

HAIR DYE DISPENSER

TECHNICAL FIELD

The present invention refers to devices for dying hair in general, and in particular relates to portable compact applicators and dispensers for dying or tinting human hair.

BACKGROUND ART

Some conventional hair dye application devices known in the art, include, among others, portable comb or brush-like unit for manual application of the dye fluids to the hair, and are usually adapted to be used by professionals. Such apparatus is disclosed, for example, in US Patents Nos. 3457928 to Kurshenoff, 4592376 to Sigmond et al., and 5297882 to Kornides. However, the apparatus known in the art entails some disadvantages.

If the dye liquid is to be emitted by manual squeeze or pressure, its operation is very difficult due to the inherent viscosity which typifies the dye liquid, and which is enhanced when dispensed through narrow tubing, let alone the difficulty to control accurate amounts of dye to be applied. The use of replaceable dye refills adds further difficulty to the required manual squeeze. To muscular users this may pose insignificant effort, yet, when the user - sometimes a young or elderly woman or one with various physiological disabilities, is performing professional routine or is conducting a self-operated dye at home - the use of a conventional applicator may become troublesome, fatiguing and even a dangerous job.

When an electrical power source is used, it usually involves coupling of the brush-like portion to an external power source or pump, and thus the compactness of the apparatus is lost while the addition of expensive and cumbersome equipment - which is especially undesired for non-professional user seeking a portable device, is unavoidable. In addition, some of the advantages of using replaceable dye-refills, like compactness, cleanliness and simplicity, are significantly dwindled when external cumbersome equipment is used. The use of an electrical power source which is embedded within the brush-like unit poses the problems of maintaining the unit compact and lightweight - so as to allow its easy hold by the hand of the user during operation, while the application of accurate amounts of dye liquid is fully controlled.

It is an object of this invention to provide a novel hair dye dispenser that overcomes the above mentioned drawbacks.

It is another object of the present invention to provide a novel hair dye dispenser which is portable, lightweight and can be easily gripped and operated by the user without excessive tiring of the user's hand, and which eliminate the use of external equipment or the coupling by cables or tubes to such external equipment.

A further object of the present invention is to provide a novel hair dye dispenser which provides for electrical means for application of the dye liquid which are embedded within a brush-like unit, whereby the electrical drive is integrally combined with the brush-like dye-application dispenser, without involving excessive weight and broad dimensions that tire the user's hand.

Still, a further object of the invention is to provide a novel hair dye dispenser that allow for the use of replaceable dye-refills or sockets.

Yet, a further object of the invention is to provide a novel hair dye dispenser that allows control of the exact amounts of dye liquids to be applied to the hair.

These and other objectives are provided by the invention to be described hereinbelow.

DISCLOSURE OF INVENTION

There is thus provided according to the present invention a hair dye dispenser, comprising a container of dye liquid defining an upper side and a base, the base comprises a plurality of spaced apart tines underneath, wherein channels through the tines and/or through holes disposed in the base in the vicinity of the tines allow expelling of dye liquid from the container, a lid for enclosing the upper side of the container, the lid may be pressed down toward the base while the rims of the lid maintain a tight sealing contact with the side walls of the container, wherein the pushing down of the lid toward the base forces the expelling of dye liquid from the container through the channels and holes, a comb portion comprising a housing into which the container may be removably insertable, a conversion mechanism for converting rotational movement into translational movement, and plunger means for pressing down the lid, the plunger means is associated and activated by the conversion mechanism when the conversion mechanism is activated by an associated rotational drive, and a handle casing coupled to the comb portion, comprising an internal rotational drive, an internal gear associated to the rotational drive for converting high rotational motion of the drive to a slow rotational motion; and an internal power source for the rotational drive, wherein the rotational motion from the drive is provided through the gear to the conversion mechanism and so pushes down the lid with a relatively slow rate and a relatively high pressure.

Optionally, the container and the lid are integrated to combine a closed container. Alternatively, the container is an open container. The container may be either disposable or adapted for its refill with dye liquid. The lid may be integral with the plunger means, so as to be repeatedly applied to and removed from the container, whereby the container is removable from the lid either for its refill with dye liquid or its entire replacement with another container.

