ABSTRACT OF THE DISCLOSURE

A fountain brush assembly wherein liquid is delivered to the bristles of a brush component to be applied to any desired surface and to be used for decorative and cosmetic purposes. A brush component includes bristles surrounded at an inner end region by a ferrule which may be tapered. An elongated tubular liquid guide has a discharge end region provided with an inner surface of the same general taper as the tapered surface of said ferrule with the latter located within the tubular liquid guide. Although the tapered surfaces are generally of the same degree of taper, they have a non-matching relationship enabling them to define between themselves a longitudinal passage through which liquid can flow beyond the ferrule to the hair-bristles of the brush component which extend beyond the ferrule. The brush component is freely moveable within the tubular liquid guide between an outer end position where the tapered surfaces engage each other and an inner end position where the brush component is situated in the tubular liquid guide to an extent greater than when the brush component is in its outer end position. An apertured abutment means extends across the interior of the tubular liquid guide and engages the brush component to determine its inner end position. The ferrule coasts with an aperture of the abutment means to function as a valve therewith.

CROSS REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part of copending application Ser. No. 731,046, filed May 22, 1968 now abandoned.

BACKGROUND OF THE INVENTION

The present invention relates to fountain brushes. In particular, the present invention relates to fountain brushes where a coloring medium in liquid form is delivered to a brush component to be applied by the latter to a desired surface. For example, fountain brushes of this type may be used for cosmetic purposes.

There are at the present time many known types of fountain brushes. These brushes however, suffer from several drawbacks. Perhaps the most important of these drawbacks resides in the fact that it has not yet been possible to manufacture fountain brushes by mass production methods at a cost low enough to make the fountain brushes economically practical while at the same time maintaining for the fountain brushes a superior quality which will enable them to perform in a highly satisfactory manner. Thus, in addition to having costly components which do not cost in the best possible manner, the known structures do not operate satisfactorily. The liquid coloring medium tends to dry and cake at locations where the flow of the medium is prevented, and the result often is that the user of the fountain brush will shake the latter in an attempt to initiate the flow. Very often such shaking results in throwing of droplets of liquid component from the fountain brush onto articles which unavoidably become soiled. A further drawback encountered with the known structures resides in the fact that a supply of the liquid coloring medium cannot be conveniently and easily replenished. Very often when the initial supply of coloring medium is exhausted, it is necessary with the known structures to throw away the entire assembly and replace it with a new assembly, so that the costs involved in the use of the known fountain brush are undesirably high.

In addition, with the known structures it is not always possible to achieve a controlled flow of the liquid coloring medium which will enable the coloring medium to be precisely applied at a preselected area. Also, with many known fountain brushes the liquid coloring medium becomes unavoidably deposited on the exterior of the assembly precisely at the surface thereof which is manually engaged so that the fingers of the user of the assembly will inevitably become soiled with the coloring medium.

SUMMARY OF THE INVENTION

It is accordingly a primary object of the present invention to provide a fountain brush assembly which will avoid the above drawbacks.

In particular, it is an object of the invention to provide a fountain brush assembly which is made of a relatively small number of efficiently operating, simply constructed components which can be very easily and inexpensively manufactured by mass production techniques.

Furthermore, it is an object of the present invention to provide a construction of this type which will reliably prevent any caking of the liquid coloring medium so as to avoid plugging of the assembly in a manner preventing the desired flow of the coloring medium.

Furthermore, it is an object of the invention to provide a fountain brush assembly which is easily manipulated for starting and stopping the flow of the coloring medium whenever desired.

Also, it is an object of the present invention to provide a fountain brush assembly which will assure a controlled flow of the coloring medium enabling just enough liquid coloring medium to reach the hair bristles of the brush to provide for a precise application of the coloring medium to any selected area.

In addition, it is an object of the invention to provide a fountain brush assembly which will reliably prevent soiling of the fingers of the operator.

