Oct. 15, 1940. C. M. HICKEY 2,218,471

HYDRAULIC COMB AND BRUSH

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FIG. 1

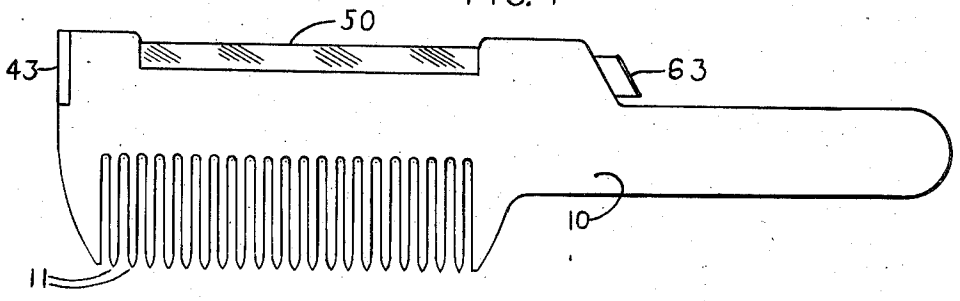


FIG. 2

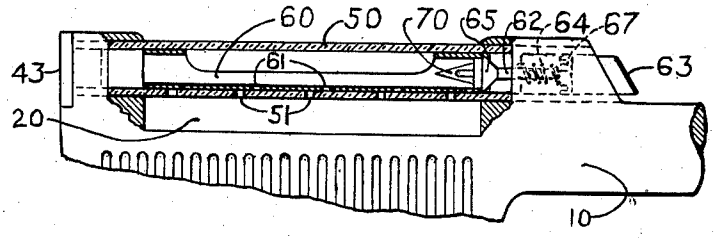


FIG. 6 FIG. 5

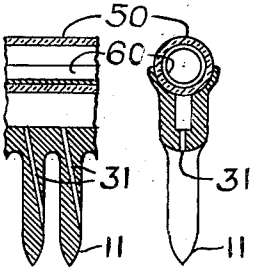


FIG. 3

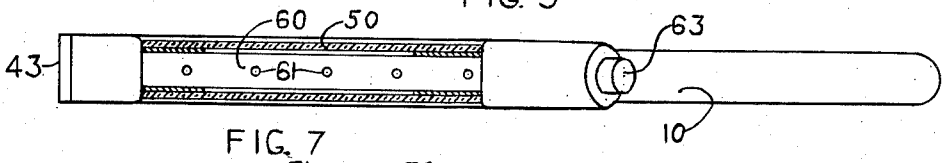


FIG. 7

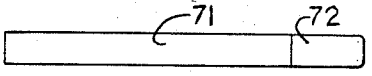
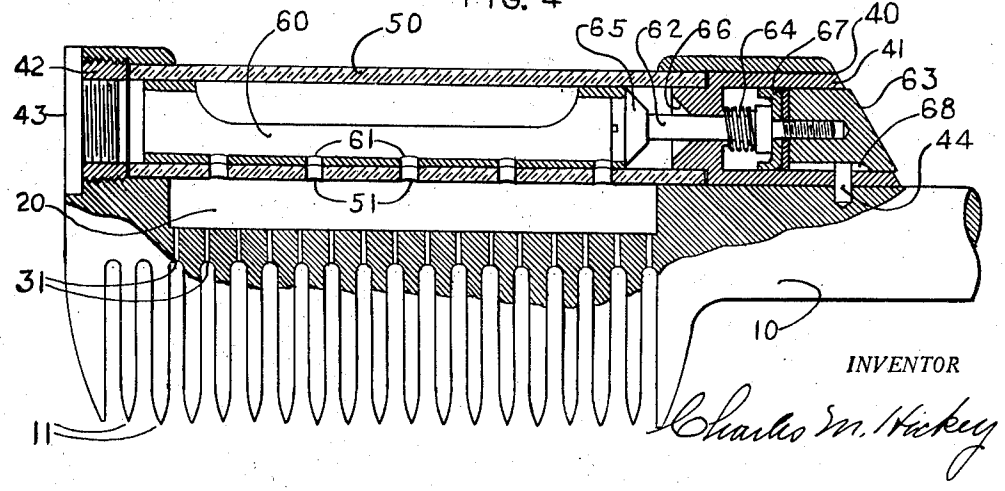


