

March 12, 1935.

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1,993,876

HAIR WAVING APPARATUS

Filed June 10, 1933

2 Sheets-Sheet 1

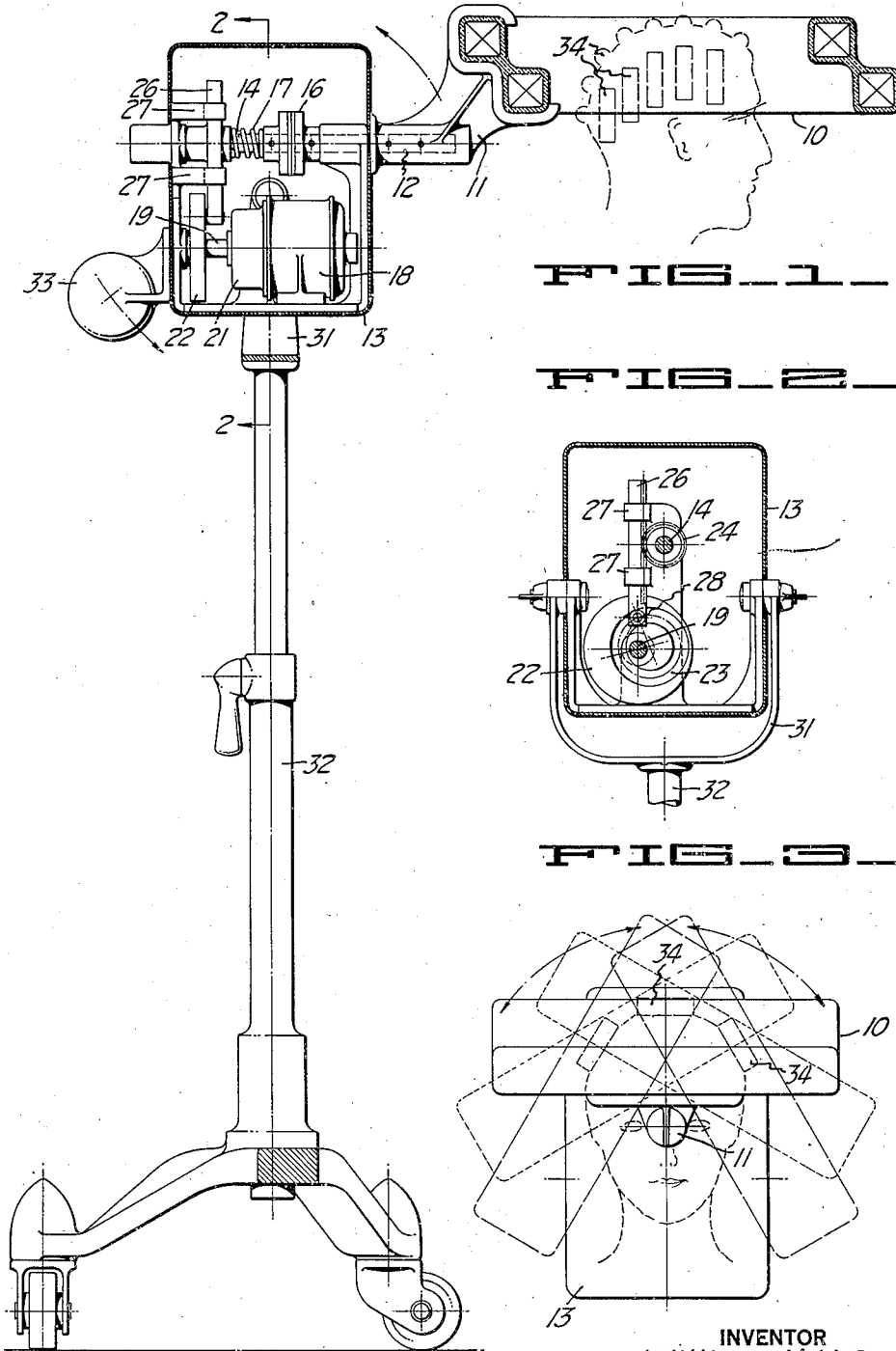


FIG. 1

FIG. 2

FIG. 3

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2 Sheets-Sheet 2

FIG. 5. FIG. 4.