The fountain brush assembly of the invention has a brush component composed of hair bristles which are surrounded at inner end regions by a ferrule which has an exterior tapered surface. A tubular liquid guide has a discharge end region which receives the ferrule and which is provided at its interior with a tapered surface of the same general taper as the tapered surface of the ferrule. However, these tapered surfaces have a non-matching relationship enabling them to define between themselves a longitudinal passage for the liquid coloring medium. The brush component is freely moveable in the tubular liquid guide between an outward end position where the tapered surface of the ferrule engages the inner tapered surface of the tubular liquid guide and an inner end position where the brush component extends into the tubular liquid guide to an extent greater than when the brush component is in its outer end position. An apertured abutment means is carried by and extends across the interior of the tubular liquid guide to engage the brush component for limiting the inward movement thereof and thus determining the inner end position of the brush component. An aperture of the abutment means, through which a restricted flow of liquid is provided, is covered and closed by the ferrule when the brush component is in its inner end position, so that in this way a valve action is achieved according to which the brush component itself initiates the flow when displaced to its outer end position and terminates the
The part of component 16 above the collar portion 20 thereof is covered by a hollow tubular guide 24 which may be made of the same material as components 12 and 16 and which has a top closed end 26. Just above the collar portion 20 the component 16 has an exterior cylindrical surface for frictionally engaging an inner cylindrical surface of the cap 24 so that the latter is frictionally retained in the component 16 with no snug sliding fit. The cap 24 however extends through a substantial distance upwardly beyond the component 16 to define with the latter a hollow space for a purpose described below.

The elongated tubular liquid guide 22 has an upper discharge end region 28 provided with an inner tapered surface 30. A brush component 32 extends into the tubular liquid guide 22 at its discharge end region 28. The brush component 32 includes elongated fine hair bristles 34 which taper to a point, as illustrated in Fig. 2, and the component 32 includes a tapered ferrule 36 made of a resiliently suitable metal or plastic and surrounding and engaging the bristles 34 at inner end regions thereof. The ferrule 36 has an exterior tapered surface of the same general taper as the interior tapered surface 30 of the discharge end region 28 of the liquid guide 22.

However, the tapered surfaces of the ferrule 36 and liquid guide 22 have a non-matching in that section, so that they define between themselves a longitudinal passage enabling liquid to flow along the exterior of the ferrule 36 to the bristles 34 where the latter project beyond the ferrule 36. Thus, in the particular example shown in the drawings, and as is particularly apparent from Fig. 3, the inner tapered surface 30 of the tubular liquid guide 22 is of a square or rectangular cross section while the ferrule 36 is of a circular cross section, so that in this way the tapered surfaces define between themselves longitudinal passages 38 through which the liquid coloring medium can flow.

The brush component 32 is freely movable within the tubular liquid guide 22 between an outer end position where the exterior tapered surface of the ferrule 36 engages the inner tapered surface of the liquid guide 22 and an inner end position where the brush component 32 is situated in the liquid guide 22 to an extent greater than when the component 32 is in its outer end position. The brush component 32 is shown in dot-dash lines in its outer end position in Fig. 2 and in solid lines in its inner end position.

An abutment means 40 is carried by and extends across the interior of the tubular liquid guide 22 for limiting the inward movement of the brush component 32 so as to determine the inner end position thereof. This abutment means 40 includes a substantially cylindrical member 42 made of any suitable plastic or like material and engaging a downwardly directed shoulder in the interior of the liquid guide 22, as is apparent from Fig. 2. The abutment means 40 has a tight friction fit within the interior of the liquid guide 22 so as to be maintained therein in the position shown in Fig. 2. This abutment means 40 is apertured so that liquid can flow therethrough. Thus, the transversely extending member 42 is formed with a central aperture 44 forming a restricted path of liquid flow from the side of abutment means 40 opposed to the brush component 32 to the side thereof where the brush component 32 is located. When the brush component 32 is located at its inner end position engaging the abutment member 42, the ferrule 36 at its rear end engages the front end of member 42 extending across and beyond the aperture 44, thus closing the aperture 44 so that liquid cannot flow therethrough, while when the brush component 32 is in its outer end position shown in dot-dash lines in Fig. 2, the restricted passage formed by the aperture 44 is uncovered, so that liquid can now flow through the abutment means 40. In this way the ferrule 36 of component 32 acts as a valve member for opening and closing the path of flow depending upon whether the brush component 32
is at its outer end position or at its inner end position, respectively. It will be noted that at no time is there any component which extends into the aperture 44 so that the entire interior cross section of the latter is available for liquid flow.

