back, metal bristles mounted in said pad, and an electrically conducting coating on said pad to electrically connect said bristles, said coating being electrically connected to the applicator tube.

In testimony whereof I have signed my name to this specification.