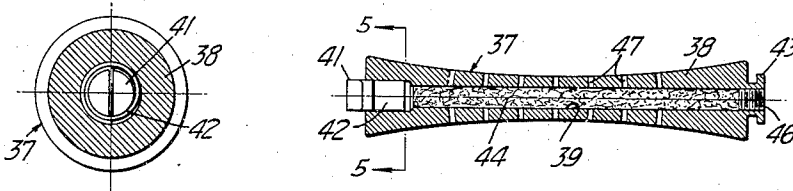


FIG. 7. FIG. 6.

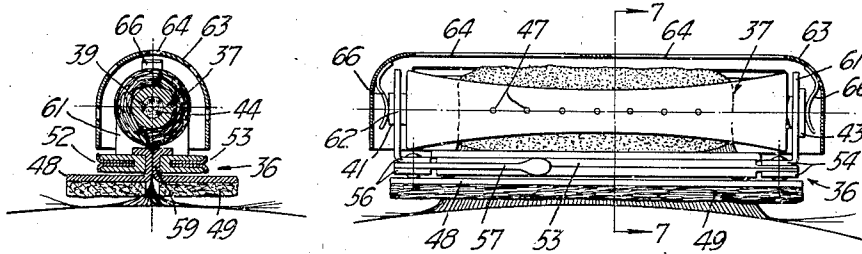
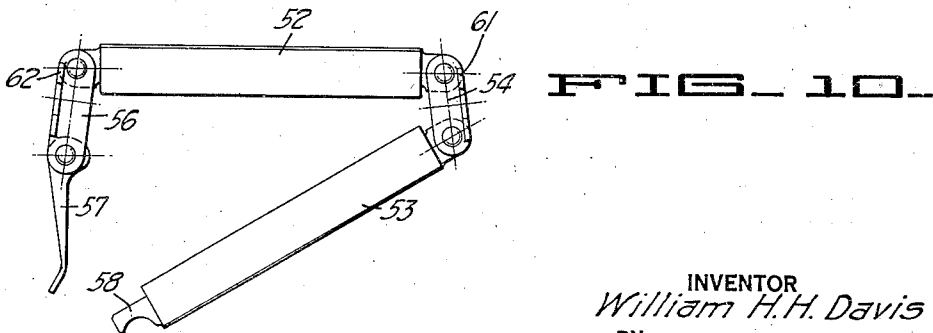
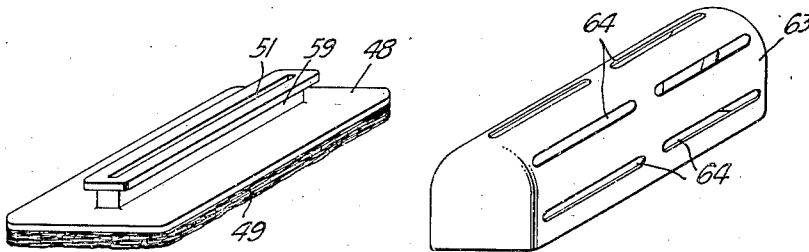


FIG. 8. FIG. 9.



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# UNITED STATES PATENT OFFICE

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## HAIR WAVING APPARATUS

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Application June 10, 1933, Serial No. 675,203

6 Claims. (Cl. 219—24)

This invention relates generally to hair waving apparatus and methods of the type in which heat is utilized to lend permanency to the wave.

It is an object of the invention to provide improved hair waving apparatus of the type in which heat is generated by induced electrical currents, and which will enable heating of all of the appliances applied to a head of hair during a single heating period.

A further object of the invention is to provide an apparatus and method of the above character in which heating by induced electrical currents can be selectively controlled, thus making it possible to prevent undue heating of certain individual appliances.

A further object of the invention is to provide a novel form of curler for use in conjunction with other hair waving appliances, whereby the curler itself may carry a part or all of the waving solution utilized.

Further objects of the invention will appear from the following description in which the preferred embodiments of the invention have been set forth in detail in conjunction with the accompanying drawings.

