CLAIMS

1. Liquid dispenser head comprising a filtering device (26) managing liquid expulsion and air intake at the interface between the inside and outside of a liquid conditioning bottle, characterised by the fact that for liquid expulsion, the filtering device comprises tubular filters (30) the walls of which are made of a membrane material selectively permeable to liquid in the presence of air and which extend longitudinally in the bottle from a perforated disk plate (28) across said head through which they emerge outside the bottle.

2. Dispenser head according to claim 1, characterised in that said filtering device (26) further comprises a membrane surface that is selectively permeable to air in the presence of liquid and is constructed and arranged so as to filter the air drawn into the bottle via an outside orifice (22) to compensate for the expelled liquid, and thus protect the space inside the bottle from outside contaminants such as bacteria.

3. Dispenser head according to claim 2, characterised in that said selectively air-permeable membrane surface forms the wall of tubular filters (32,132) that emerge through the same perforated disk plate (28, 128) as the selectively liquid-permeable tubular filters.

4. Dispenser head according to claim 3, characterised in that said tubular filters whose wall is a selectively air-permeable membrane are extending at the vicinity of said disk plate (28).

5. Dispenser head according to claim 3 or 4, characterised in that tubular filters in said filtering device are distinctively with a hydrophilic wall (30) for liquid extraction and distinctively with a hydrophobic wall (32) for air intake.

6. Dispenser head according to claim 5, characterised by the fact that the walls of the tubular filters (30, 32) show a particle filtering capacity which is different depending on whether they are associated with liquid expulsion or air intake, and is finer for the hydrophobic wall (which is preferably a bacteria filtering membrane) and coarser for the hydrophilic wall, thereby facilitating the dispensing of viscous solutions.

7. Dispenser head according to one of claims 3 to 5, characterised by the fact that the tubular filters are bended in U-shape and that both end mouths (31) of each of them are embedded in said disk plate, whereby the internal ducts in said tubular filters emerge on the upper side (29) of said disk plate and communicate there with the outside.

8. Dispenser head according to one of the above claims, characterised by the fact that above the mouths of the tubular filters, the upper side (29) of the transverse disk plate (28) is covered with a protective porous stopper (24, 124).

9. Dispenser head according to any one of claims 3 to 8, characterised by the fact that the filtering device comprises several hydrophilic membrane tubular filters (30) which are grouped together into a bundle of elongated ducts extending in the longitudinal direction of the bottle, the resulting bundle being further surrounded with a guide sheath (34).

10. Dispenser head according to the preceding claim, characterised by the fact that the filter device comprises a hydrophobic tubular membrane filter (32) which is coiled around said sheath in the proximity of said disk plate (28) used to mount the assembly across said dispenser head.

11. Dispenser head according to the preceding claim, characterised by the fact that said sheath (34) has a window (36)

for the liquid to pass through its tubular wall when the dispenser head is upturned, said window being placed in proximity to said disk plate (28).

12. Dispenser head according to the preceding claim, characterised by the fact that the hydrophobic filter tube (32) reserved for air intake is located between the transverse disk plate (28) and said window (36), and coiled around the axis of the bottle, outside the sheath (34) encasing the hydrophilic tubular filters (31) reserved for liquid expulsion.

13. Dispenser head according to claim 9, characterised by the fact that the guide sheath encasing the hydrophilic tubular filters (30) has the same diameter as the neck of the bottle (10) on which said head is mounted, with the hydrophobic tubular membrane (32) reserved for air intake being inside said sheath.

14. Dispenser head according to any one of claims 3 to 13, characterised by the fact that the hydrophilic tubular filters (30) for liquid expulsion and the hydrophobic tubular filters (32) for air intake are both U-shaped and the opposite mouths of the internal ducts emerge through said transverse disk plate (128), with the longitudinal height of the hydrophobic membrane filters (130) being less than that of the hydrophobic membrane filters.

15. Dispenser head according to one of the preceding claims, characterised by the fact that its annular body for mounting it in a liquid conditioning bottle forms a dropper tip for the liquid expelled through said filtering device and that it also has an airtight removable cap (12, 112).

CLAIMS

1. Liquid dispenser head comprising:
a filtering device (26) with a semi-permeable interface membrane managing liquid expulsion and air intake at the interface between the inside and outside of a liquid conditioning bottle,
wherein said interface membrane in said filtering device comprises hydrophilic tubular filters for liquid expulsion having the walls made of a membrane material selectively permeable to liquid in the presence of air, said hydrophilic tubular filters extending longitudinally in the bottle from a transverse disk plate (28) mounted across said head through which they emerge outside the bottle, and
wherein said interface membrane further comprises a hydrophobic membrane surface that is selectively permeable to air in the presence of liquid and is constructed and arranged aside said hydrophilic tubular filters in the vicinity of said plate so as to filter contaminants from outside air drawn into the bottle via an outside orifice to compensate for liquid having been expelled out through said orifice.

2. Dispenser head according to claim 1, comprising at least one hydrophobic tubular filter for air intake having walls made of a hydrophobic membrane material selectively permeable to air in the presence of liquid that form said hydrophobic membrane surface, and wherein said at least one hydrophobic tubular filter for air intake emerges through same said transverse disk plate as said hydrophilic tubular filters for liquid expulsion.

3. Dispenser head according to claim 2, wherein the walls of said at least one hydrophobic tubular filter for air intake and said hydrophilic tubular filters for liquid expulsion show a particle filtering capacity which is finer for the hydrophobic tubular filter wall and coarser for the hydrophilic tubular filter.

4. Dispenser head according to claim 3 wherein the walls of said at least one hydrophobic tubular filter are made of a selectively air-permeable bacteria filtering membrane.