Preferably, the tines are lined down in at least one line in the base, and at least some of the tines may be channeled to the interior of the container to allow expelling of dye liquid.

Further optionally, the internal gear comprises a spur gear having multiple spurs. The internal gear may also comprise an array of pairs of spur wheels each of which comprises a large diameter toothed wheel rigidly coupled to a coaxial small diameter toothed wheel, the pairs of spur wheels are alternately pivotally disposed in two parallel hinges and engage in succession so as the small diameter toothed wheel of the former pair always engages the large diameter toothed wheel of the next pair, and wherein the first of which is driven by the driving shaft of the motor and the last of which is associated to the conversion mechanism.

Still, further preferably the internal gear may convert the high rotational spin of the drive to a low rotational spin by a ratio between 1:20,000 to 1:150,000, most preferably by a ratio of 1:88,000.

Preferably, the pressure exerted by the plunger means and the lid exceeds 0.15 KG/cm², most preferably exceeds 0.28 KG/cm².

Optionally, the rotational drive may comprise a motor and the motor may comprise an electrical motor. The drive may also comprise a gear motor, whereby the gear motor comprises a motor having an integral gear mechanism which may be associated in a row to the internal gear or directly to the conversion mechanism instead of the internal gear, for conversion of high rotational motion of the motor into a slow rotational motion.

According to one alternate embodiment, the conversion mechanism comprises a driving shaft coupled through clutch means to the internal gear for receiving rotational driving motion, the clutch means allow manual displacement of the drive shaft into its initial position whereby the plunger is in its upper position, a second shaft is pivotally mounted on the plunger means in parallel to the drive shaft, at least one arm is rigidly connected to the drive shaft and pivotally connected to the second shaft, so that when the drive shaft rotates in its forward motion, the arm rotates from an upper position toward a lower position and presses the plunger means downwards. The conversion mechanism may further comprise at least one further arm which is pivotally connected at one end to a third shaft mounted on the plunger means, the other end of which is pivotally connected to a forth shaft which in its turn is mounted to the casing of the comb portion. The lid may further comprise a recess located beneath the plunger means, and the recess may be broader than the bottom of the plunger means enough to allow its transverse movement within the recess. The recess may be coated with a friction reducer.

In a further alternate embodiment, the conversion mechanism comprises two driving shafts coupled through clutch means to the internal gear for receiving rotational driving motion, two stabilizing shafts that are pivotally mounted on the plunger means in parallel to the drive shafts, at least one arm is rigidly connected to each of the drive shafts and pivotally connected to the stabilizing shafts, so that when each of the drive

shafts rotates in its forward motion, each of the at least one arm rotates from an upper position toward a lower position and presses the plunger means downwards. The plunger means may further comprise lateral recesses by which the stabilizing shafts are joined to the plunger means.

Optionally, the clutch means comprise quadrate bearings, one bearing is attached to the drive shaft, the other bearing is attached to the internal gear, one of the bearings comprises a quadrate protrusion adapted to removably couple to a meshing niche in the other bearing, spring means that continuously hold the protrusion in the niche so that the drive shaft spins along with the gear, a knob that is positioned at the end of the drive shaft to allow the manual pull of the drive shaft and one of the bearing from the other bearing and turning of the drive shaft in reverse direction which pulls up the plunger means and whereby release of the knob locks the bearings and the drive shaft in a position adapted for initial press of the plunger means.