Referring to the drawings:

Figure 1 is a side elevational view, partly in cross section, illustrating a machine incorporating the present invention.

Fig. 2 is a cross sectional detail taken along the line 2—2 of Fig. 1.

Fig. 3 is a diagrammatic view illustrating the manner in which the coil structure is oscillated.

Fig. 4 is a side elevational view, in transverse cross section illustrating one of the curlers which I prefer to employ.

Fig. 5 is a cross sectional detail taken along the line 5—5 of Fig. 4.

Fig. 6 is a side elevational view, partly in cross section, illustrating an assembly of the curler shown in Figs. 4 and 5 with a protector, together with a magnetic shunt element for effectively reducing heating.

Fig. 7 is a cross sectional detail taken along the line 7—7 of Fig. 6.

Fig. 8 is a perspective view, illustrating the magnetic shunt element shown applied over the curler in Figs. 6 and 7.

Figs. 9 and 10 illustrate parts of the protector which may be utilized with my apparatus.

In permanent hair waving it is conventional practice to wind a strand of hair upon curlers or waving forms, and to then steam the hair by suitable electrical heaters to impart permanency to the hair. The heater elements are either of

the external or internal type, depending upon whether or not the electrical resistance conductors are incorporated in a separate structure to be applied to the exterior of the wrapped hair, or incorporated within the curlers. Waving apparatus of this character necessitates the use of electrical conductor cords for connecting the heating elements with the source of current supply. In order to obviate the use of such electrical connecting cords, it has been proposed to supply heat by induced electrical currents, in which event it is only necessary to place the appliances in a varying magnetic field. One difficulty with such apparatus has been that the coil structure which is utilized to create the varying magnetic field must be placed in at least two positions during a complete waving operation, to properly heat all of the waving appliances. This is by virtue of the fact that the elements within the appliances extend at different angles when a head of hair is completely prepared, while eddy currents to heat the same are induced only when these elements are in certain positions with respect to the axis of the magnetic field. A further difficulty has been that during a heating operation, an operator cannot reduce or control the heat applied to any one appliance. This is a serious disadvantage since the amount of heat required to properly wave a strand of hair depends somewhat upon the length of the strand and the condition of the hair. Where external elements of the resistance type have been used for furnishing heat, control has been effected by disconnecting the current supply to a particular heater, or by removing this heater while permitting the remainder of the appliances to be heated. The apparatus described herein utilizes induced electrical currents for supplying heat, but the disadvantages which have just been outlined, are effectively overcome.

Referring first to Fig. 1 of the drawings, the apparatus illustrated therein consists of a coil structure 10, which is adapted to be excited from a suitable source of alternating current and which serves the purpose of creating a varying magnetic field. This coil structure is adapted to embrace the head of hair being waved, but rather than to have it carried by a supporting structure in such a manner that it must be removed to different operating positions manually, I preferably provide mechanical means which serves to oscillate this structure recurrently during a waving operation. Thus the coil structure has been shown carried by a bracket 11 which in turn is secured to a shaft 12. Shaft 12 is journaled to

and extends outwardly from a suitable housing 13. Aligned with the axis of shaft 12 there is a second shaft 14, which is likewise journaled to housing 13. Interposed between the shafts 12 and 14 there is a friction coupling 16, the frictional surfaces of which are normally urged into engagement by spring 17.

Mounted within the housing 13 there is a suitable electrical motor 18, the shaft 19 of which is driven thru suitable reduction gearing 21. Mounted upon shaft 19 there is a cam 22, one face of which is provided with a cam groove 23. Secured to the shaft 14 there is a pinion 24 which engages the teeth of a reciprocating rack 26. Rack 26 is engaged by suitable guides 27, and the lower end of this rack carries a roller 28 engaging within cam groove 23. With this arrangement, it is evident that as the motor 18 is continuously operated, reciprocation of rack 26 causes coil structure 10 to oscillate about the axis of shaft 12. Friction coupling 16 makes it possible to shift the position of coil structure 10 when the motor is not in operation, and to interrupt the oscillating movements of the coil structure in the event this structure meets with an obstruction.