FIG. 4



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FIG. 9

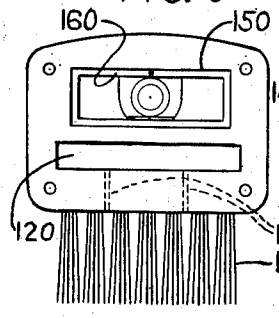


FIG. 8

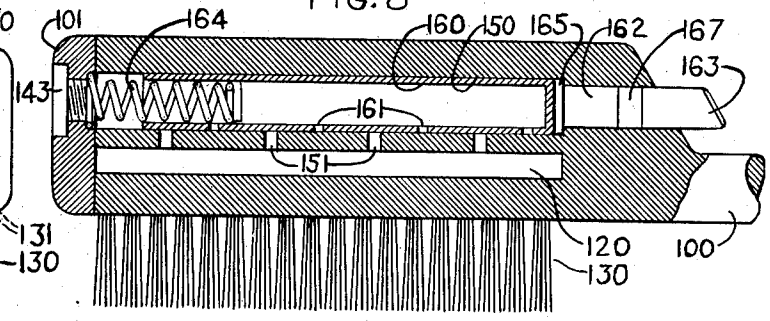


FIG. 10

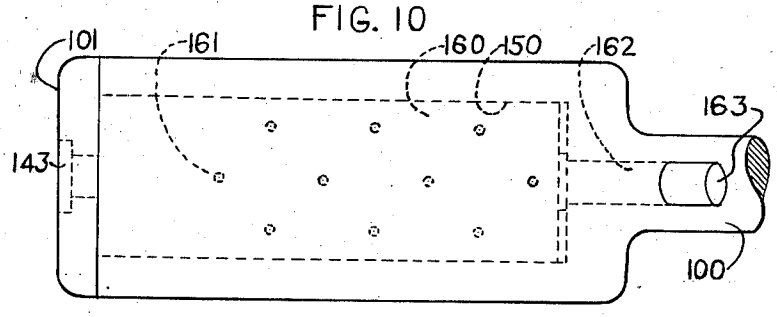


FIG. 11

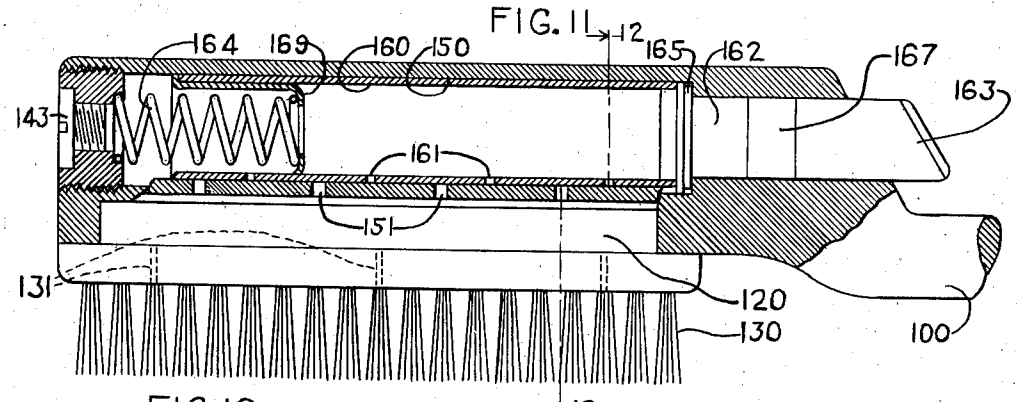
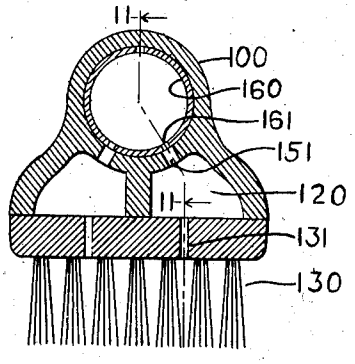


FIG. 12



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UNITED STATES PATENT OFFICE

2,218,471

HYDRAULIC COMB AND BRUSH

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Application September 27, 1937, Serial No. 165,856

9 Claims. (Cl. 132—13)

This invention relates to a device for treating the hair and skin, and more particularly to a simple means for applying fluids to the hair and skin of human beings and other animals during the act of combing or brushing.