The liquid supply or holding means 14 has an end wall 46 located next to that end of liquid guide 22 which is distant from the discharge end region 28 thereof, and a means coacts with the end wall 46 of the liquid-holding means 14 for providing for a flow of liquid through the end wall 46. In the example illustrated in FIG. 2, this means which coacts with the end wall 46 takes the form of a piercing member 48 having a tubular construction and made of suitable metal and having an axial bore extending completely therethrough. This member 48 is tightly seated within the axial bore of a suitable plastic plug 50 frictionally received within the tubular liquid guide 22 and having at its lower end and outwardly extending flange 52 engaging the inner end of liquid guide 22 and the adjoining end of the container 14. The bottom end of the piercing member 48 is inclined as illustrated in FIG. 2 so that when the container 14 is advanced toward the member 22, the bottom end of piercing member 48 will pierce through the wall 46 so as to provide communication between the interior of the liquid-holding means 14 and the interior of the liquid guide 22.

Between the plug 50 and the abutment means 40 there is compressing the container 14 within the barrel 12. In the particular example illustrated in FIG. 2 the wall of the barrel 12 is formed with a slot in which a lever 58 is pivotally mounted intermediate its ends, and one end of the lever 58 is pivotally linked with an outer manually engageable level 60 while the other end is pivotally linked with an inner pressure member 62, as is conventional with fountain pens. Thus, when the operator swings the lower end of the lever 60 away from the barrel 12 the lever 58 will act to advance the pressure member 62 into engagement with the container 14 compressing the latter so as to expel liquid out of the latter through the tubular piercing member 48 into the reservoir 54.

The structure described above will normally assume a position where the brush component 32 is at its inner end position closing the aperture 44. When it is desired to use the fountain brush assembly of the invention, the operator simply removes the cap 24 and compresses the container 14. The result is that the liquid-holding means 14 discharges liquid out through the reservoir 54 and the aperture 44 into engagement with the ferrule 36 for advancing the component 32 to its outer end position, and the liquid will flow through the longitudinal passages 38 to reach the fine hair bristles 34. Because of the restricted passage provided by the aperture 44 and because of the longitudinal passages 38 a controlled flow of liquid is achieved in this way to deliver to the exposed portions of the hair bristles 34 the coloring liquid in an amount sufficient to be efficiently applied in a precise manner to any desired area, and this construction is particularly suitable for cosmetic purposes according to which the coloring medium may be used as a lipstick, as an eye liner, or as an eye shadow.

The liquid-holding means 14 serves not only to supply liquid to the brush component 32 but also to retract liquid from the container 64 by way from the open end of the liquid guide 22 and to admit air into this discharge end region 28. Thus, when the force of compression on the container 14 is terminated, the container 14 will automatically expand back to its original configuration, retracting liquid back into its interior and away from the discharge end region of the liquid guide 22, so that air will enter this discharge end region and at the same time the brush component 32 itself will be retracted back to its inner end position closing the aperture 44. The suction at the side of the aperture 44 applied to the brush component 32 will maintain the latter at its inner end position until liquid is again pushed out of the liquid-holding means 14. It is to be noted that the parts are shown in FIG. 2 at a scale larger than their actual size. The movement of the brush component 32 between its inner and outer end positions is very slight although it is visually perceptible if the operator watches for the axial movement of the brush component 32. Under normal conditions the extent of movement of the brush component 32 is so slight that it is not even noticed by the operator. Thus the operator will simply expel a given quantity of liquid until the bristles 34 apply the coloring medium in the desired manner, and then the force of compression is released while the operator continues to use the fountain brush with the liquid which has been delivered to the brush component 32. Now the entire interior is cut off at the aperture 44 from the outer atmosphere so that caking of liquid cannot take place and the interior portion of the discharge end region 28 of liquid guide 22 has air which surrounds the ferrule 36 so that caking also cannot take place at this location. If the brush is used to such an extent that more liquid coloring medium is required, the operator the container 14 for a second time. It is completely unnecessary to shake the device so as to initiate the flow of the liquid coloring medium, although, if desired, there is no harm in the operator inverting the device initially so that the brush component 32 will be displaced to its outer end position by gravity as well as by the force of the liquid supplied from the liquid-holding means 14.