Further features and advantages of the invention will be apparent from the description below, given by way of example only.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention will be further understood and appreciated from the following detailed description, taken in conjunction with the following enclosed drawings in which like numerals designate correspondingly analogous elements or sections throughout, and in which:

Figure 1 is a perspective overall view illustrating the possible casing of a hair dye dispenser, constructed and operative in accordance with the invention;

Figure 2 is a side cross-sectional view illustrating the internal components of one embodiment, constructed and operative in accordance with the invention;

Figure 3 is a top cross-sectional view of the embodiment of Figure 2;

Figure 4 is a frontal cross-sectional view of the embodiment of Figure 2;

Figures 5-6 are side and top cross-sectional views, correspondingly, of the operative elements of the comb portion of the embodiment of Figure 2;

Figure 7 is a cross sectional view of the plunger and the translation conversion mechanism of the embodiment of Figure 5;

Figure 8 is a cross sectional view of the gear of the embodiment of Figure 5;

Figure 9 is a further side view of the operative parts of the embodiment of Figure 2;

Figure 10 is a further top view of the operative parts of the embodiment of Figure 2;

Figure 11 is a further frontal view of the operative parts of the embodiment of Figure 2;

Figure 12 is a side view of an alternate conversion mechanism constructed and operative according to the invention;

Figure 13 is a side view of the embodiment of Figure 12;

Figure 14 is a frontal view of the embodiment of Figure 12;

Figure 15 is a side view of a further gear constructed and operative in accordance with the invention;

Figure 16 is a top view of the embodiment of Figure 15;

Figure 17 is a frontal cross section of the gear of Figure 15;

BEST MODES FOR CARRYING OUT THE INVENTION

Referring initially to Figures 1-3, there is shown a hair dye dispenser 1, comprising a container 3 of dye liquid 5 defining an upper side 7 and a base 9. Base 9 comprises a plurality of spaced apart tines 11 underneath, wherein channels 13 through tines 11, and/or through holes 15 that are disposed in base 9 in the vicinity of tines 11, allow expelling of dye liquid 5 from container 3.

Lid 17 for enclosing the upper side of container 3 may be pressed down toward the base while the rims 19 of lid 17 maintain a tight sealing contact with the side walls of container 3. It will be appreciated by those vested in the art that the pushing down of lid 17 toward base 9 will force the expelling of dye liquid 5 from container 3 through channels 13 in holes 15 and/or tines 11.

Dispenser 1 further comprises a comb portion 21 which basically forms the housing into which container 3 may be removably inserted. Comb portion 21 further comprises a conversion mechanism 23 for converting rotational movement of the driving means into translational movement required for pushing down lid 17. To this end, plunger means 25 for pressing down lid 17 are associated and activated by mechanism 23 when mechanism 23 is activated by an associated rotational drive as explained below.

A further section of dispenser 1 is the handle casing 27 which is coupled to comb portion 21. Handle casing 27 encompasses an internal drive such as internal motor 29, an internal power source 31 for motor 29, and an internal gear 33 associated to motor 29 for converting high rotational motion of motor 29 into a slow rotational motion.

Motor 29 preferably comprises an electrical motor, such as the gear motor manufactured by "Bühler", which may typically yield a torque of 20 Newton/cm at 1/1 rpm. The rotational drive from motor 29 may be provided to mechanism 23 either through gear 33 or directly - if motor 29 is a gear motor. Thus, lid 17 is pushed down with a relatively slow rate of a few millimeters per minute and a relatively high pressure of approximately 0.3 Kg/cm² - high enough to overcome the resistance of the system for expelling the highly viscous dye liquid 5 through the narrow channels 13.

Container 3 and lid 17 may be integrated to combine a closed container which may be either a disposable container or may be refilled with dye liquid when lid 17 is pulled up for further use or removed and replaced with a new lid 17. In such a case comb portion 21 will provide for removal and insertion of a closed container 3 integral with lid 17.

Alternately, container 3 may be an open container, while lid 17 is repeatedly inserted therethrough - allowing the use of either a disposable container 3 or the multiple use of the same open container 3 which is refilled with dye liquid 5 each time before use. Lid 17 in such a case may be either permanently installed into mechanism 23 or removable for easy insertion into open container 3. If lid 17 is integral with plunger means 25 - lid 17 would be repeatedly applied to and removed from the open container 3, whereby container 3 is removable from lid 17 either for its refill with dye liquid 5 or for its entire replacement with another container. In any case, container 3 may be a closed container whose lid (not shown) is adapted to be disposed beneath lid 17 for its push by a reciprocating movement of lid 17.