An object of this invention is to provide means for accurately controlling the supply of fluid during a treatment.

Another object is to provide a hydraulic comb and brush having a reservoir for receiving, holding, and discharging the fluid as desired.

A further object is the provision of positive pressure and valve control means for forcing and distributing the treating fluid between the teeth of a comb or the bristles of a brush.

This comb and brush in its preferred form comprises a reservoir for holding a supply of treating fluid or liquid and hydraulic pressure producing means for propelling the liquid and capillary ducts for causing substantially uniform distribution of the treating liquid to the teeth of the comb and the bristles of the brush.

A more detailed description of this invention follows and is illustrated in the accompanying drawings.

Fig. 1 is a side view of one arrangement of the hydraulic comb.

Fig. 2 is a partial side and cross-section view of the comb showing especially the working parts in their normal non-operated position.

Fig. 3 is a top view, part in cross-section, of the comb.

Fig. 4 is an enlarged partial side and cross-section view of the comb showing especially the working parts in their operated position for propelling the liquid to the region of the teeth.

Fig. 5 is a transverse cross-section of Fig. 2 between teeth.

Fig. 6 is a longitudinal cross-section view of a fragmentary portion of the comb showing especially the capillary ducts for the passage of the treating fluid through the upper portion of the teeth.

Fig. 7 is a view of an individual sealed liquid supply container for filling or charging the reservoir of the comb or brush.

Fig. 8 is a partial side and longitudinal cross-section view of the hydraulic brush equipped with a rectangular liquid supply reservoir and propelling mechanism.

Fig. 9 is a transverse view of Fig. 8 with its end cap removed.

Fig. 10 is a partial top view of Figs. 8 and 9 showing especially, by dotted lines, the position of the working parts.

Fig. 11 is a partial side and longitudinal cross-section view along planes 11—11 of Fig. 12 of the brush equipped with a cylindrical liquid supply reservoir and propelling mechanism.

Fig. 12 is a transverse cross-section of Fig. 11 along planes 12—12.

Similar reference characters on the different drawing figures refer to corresponding parts.

Referring first to the form of the invention shown in Figs. 1 to 7, the hydraulic comb, its exterior is in general similar to that of an ordinary comb. The body of comb 10, with its teeth 11, is provided with a liquid distributing chamber 20 from which small diameter ducts 31, preferably having a cross-sectional area of capillary size, extend to space between the teeth as shown in Figs. 4 and 5, or through a portion of the teeth as shown in Fig. 6. The drawing figures are not to scale and the small ducts for clarity are drawn much enlarged. The top of the distributing chamber 20 is tightly closed and covered by the liquid holding chamber or reservoir 50 positioned above it in channel 40. The liquid holding chamber is cylindrical and preferably made of transparent material to give the user a view of the quantity of liquid therein. The top of the comb body above the distributing chamber is formed with a longitudinal cylindrical cavity or channel 40 in which the cylindrical holding chamber or reservoir 50 tightly fits. The cylindrical channel 40 at the handle end is plugged by a tubular member 41 fitted therein under pressure or made as an integral part of the comb body and at the other end is plugged by a threaded tubular member or bushing 42 which is tightened to press against an end of reservoir 50 and press it against the inner end of the member 41 to seal each end of the reservoir in the comb member. Gaskets may be employed at each end of the reservoir for preventing leakage. A removable stopper or threaded plug 43 screws into the bushing 42 to permit filling the reservoir with the treating liquid. A sleeve valve and piston member 60 is arranged to be reciprocated in the tubular reservoir 50. It has a number of ports 61, preferably of capillary diameter, which may be aligned with corresponding ports 51 in the tubular chamber 50 when the valve and piston member 60 is reciprocated into the position shown in Fig. 4. The sleeve preferably is longitudinally slotted and elastic so that it presses against the walls if the surrounding reservoir in a manner similar to that of a piston ring. Normally the valve member 60 is longitudinally held by the spring 64 in the position shown in Fig. 2 in which the capillary