It is to be noted that not only are the above-described components of the structure of the invention exceedingly simply and inexpensive to manufacture, but in addition they are readily assembled. Thus, the brush component 32 will initially be introduced into the liquid guide 22, after which the abutment means 40 is inserted, and then the piercing member 48 together with the plug 50 can be inserted. Then this entire assembly is introduced into the outer wall portion of the liquid guide 22 which is formed by the tubular container 16. The tubular container 14 is then inserted into the container 16, and the end wall 46 is automatically pierced as it is advanced into engagement with the plug 50. Now the entire assembly can be very simply introduced into the barrel 12, after which the cap 24 is placed on the assembly. In order to replace a container 14, it is a simple matter to remove the component 16 from the barrel 12 to remove the empty container 14, and to replace it with a new container with a fresh supply of liquid in the manner described above. If desired, the tubular component 16 and the liquid guide 22 may be formed of an integral unitary one-piece body, as for example, in the form of a single molding.

If it should happen that the liquid within the container 14 is of a type which tends to be rather viscous after a given time, a freely movable body such as a suitable ball member or the like may be located within the container 14 to move about therein as is necessary in order to maintain its free-flowing characteristics.

The embodiment of the invention which is shown in FIGS. 4–6 operates in the same way as that described above. However, in this case the inner tubular liquid guide 66 extends to the end region 10 of the container 64 in the form as shown. This container is situated within an outer barrel 68 made of a flexible material such as any suitable plastic which is resilient and made of an elastomeric material which may be the same as the material used for the container 64. The means which coacts with the end wall 66 for providing the flow of liquid therethrough in
this case takes the form of a pair of crossed slits 70 which intersect each other and extend through the end wall 66 in the manner shown in FIGS. 4-6. Thus, when the barrel 68 is compressed in the manner indicated by the arrows 72 in FIG. 5, the end wall 66 will be deformed so as to open the slits 70 and provide for the flow of liquid coloring medium which now will coat with the other components in the manner described above. When the compressive force is terminated, the parts resume their initial condition due to their inherent elasticity, and the liquid coloring medium is thus retracted back into the liquid-holding means 64 while the slits 70 automatically close.

It may sometimes happen that when the cap 24 is placed on and removed from the component 16, the inner surface thereof, particularly at the lower open-end region, is engaged by the hair bristles 34 so that some of the coloring medium becomes deposited on the inner lower surface region of the cap 24. The result is that when the cap 24 is replaced it may happen that some of the liquid color medium becomes transferred to the exterior surface of the component 16 so that upon subsequent removal of the cap 24 the fingers of the operator will become soiled with the coloring medium situated at the exterior surface of the component 16.

In order to avoid this latter result a structure as shown in FIGS. 7 and 8 may be provided. In this case the tubular component 16 is formed adjacent its upper end, as viewed in FIGS. 7 and 8, with an annular groove 17 and is covered by a cap member 80 which may be identical with the cap member 24 except that it is formed with an internal rib 82 situated just above the lower cylindrical region 84 of the cap member 80. The member 80 is formed adjacent its lower end 84 with an exterior groove which forms the internal rib 82. Within this cap 80 there is an insert means 86 in the form of a hollow tubular insert 88 of any flexible plastic such as polyethylene and having a top closed end situated adjacent the top inclined closed end of cap 80 when the latter is in its covering position shown in FIG. 7. This flexible tubular plastic insert 88 is formed in the region of its lower end with a downwardly directed shoulder 90 which is to be engaged by the rib 82 when the cap 80 is removed. Thus, as is shown in FIG. 8, during removal of the cap 80 the rib 82 thereof will engage the shoulder 90 so as to remove the insert means 86 together with the cap 80. When the parts are replaced to the position shown in FIG. 7, the insert will engage with an interior rib 83 which is formed therefrom to move with the remainder of the parts to the position shown in FIG. 7 the rib 83 will snap into the groove 17 while the cap 80 continues to move to its position shown in FIG. 7.