Tines may be lined down in at least one line in base 9 for helping in the combing action of dispenser 1. The tines may include both tines 11 - which are channeled to the interior of the container 3 to allow expelling of dye liquid 5 for distribution to the hair, and non-channeled tines which are disposed merely for enhancing the combing action of dispenser 1, such as the tines denoted 35 in Figure 1.

Gear 33 may comprise a spur gear having multiple spurs 37. For instance, gear 33 may comprise an array of pairs 39 of spur wheels 37, as in Figures 15-17, each of which comprises a large diameter toothed wheel 41 (in Figure 16) rigidly coupled to a coaxial small diameter toothed wheel 43 (in Figure 16). The pairs of spur wheels 39 are alternately pivotally arranged in two parallel hinges 45 and 47, correspondingly, and engage in succession so that the small diameter toothed wheel 43 of the former spur 37 always engages the large diameter toothed wheel of the next spur 37. It will be appreciated by those skilled in the art that when the first of the consecutively arranged spurs 37 is driven by the driving shaft 49 of motor 29 and the last of consecutively arranged spurs 37 is associated to mechanism 23, the rotational velocity of driving shaft 49 may be reduced by several magnitudes while the torque is enhanced by several magnitudes. It was found that a gear 33 typically adapted for such tasks should be designed to convert the high rotational spin of motor 29 to a low rotational spin by a ratio between 1:20,000 to 1:150,000, most preferably, by a ratio of 1:88,000. In such cases, the pressure exerted by plunger means 25 and lid 17 exceeds 0.15 KG/cm², most preferably exceeds 0.28 KG/cm².

Motor 29 may further comprise a "gear motor" as mentioned above, whereby motor 29 comprises an integral gear mechanism (not shown) which may be coupled in a row to the internal gear 33 for enhancing the conversion of high rotational motion of motor 29 into a slow rotational motion.

In such a case gear 33 may be reduced to comprise a minimal number of spurs 37, such as illustrated in Figures 5 through 8 or eliminated altogether.

In reference to Figures 5 to 11, mechanism 25 may comprise a driving shaft 51 which is coupled through clutch means 53 to internal gear 33 for receiving rotational driving motion. When the distribution of dye liquid 5 is completed or the removal of container 3 is required for any reason, clutch means 53 allow for manual displacement of drive shaft 51 into its initial position whereby plunger means 25 is in its upper position, ready for a new session or round of pushing of lid 17. This may be simply provided by clutch means formed of quadrate bearing 53, wherein one bearing portion 55 is attached to drive shaft 51, and the other bearing portion 57 is attached to internal gear 33. One of the bearing portions 55 and 57 comprises a quadrate protrusion 59 adapted to removably couple to a meshing niche 61 in the other bearing portion 57 or 55, correspondingly. Spring means 63 continuously hold protrusion 59 in niche 61 so that drive shaft 51 spins along with gear 33. A knob 65 positioned at the end of drive shaft 51 allow the manual pull of drive shaft 51 and one of the bearing portions 55, 57 from the other bearing 57, 55, correspondingly, and turning of drive shaft 51 in reverse direction which pulls up plunger means 25. Release of knob 65 locks bearing portions 55 and 57 when protrusion 59 is directed again to be inserted into niche 61 (such as after circular or semi-circular reverse turn or a rotation of 90° - if niche 61 is cross-shaped), and drive shaft 51 in a position adapted for initial press of plunger means 25.

A second shaft 71 is pivotally mounted on upright 73 of plunger means 25 in parallel to the drive shaft. At least one arm, such as the two arms 75, is rigidly connected to drive shaft 51 and pivotally connected to second shaft 71, so that when drive shaft 51 rotates in its forward motion, the remote end 77 of each arm 75 rotates from an upper position toward a lower position and presses second shaft 71 and therefore plunger means 25 through upright 73 downwards.