To enable swinging of the coil structure 10 upwardly to an out-of-the-way position, or downwardly into an operating position embracing the head being waved, housing 13 is shown having a pivotal connection with the side branches of a fork 31. This fork in turn is connected to a suitable supporting standard 32, which is preferably vertically adjustable. A weight 33 may be carried by the housing 13, to counterbalance the weight of the coil structure 10.

In Fig. 1 the position of a prepared head of hair with respect to the coil structure 10 is shown, during a heating operation. It will be noted that a plurality of appliances 34 are arranged upon the head, some of these appliances being upon the side of the head and extending in a general upright position, and others being upon top of the head and extending in a general horizontal position. A desirable construction for these appliances has been illustrated in Figs. 5 to 10 inclusive. In general, each appliance consists of a protector 36 adapted to clamp upon a strand of hair adjacent the scalp, in conjunction with an elongated curler 37. The curler as illustrated in Figs. 4 and 5 consists of a body 38 formed of suitable magnetic material, such as steel, and which is hollow in that it is provided with an inner longitudinal bore 39. A stud 41, provided with a squared head, is journaled within one end of body 38, and is rotatable in only one direction with respect to the body by virtue of suitable clutching means 42. The other end of the curler is likewise provided with a projecting pin or stud 43. Positioned within the bore 39 there is suitable absorbent material 44 such as cotton. This cotton is adapted to be saturated with a suitable waving solution, which can be introduced by removal of the plug 46. Apertures 47 are provided in the body of the curler, to permit vapor from the waving solution to escape and penetrate the hair.

While various types of protectors can be employed, I have illustrated a protector substantially as disclosed and claimed in Keele Patent 1,933,913, Nov. 7, 1933. This protector consists of one part 48 formed of resilient rubber, the lower surface of which is covered by a felt pad 49. A longitudinal slot 51 accommodates a flattened strand of hair. The clamping means utilized in con-

junction with the part 48 is illustrated in Fig. 10. It consists of a pair of bars 52 and 53, pivotally connected together by links 54. The free end of bar 52 is also pivotally connected to links 56, which carry a cam locking lever 57. This locking lever can be engaged over a hook-shaped end portion 58, formed upon one end of bar 53. When the clamping means of Fig. 10 is engaged upon the raised portion 59 of part 48, as shown in Figs. 6 and 7, the strand of hair within the longitudinal slot 51 can be securely gripped. Raised slotted lugs or posts 61 and 62 are carried by links 54 and 56, and serve as a mounting for the curler 37.

The assembly as shown in Figs. 6 and 7 also includes a magnetic shield 63. Assuming however that this shield is not applied to the assembly, when the curler 37 is placed within the varying magnetic field, with its axis extending generally parallel to the field axis, it is magnetized, and eddy currents are induced within it which causes considerable heating. The amount of heating is determined largely by the available magnetic flux, and by the proportioning of the magnetic parts of the curler. With a curler properly proportioned, and with a magnetic field of proper strength, the amount of heating can be made proper for a waving operation. As has been previously stated, where a number of such appliances are being heated simultaneously by a common magnetic field, the operator may desire to reduce the heating of any one curler, to prevent undue baking of the hair. It is for the purpose of accomplishing this result that I have shown the additional magnetic shield 63. This shield is formed of suitable magnetic material, and may be trough-like in shape as illustrated in Figs. 6 and 7. The side walls are provided with longitudinal slots 64, in order to minimize eddy currents. The ends of the shield are provided with inner spring fingers 66 of non-magnetic material which serve to clip upon the ends of the curler, it is evident that when the curler is in a given magnetic field, a considerable amount of magnetic flux will be shunted thru the shield, and therefore the body of the curler will be magnetized to a lesser degree. Therefore, the amount of heating afforded by induced eddy currents within the curler can be made of such a value as to avoid the possibility of undue baking.