With this construction when the cap 80 is replaced through the reverse of these operations, the brush component 32 will initially be received within the insert means 86 so that if the cap 80 is not in a precisely axial position the brush component will engage the inner surface of the insert 86 rather than the inner surface of the cap 80 and any coloring medium will be deposited on the inner surface of the insert means 86. When the cap 80 is then moved down to its covering position from the position shown in FIG. 8, there can be no transfer of colored medium from the inner surface of cap 80 of the exterior surface of component 16, and in this way soiling of the fingers of the operator is reliably prevented.

Also, it is to be noted that with this construction the insert 86 provides an air-tight seal in which the brush is protected.

Moreover, it is to be noted that instead of a tapered ferrule and tapered guide surface 30 of non-matching cross section, it is possible to accommodate a cylindrical ferrule in a guide passage of non-matching cross section which is constant throughout the length of the guide passage. With such a construction, for example, short prongs at the discharge end 28 of the guide can project over the end of the ferrule from which the bristles 34 extend with these prongs being circumferentially spaced about the axis of the guide to engage the ferrule and limit its outward movement in the same way that the matching tapered surfaces coat for this purpose, so that with such construction it is also possible to achieve the limited axial movement of the brush component. However, the structure described above and disclosed in the drawings is preferred because of its simplicity and efficiency in operation as well as the easy assembly of the components. Thus, whether the tapered surfaces of the structure disclosed in the drawing are used or whether another construction with a non-tapered ferrule is used, there will in any event be a limiting means limiting the movement of the brush component between the end positions shown in solid and dot-dash lines in FIG. 2.

It is thus apparent from the above description that an exceedingly simple and inexpensive structure is provided to operate very reliably to achieve the desired results. Although the structure is inexpensive to manufacture and assemble, nevertheless there is no sacrifice in the quality of the operation of the parts. It is to be noted that not the least of the advantages achieved by the structure of the invention resides in the fact that it is capable of operating efficiently irrespective of altitude and atmospheric pressure. Thus, with some known fountain brushes the liquid coloring medium automatically leaks therefrom at relatively high altitudes so that during an airplane flight or at certain cities which are located at a considerable distance above sea level it sometimes happens that the liquid coloring medium leaks from the known structure.

With the structure of the invention, such leakage is reliably prevented irrespective of the atmospheric pressure, and at the same time the structure is easily manipulated at any altitude to provide the required operation of the assembly.