ports 61 are not in alignment with the ports 51 and the liquid consequently is retained in the reservoir 50. The sleeve valve and piston member 60 connects with and is reciprocated by stem 62 which carries on its outer end an enlarged exterior member 63 for applying pressure by the hand to move the valve and piston member inwardly for propelling or forcing liquid from the reservoir and to the teeth of the comb. The inner end of the valve member 60 seats against end member 41 in a way to prevent liquid from leaking out around the stem 62. Any suitable sealing means such as conical member 65 carried on the stem 62 arranged to engage the fixed seat 66 under the pressure of the spring 64 may be employed to form a liquid tight joint where the stem extends into the reservoir 50. As a further precaution against leakage, a packing or cup-shaped piston 67 of leather or other suitable material may be attached to the valve stem 62 snugly fitting in the tubular portion of end member 41. The small and large washers on each side of the packing 67 holds it in place on the stem with its flexible cupped shaped end facing inwardly. The cylindrical sleeve valve 60 and the extension end 63 are held in proper position so that the ports 51 and 61 are in angular alignment by the pin 44 fixed in the frame of the comb engaging in the longitudinal slot 68 in the reciprocating extension end 63.

Liquid is forced from the reservoir 50 to the distributing chamber 20 and through the small ducts 31, which may be of capillary size, between the teeth of the comb by reciprocating the sleeve valve and piston 60 from the normal rest position shown in Fig. 2 to that shown in Fig. 4. This is readily done by pressure of the thumb on the end extension 63. In this movement of the piston the liquid is placed under pressure and a definite amount positively forced to the teeth. Upon removing the thumb from the end extension 63, the spring 64 restores it and the valve and piston member 60 to the normal position shown in Fig. 2.

The liquid for filling the reservoir 50 may be taken from an ordinary bottle or other container, or it may be supplied from a sealed capsule or tube having a supply for one charge. This individual supply tube has the advantage of keeping the liquid fresh and of insuring the genuineness of the liquid as each tube can be under seal from the manufacturer and designed so that it is broken or otherwise destroyed in emptying its contents into the reservoir. Such a single-use container is shown in Fig. 7 and means for breaking or puncturing an end are shown in Fig. 2. The sealed charging tube 71 may be of glass or metal of a size to be inserted into the sleeve valve and one end pressed against the pointed member 70 at the inner end of the sleeve until it is ruptured and the liquid runs into the reservoir. The capsule may then be removed or it may be of such length and material that it may be left in the reservoir until a new charge of liquid is required. If made of brittle instead of tearable material the breakable end is preferably covered with a gauze 72 for catching the broken small fragments. A capsule for emptying by breakage would preferably be of thinner glass at the breakable end. The puncturing member 70 is slotted or otherwise shaped so as to allow the liquid to readily leak out of any type of ruptured capsule and avoid stopping the punctured opening.

Figs. 5 and 6 are fragmentary transverse and longitudinal cross-sections, respectively, showing particularly cross-sections through the ducts and other passages, in the former the small ducts 31 lead between the teeth and in the latter, a modified arrangement, the ducts pass through the body of the teeth for a portion of their length and then pass through a side of the teeth near their points.

Figs. 8 to 12 show the hydraulic system as used in the comb applied to a brush. Figs. 8 to 10 show the brush equipped with a rectangular shaped liquid supply reservoir and sleeve valve and piston, while Figs. 11 and 12 show the brush equipped with these elements, cylindrical in shape and similar to corresponding parts of the comb. The construction of the liquid supply reservoir in the brush is integral with the brush frame which is somewhat simpler than the construction shown for the comb in which the reservoir is a separate cylindrical member which may be transparent while the other parts are opaque. However, either type of construction may be employed in either the comb or the brush. The body of either may be made of a transparent material. A large spring for holding the valve and piston in the normally closed position is shown within the liquid reservoir of the brush instead of in the handle, as in the comb.