Operation of my apparatus can be briefly reviewed as follows:—A head of hair is first prepared, substantially as shown in Fig. 1, by first applying the protectors to the strands of hair and then winding these strands upon the curlers. The arrangement as shown in Fig. 1 can be followed, in which the curlers on the sides of the head extend in a general upright position, and the curlers on top of the head extend in a general horizontal position. If desired, the strands as clamped upon the curlers can be enclosed in a suitable moisture retaining pad or envelope. The heating period is then commenced by bringing the coil structure 10 down in position to embrace the head, after which the motor 18 is started in operation and the coil structure excited from a suitable source of alternating current. In general a fairly high frequency source of alternating current is desirable, as for example a frequency in the neighborhood of 600 to 800 cycles per second. With the coil structure 10 in a substantially horizontal plane the curlers upon top of the head will not be heated to any substantial degree, since at that time they extend substantially at right angles to the axis of the magnetic field.

However the curlers upon the sides of the head are heated by induced electrical current. As the coil structure 10 is continuously oscillated, it is evident that all of the curlers assume positions with respect to the magnetic field, which are proper for inducing electrical heating currents. In other words oscillation of the coil structure makes it possible to heat all of the curlers substantially simultaneously, without the necessity of two or more distinct heating periods with the coil structure in different positions. If during the heating period the operator finds that one strand of hair is being baked too severely, the operator merely clips a magnetic shield 63 over this curler, thus reducing the heating to avoid injury. If during the heating period the subject or some other object should come into the path of oscillation of the coil structure, no injury will result, due to slippage of coupling 16. During the heating operation, solution carried by the absorbent material 44 is vaporized, and the vapors passing thru apertures 47, penetrate the wound hair.

I claim:

1. In hair waving apparatus, a plurality of hair engaging appliances adapted to be secured to a head of hair, said appliances being also adapted to be heated by induced electrical currents when placed in a varying electromagnetic field, a coil structure adapted to embrace the head and to be excited from a source of alternating current, and motive means for recurrently oscillating said structure through an angle of less than 180°.

2. In hair waving apparatus, a protector adapted to be clamped upon a strand of hair adjacent the scalp, a curler formed of magnetic material upon which the strand of hair can be wound, with a curler disposed adjacent the protector and likewise substantially parallel to the scalp, means for subjecting said curler to a varying magnetic field whereby the curler is heated by induced electrical currents, and a magnetic shunt element adapted to be detachably disposed adjacent said curler and serving to effectively reduce the heating of said curler.

3. In hair waving apparatus, a protector adapted to be clamped upon the strand of hair adjacent the scalp, a curler formed of magnetic material upon which the hair strand can be wound, said curler being adapted to be mounted upon said

protector, means for subjecting said curler to a varying magnetic field whereby the curler is heated by induced electrical currents, and a magnetic shunt element adapted to be clipped over said curler to reduce the effective heating thereof.

4. In hair waving apparatus, a protector adapted to be clamped upon a strand of hair adjacent the scalp, an elongated curler formed of magnetic material upon which the hair strand can be wound, said curler being adapted to be mounted upon said protector, means for subjecting said curler to a varying magnetic field whereby the curler is heated by induced electrical currents, and a magnetic shunt element adapted to be removably clipped upon said curler to reduce the effective heating thereof, said element when applied to the curler extending longitudinally thereof with end portions adjacent the ends of the curler.

5. In hair waving apparatus, a protector adapted to be clamped upon the strand of hair adjacent the scalp, an elongated curler formed of magnetic material upon which the hair strand can be wound, said curler being adapted to be mounted upon said protector, means for subjecting said curler to a varying magnetic field whereby the curler is heated by induced electrical currents, and a magnetic shunt element adapted to be removably clipped upon said curler to reduce the effective heating thereof, said element when applied to the curler being thermally insulated with respect to the curler and the hair wound thereon.

6. In hair waving apparatus, a plurality of hair engaging appliances adapted to be secured to a head of hair, said appliances being adapted to be heated by induced electrical currents when placed in a varying electro magnetic field, a coil structure adapted to embrace the head and to be excited from a source of alternating current, means serving to support the coil structure for pivotal movement about an axis extending generally diametrically with respect to the same, an electric motor, and driving means connecting the motor to the coil structure for recurrently oscillating the coil structure through angle of less 180° about said axis.

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