What is claimed is:
1. In a fountain brush assembly, a brush component including a plurality of hair bristles and a ferrule surrounding said bristles at an inner end thereof, an elongated tubular liquid guide having a discharge end region and having an inner guide space in which said brush component is accommodated with the cross section of said inner space of said tubular guide being greater than the cross section of said ferrule so that liquid can flow between said ferrule and guide, said brush component being freely movable with respect to said guide, and limiting means coating with said guide and brush component to limit the discharge end region of said brush component extending into said liquid guide to an extent greater than when in said outer end position thereof, and apertures abutting means carried by and extending across the interior of said liquid guide for engaging said ferrule to determine the inner end position of said brush component, the latter being spaced outwardly beyond said abutting means when in said outer end position thereof, said abutting means including an abutting member extending across the interior of said liquid guide and formed with at least one aperture, said ferrule having a rear end engaging said abutting member and projecting therefrom, said abutting member extending into the latter, without extending into the latter, when said brush component is at said inner end position thereof, so that said brush component coats with said aperture to act as a valve for opening a path of liquid flow when said brush component is in said outer end position thereof, and for closing the path of flow when said brush component is in said inner end position thereof, said aperture having its inner space at all times entirely free and available for flow of liquid.
2. In a fountain brush assembly, a brush component including a plurality of hair bristles and a ferrule surrounding said bristles at an inner end region thereof, said ferrule having an exterior tapered surface, an elongated tubular liquid guide having a discharge end region provided in its
interior with a tapered surface generally of the same taper as the tapered surface of said ferrule but having in cross section a non-matching relationship with respect to the tapered surface of said ferrule so that when the latter tapered surface engages the inner tapered surface of said liquid guide a passage will be defined between said tapered surfaces for directing liquid along the exterior of said ferrule to the bristle portions extending outwardly beyond said ferrule, said brush component being freely movable with respect to said liquid guide between an outer end position where said tapered surfaces engage each other and an inner end position where said brush component extends into said liquid guide to an extent greater than when in said outer end position thereof, and apertured abutment means carried by and extending across the interior of said liquid guide for engaging said ferrule to determine the inner end position of said brush component, the latter being spaced outwardly by said abutment means when in said outer end position thereof, said abutment means including an abutment member extending across the interior of said liquid guide and formed with at least one aperture, said ferrule having a rear end engaging said abutment member and extending across and beyond said aperture, without extending into aperture, for closing said aperture when said brush component is in said inner end position thereof, said aperture at all times having its entire interior cross section available for liquid flow, and said brush component thus coacting with said aperture to act as a valve for opening a path of liquid flow when said brush components is in said outer end position and for closing the path of flow when said brush component is in said inner end position thereof.

3. The combination of claim 2 and wherein said aperture is a central aperture defining a restricted path of liquid flow from the side of said abutment member opposed to said brush component to the side thereof where said brush component is located, and liquid-holding means communicating with the interior of said liquid guide at the side of said abutment means opposite from said brush component for supplying liquid to flow along the interior of said liquid guide through said aperture for displacing said ferrule away from said abutment means while advancing said brush component to said outer end position thereof and for retracting liquid back from said side of said abutment means where said brush component is located through said aperture to the side of said abutment means opposite from said brush component while drawing air into said liquid guide at said side of said abutment means where said brush component is located for retracting said brush component back to said inner end position where said ferrule closes said aperture.

4. The combination of claim 3 wherein said liquid guide has at the side of said abutment means opposed from said brush component between said abutment means and liquid-holding means an interior space, and filter means situated in said space adjacent said abutment means for filtering liquid which flows therethrough to said apertured abutment means.

5. The combination of claim 3 wherein said liquid-holding means includes an elongated flexible tubular container extending longitudinally beyond an end of said tubular liquid guide distant from said brush component and having next to the latter end of said liquid guide an end wall and means coating therewith for directing liquid toward said brush component when said flexible tubular liquid-container is compressed and for retracting liquid back into said liquid-holding means when said tubular liquid-container expands back to its original configuration.

6. The combination of claim 1 and wherein said tubular liquid guide has an outer wall portion provided with an external surface to be engaged manually during use of the fountain brush, a closure cap engaging said exterior surface for covering said brush component and liquid guide when the fountain brush is not used, and an insert means in said cap for surrounding the brush component when said cap is in a covering position covering said liquid guide and brush component and preventing any liquid from being transferred from said brush component to an inner surface of said cap and then from the latter inner surface to said exterior surface of said outer wall portion of said liquid guide, said insert means being in the form of a flexible tubular insert shorter than said cap and axially shiftable therein, said insert receiving said brush component when said cap is placed in its covering position, and said insert and cap having contacting shoulders which engage each other for retracting said insert together with said cap when the latter is removed from said liquid guide and initially is axially displaced with respect to said insert until said shoulders engage each other, said insert frictionally engaging said outer wall portion of said tubular liquid guide when receiving said brush component and being held in engagement with said outer wall portion only by frictional engagement therewith until said shoulders engage each other during removal of said cap.

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U.S. Cl. X.R.

401—135, 269, 274