Referring to the brush having the rectangular reservoir, Figs. 8 to 10, the brush body 100 has a rectangular shaped reservoir 150 and distributing chamber 120 extending over the top of the bristle section 130. These cavities may be formed in the brush body with openings at the end of the brush which are closed by the attached end piece 101. The rectangular sleeve or slide valve and piston member 160 having ports 161 is attached to the stem 162 and the end extension 163 to which pressure is applied by the hand for reciprocating the valve and piston the same as in the comb. Ports 151 leading from the reservoir into the distributing chamber 120 are in alignment with the ports 161, preferably of capillary size, in the slide valve when it is operated by pushing towards the end of the brush. In this position the liquid is under pressure and a small amount is forced from the reservoir to the distributing chamber and through small ducts 131 leading therefrom to the bristles of the brush. Liquid is prevented from leaking from the reservoir around the stem 162 by the packing washer 165, and also by the cup-shaped piston 167 of leather or other suitable material attached to the valve stem and snugly fitting in the tubular passage in which the stem operates. A compression spring 164 presses between the far end 101 of the reservoir and an abutment on the sleeve valve and piston member 160 to normally hold these members in their rest position towards the handle of the brush and also seals the reservoir where the stem 162 enters the reservoir by pressing packer washer 165 against the end wall. A removable stopper or threaded plug 143 is provided for filling the liquid supply reservoir.

Figs. 11 and 12 show a simplified brush having a round reservoir 150 and round valve and piston members 160. The reservoir, passage for the valve stem, and distributing chamber are all formed in the brush body 100. The bristle section 130 is preferably made as a separate unit and is attached to the brush body by any suitable means. This arrangement facilitates manufacture of both the brush body and bristle section. A plurality of small ducts 131, preferably of capillary size, are drilled through the bristle section in any desired arrangement to properly distribute

the liquid to the bristles. In Fig. 11 the liquid control parts are shown in their normal rest position with the ports 151 and 161 leading from the reservoir out of alignment and consequently closed, while in Fig. 12 these ports are shown in alignment and open. One set of these ports 161 are preferably of capillary size. The valve and piston member 160 is connected to the stem 162 and the extension end 163 so that it may be manually reciprocated for propelling liquid to the bristles. A packing washer 165 and flexible cup-shaped piston 167 prevents outward leakage of the liquid around the stem but is designed to allow entrance of air. A compression spring 164 presses between the far end of the reservoir and an abutment 169 in the valve and piston member to normally hold these members in their rest position towards the handle of the brush and to keep all passages from the reservoir sealed. A removable stopper or threaded plug 143 permits filling the liquid supply reservoir. The brush arrangements may be readily adapted to employ the individual capsule for supplying liquid to the reservoir as described for the comb. One such modification of the brush would consist in making the removable stopper of sufficient diameter to permit the insertion of the capsule and either having the spring 164 removable or the capsule pass through it, as would be possible in the arrangements shown in the drawings.

The ports and ducts of small diameter, some of capillary size, are employed to control the rate of flow of the liquid and to obtain a more uniform distribution of it to the teeth of the comb and to the bristles of the brush. The ports and ducts may be conical holes or otherwise throttled to make the capillary section short and thus avoid clogging. While the ports and ducts between the supply reservoir and the teeth or bristles generally have been described as of capillary size they may be of larger size, particularly when a few are used, their size being governed by their number and distribution and the fluid used in the device. Also distributing media may be used in the distributing chamber to more uniformly distribute the fluid and to more slowly carry it to the teeth or bristles. For this distributing media granular particles or thread-like members of non-absorbent material such as metal, glass or the like are preferred. Fine wire mesh positioned in the distributing chamber with the crossed wires positioned obliquely to the axis of the chamber cause a very effective spread of the fluid passed from the reservoir through a few ports. Such granules or wires carriers not only are very effective but they can be readily cleaned by washing as their material is non-absorbent. In applying a dyeing fluid slow and uniform flow is very desirable and for such use the distributing chamber would be equipped with the distributing media, while for many other uses it could and would be omitted.