Optional stabilization of upright 73 for ensuring its upright positioning through the entire pushing process, may be provided by another arm 79 which is pivotally connected at one end to a third shaft 81 mounted on upright 73. The other end of arm 79 is pivotally connected to a forth shaft 83 which in its turn is mounted to the casing of comb portion 21. It will be appreciated that such arrangement will keep upright 73 in an upright positioning, but a slight transverse movement of plunger 25 will still occur. A recess 85 - shown in Figures 5 to 7, mounted on lid 17, may be located beneath plunger means 25 to provide further stabilization. Recess 85 may be coated with a friction reducer - such as Teflon® coating, to minimize undesired friction when plunger means 25 moves transversely, in which case recess 85 is preferably broader than the bottom of plunger means 25 to allow its transverse movement.

An alternate mechanism 23 is illustrated in Figures 12 to 17. Two driving shafts 51 coupled through clutch means 53 to internal gear 33 for receiving rotational driving motion. Clutch means 53 allow manual displacement of drive shafts 51 into their initial position whereby the plunger means is in its upper position, in a manner equivalent to the one described above in reference to the embodiment of Figures 5-11. Two stabilizing shafts 71 are pivotally mounted on plunger means 25 in parallel to the drive shafts 51, through uprights 73. At least one arm 75, but preferably two arms 75, is rigidly connected to each of drive shafts 51 and pivotally connected to stabilizing shafts 71, so that when each of drive shafts 51 rotates in its forward motion, arms 75 rotates from an upper position toward a lower position and presses plunger means 25 downwards. Since the rotation of arms 75 about shafts 51 involves the lateral movement of the remote ends 77 of arms 75, each upright 73 preferably comprises a lateral recess 85 by which shafts 71 are joined to uprights 73.

Lateral recesses 85 allow the lateral movement of shafts 71 and arms 75 while uprights 73 - and therefore plunger means 25, remain intact - without lateral movement through the entire pushing action of lid 17.

It will be appreciated by those skilled in the art that the invention is not limited to what has been shown and described hereinabove by way of example only. Rather, the invention is limited solely by the claims which follow.

CLAIMS

1. A hair dye dispenser, comprising:

(a) a container of dye liquid defining an upper side and a base, said base comprises a plurality of spaced apart tines underneath, wherein channels through said tines and/or through holes disposed in said base in the vicinity of said tines allow expelling of dye liquid from said container;

(b) a lid for enclosing the upper side of said container, said lid may be pressed down toward the base while the rims of said lid maintain a tight sealing contact with the side walls of said container, wherein the pushing down of said lid toward said base forces the expelling of dye liquid from said container through said channels and holes;

(c) a comb portion comprising:

(1) a housing into which said container may be removably insertable;

(2) a conversion mechanism for converting rotational movement into translational movement; and

(3) plunger means for pressing down said lid, said plunger means is associated and activated by said conversion mechanism when said conversion mechanism is activated by an associated rotational drive; and

(d) a handle casing coupled to said comb portion, comprising:

(1) an internal rotational drive;

(2) an internal gear associated to said rotational drive for converting high rotational motion of said drive to a slow rotational motion; and

(3) an internal power source for said rotational drive,

wherein said rotational motion from said drive is provided through said gear to said conversion mechanism and so pushes down said lid with a relatively slow rate and a relatively high pressure.



2. A hair dye dispenser as in claim 1, wherein said container and said lid are integrated to combine a closed container.
3. A hair dye dispenser as in claim 1, wherein said container is an open container.
4. A hair dye dispenser as in claim 1, wherein said container is disposable.
5. A hair dye dispenser as in claim 1, wherein said container is adapted for its refill with dye liquid.
6. A hair dye dispenser as in claim 1, wherein said lid is integral with said plunger means, so as to be repeatedly applied to and removed from said container, and wherein said container is removable from said lid either for its refill with dye liquid or its entire replacement with another container.
7. A hair dye dispenser as in claim 1, wherein said tines are lined down in at least one line in said base, and wherein at least some of said tines are channeled to the interior of said container to allow expelling of dye liquid.
8. A hair dye dispenser as in claim 1, wherein said internal gear comprises a spur gear having multiple spurs.