While different detail arrangements are shown for corresponding parts in different figures of the drawings any suitable combination or modification thereof may be made in a complete hydraulic comb or brush. A combination of both may be made by combining both teeth and bristles in one unit. Further the bristle section of the brush is removable thus readily permitting cleaning and sterilizing, and also interchangeable to permit the use of members with bristles of different stiffness and spacing, or for use with different dye colors. The ducts leading to the region of the teeth or bristles when made of capillary size especially aid in equalizing the distribution of the fluid in measured increments and prevent general leakage. The employment of surface capillary carrier media and capillary duct control passages are a novel feature of this invention. The general design of both the hydraulic comb and brush is such as to readily adapt it to simple standard manufacturing processes and to the employment of various materials in its construction.

Other modifications of details may be made to the forms of the invention herein illustrated and described without departing from the spirit of the invention or the scope of the claims.

What I claim is:

1. A device for treating and applying liquids to the hair and hide of an animal, comprising a member having a plurality of projections for contacting and agitating the surface of the animal, a liquid supply chamber, ducts leading from said chamber to the region of said projections, and manually operated reciprocatable liquid displacing means associated with said chamber and arranged to displace in any one reciprocation stroke a volume relatively small in comparison with the volume of said chamber for creating a limited pressure in said chamber for propelling fluid therefrom to the region of said projections.

2. In combination a comb member, a liquid supply chamber, a plurality of capillary channels for conducting and distributing liquid from said supply chamber to the teeth of said comb, valvular means for controlling at the will of the user of the comb the transmission of liquid from said supply chamber to said teeth, and liquid displacing means having an operative volume displacement equaling a small part of the volume of said supply chamber for forcing a measured amount of said liquid to said teeth.

3. In a comb for applying liquid to the hair, a liquid supply reservoir, a reciprocatable piston associated with said reservoir and arranged for varying the volume of the liquid containing space, means for limiting the stroke movement of said piston to control the displacement per reciprocation to only a small part of the volume of said reservoir, capillary ducts leading from said reservoir to the region of a plurality of teeth of said comb, and means for reciprocating the said piston a definite amount controlled by said limiting means to propel liquid from said reservoir to the region of the teeth of the comb.

4. A hydraulic comb for applying liquids to the hair and skin in the process of combing comprising a liquid reservoir, capillary conducting passages from said reservoir to the region of the teeth of said comb, and volitionally controlled associated valvular and liquid displacing means associated with said capillary conducting passages and said reservoir for governing and positively propelling the liquid transmitted to said capillary conducting passages.

5. A hydraulic combing device having a plurality of contacting elements for applying liquids to an irregular surface comprising a liquid holding reservoir, a liquid distributing chamber associated with a plurality of said contacting elements, and pumping means for intermittently manually forcing with each pumping cycle small portions of the liquid from said reservoir to said contacting elements.

6. In combination a comb for applying liquid to the hair and scalp comprising a liquid holding reservoir, channels of capillary size posi-

tioned between said reservoir and the teeth of the comb, valvular means for controlling at the will of the user the transmission of liquid from said reservoir to said teeth, and pumping means for intermittently at the will of the user creating a hydraulic pressure on the liquid in said reservoir.

7. In a hydraulic fluid applicator a plurality of projections for contacting an exterior surface, a liquid supply reservoir, means for causing a pressure in said reservoir, capillary carrier media between said reservoir and said projections, and valvular control means arranged for opening when said pressure exists and for closing for permitting and for restraining respectively the flow of liquid from said reservoir to said media as the user of the device may desire.

8. A hydraulic applicator device comprising a liquid reservoir, capillary media wetted with liquid forced from said reservoir, means for limiting the supply of liquid to said media to a prearranged amount, manually operated means for changing the volume of said reservoir for creating pressure pulses in said reservoir, elastic means for restoring said manually operated means to non-operated condition, and valvular means cooperating with said manually operated means for passing liquid from said reservoir to said media in synchronism with said pressure pulses.

9. A hydraulic combing device comprising a comb, a liquid supply reservoir associated with said comb, ducts from said reservoir to the region of the teeth of said comb, valvular means between said reservoir and said ducts for governing the passage of liquid to the teeth of said comb, and reciprocatable pumping means having a volume displacement per stroke equaling a small portion of the volume of said reservoir and associated with said reservoir for propelling therefrom through said ducts measured amounts of liquid to the region of the teeth of said comb.

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