9. A hair dye dispenser as in claim 8, wherein said internal gear comprises an array of pairs of spur wheels each of which comprises a large diameter toothed wheel rigidly coupled to a coaxial small diameter toothed wheel, the pairs of spur wheels are alternately pivotally disposed in two parallel hinges and engage in succession so as the small diameter toothed wheel of the former pair always engages the large diameter toothed wheel of the next pair, and wherein the first of which is driven by the driving shaft of said motor and the last of which is associated to said conversion mechanism.

10. A hair dye dispenser as in claim 1, wherein said internal gear converts the high rotational spin of said drive to a low rotational spin by a ratio between 1:20,000 to 1:150,000.

11. A hair dye dispenser as in claim 10, wherein said internal gear converts the high rotational spin of said drive to a low rotational spin by a ratio of 1:88,000.

12. A hair dye dispenser as in claim 1, wherein the pressure exerted by said plunger means and said lid exceeds 0.15 KG/cm².

13. A hair dye dispenser as in claim 9, wherein the pressure exerted by said plunger means and said lid exceeds 0.28 KG/cm².

14. A hair dye dispenser as in claim 1, wherein said rotational drive comprises a motor.

15. A hair dye dispenser as in claim 14, wherein motor comprises an electrical motor.



16. A hair dye dispenser as in claim 1, wherein said drive comprises a gear motor, whereby the gear motor comprises a motor having an integral gear mechanism which may be associated in a row to said internal gear or directly to said conversion mechanism instead of said internal gear, for conversion of high rotational motion of said motor into a slow rotational motion.

17. A hair dye dispenser as in claim 1, wherein said conversion mechanism comprises:

- (a) a driving shaft coupled through clutch means to said internal gear for receiving rotational driving motion, said clutch means allow manual displacement of said drive shaft into its initial position whereby said plunger is in its upper position;
- (b) a second shaft pivotally mounted on said plunger means in parallel to said drive shaft;
- (c) at least one arm rigidly connected to said drive shaft and pivotally connected to said second shaft, so that when said drive shaft rotates in its forward motion, said arm rotates from an upper position toward a lower position and presses said plunger means downwards.

18. A hair dye dispenser as in claim 17, wherein said conversion mechanism further comprises:

- (d) at least one further arm which is pivotally connected at one end to a third shaft mounted on said plunger means, the other end of which is pivotally connected to a forth shaft which in its turn is mounted to the casing of said comb portion.

19. A hair dye dispenser as in claims 17 or 18, wherein said lid further comprises a recess located beneath said plunger means.



20. A hair dye dispenser as in claim 19, wherein said recess is broader than the bottom of said plunger means enough to allow its transverse movement within said recess.

21. A hair dye dispenser as in claims 19 or 20, wherein said recess is coated with a friction reducer.

22. A hair dye dispenser as in claims 1, wherein said conversion mechanism comprises:

(a) two driving shafts coupled through clutch means to said internal gear for receiving rotational driving motion.

(b) two stabilizing shafts that are pivotally mounted on said plunger means in parallel to said drive shafts,

(c) at least one arm rigidly connected to each of said drive shafts and pivotally connected to said stabilizing shafts, so that when each of said drive shafts rotates in its forward motion, each of said at least one arm rotates from an upper position toward a lower position and presses said plunger means downwards.

23. A hair dye dispenser as in claim 22, wherein said plunger means further comprises lateral recesses by which said stabilizing shafts are joined to said plunger means.



24. A hair dye dispenser as in claims 1, wherein said clutch means comprise quadrate bearings, one bearing is attached to said drive shaft, the other bearing is attached to said internal gear, one of the bearings comprises a quadrate protrusion adapted to removably couple to a meshing niche in the other bearing, spring means that continuously hold said protrusion in said niche so that said drive shaft spins along with said gear, a knob that is positioned at the end of said drive shaft to allow the manual pull of said drive shaft and one of said bearing from the other bearing and turning of the drive shaft in reverse direction which pulls up said plunger means and whereby release of said knob locks said bearings and said drive shaft in a position adapted for initial press of said plunger means.

25. A hair dye dispenser substantially comprising any and all features of novelty as described, referred to, exemplified, illustrated or shown, hereinabove or in the accompanying drawings.