5. Dispenser head according to claim 2, further comprising a protective porous stopper covering said transverse disk plate (28) over all mouths of said hydrophilic tubular fillers and said at least one hydrophobic tubular filter emerging therethrough out of said bottle.

6. Dispenser head according to claim 2, wherein said at least one hydrophobic tubular filter for air intake is coiled in the vicinity of said transverse disk plate around a bundle of said hydrophilic tubular filters for liquid expulsion extending longitudinally therefrom.

7. Dispenser head according to claim 1, wherein the tubular filters for liquid expulsion are bended in U-shape and that both end mouths (31) of each of said hydrophilic tubular filters being embedded in said transverse disk plate, whereby the internal ducts in said hydrophilic tubular filters emerge on an upper side (29) of said transverse disk plate and communicate there with outside the bottle.

8. Dispenser head according to claim 7, comprising hydrophobic tubular filters for air intake having walls made of a hydrophobic membrane material selectively permeable to air in the presence of liquid that form said hydrophobic membrane surface, said hydrophobic tubular filters being disposed surrounding a bundle of said hydrophilic tubular filters in the vicinity of said transverse disk plate.

9. Dispenser head according to claim 8, wherein said hydrophobic tubular filters extend a length from said transverse disk plate which is shorter compared to said hydrophilic tubular filters extending longitudinally into the bottle.

10. Dispenser head according to claim 8, wherein said hydrophobic tubular filters for air intake as well as said hydrophilic tubular filters for liquid expulsion are bended in U-shape with both end mouths being embedded in said transverse disk plate, whereby internal ducts in said either hydrophobic or hydrophilic tubular filters emerge on an upper side of said transverse disk plate and communicate there with outside the bottle.

11. Liquid dispenser head comprising a filtering device with a semi-permeable interface membrane managing liquid expulsion and air intake at an interface between inside and outside a liquid conditioning bottle, wherein said interface membrane in said filtering device comprises a bundle of hydrophilic tubular filters for liquid expulsion having walls made of a membrane material selectively permeable to liquid in the presence of air,
said hydrophilic tubular filters extending in a bottle longitudinal direction from a transverse disk plate mounted across said head through which they emerge outside the bottle on an upper side of said transverse disk plate,
wherein said liquid dispenser head further comprises a non-perforated guide sheath encasing said bundle of hydrophilic membrane tubular lifters, and
wherein said interface membrane in said filtering device further comprises a hydrophobic membrane surface that is selectively permeable to air in the presence of liquid and is formed into at least one hydrophobic tubular filter for air intake which is coiled around outside said sheath in the vicinity of said transverse disk plate and has end mouths emerging out through said transverse disk plate on said upper side thereof.

12. Dispenser head according to claim 11, wherein said sheath (34) has a window (36) for the liquid to pass through its tubular wall onto the longitudinally extending hydrophilic tubular filters for liquid expulsion when the dispenser head is upturned, said window being placed in proximity to said disk plate (28).

13. Dispenser head according to claim 12, wherein said at least one hydrophobic tubular filter (32) for air intake coiled around outside said sheath is located between the transverse disk plate (28) and said window (36) through said sheath.

14. Dispenser head according to claim 11, further comprising a protective porous stopper covering said transverse disk plate over all mouths of said hydrophilic tubular filters and said at least one hydrophobic tubular filter emerging out through said transverse disk plate.

15. Dispenser head according to claim 11, further comprising an annular dropper body for airtight connection onto a neck of a liquid containing bottle and wherein said

at least one hydrophobic tubular filter for air-intake is located in said dropper body while said hydrophilic tubular filters for liquid expulsion for liquid extend longitudinally further into said bottle.

16. Dispenser head according to claim 15, wherein said dropper body terminates into a dropper tip outside said bottle for expelling liquid out of said bottle through said filtering device and further comprising a removable cap for air-tightly closing said dropper tip off.

17. Liquid dispenser head comprising:
a filtering device with a semi-permeable interface membrane managing liquid expulsion and air intake at an interface between inside and outside a liquid conditioning bottle,
wherein said interface membrane in said filtering device comprises a bundle of hydrophilic tubular filters for liquid expulsion having walls made of a membrane material selectively permeable to liquid in the presence of air,
said hydrophilic tubular filters extending in a bottle longitudinal direction from a transverse disk plate mounted across said head through which the emerge out on an upper side of said transverse disk plate,
wherein said interface membrane in said filtering device further comprises a hydrophobic membrane surface that is selectively permeable to air in the presence of liquid and is formed into several hydrophobic tubular filters for air intake that are placed around said bundle and have end mouths emerging out through said transverse disk plate on said upper side thereof, and
wherein said hydrophobic tubular filters for air intake extend in said longitudinal direction along a longitudinal height less than that of the hydrophilic membrane filters for liquid expulsion.

18. Dispenser head according to claim 17, further comprising a protective porous stopper covering said transverse disk plate over all mouths of said hydrophilic tubular filters and said hydrophobic tubular filters emerging out through said transverse disk plate.

19. Dispenser head according to claim 18, wherein said hydrophilic tubular filters and said hydrophobic tubular filters are supported by said transverse disk plate, wherein said transverse disk plate is mounted across a dropper for airtight connection to a liquid conditioning bottle and wherein said dropper annular body terminates into a dropper tip outside said bottle for alternate liquid expulsion and air intake through said orifice.

20. Dispenser head according to claim 19, further comprising a removable cap for airtightly closing said orifice off.

21. Dispenser head according to claim 19, wherein said hydrophilic tubular filters for liquid expulsion are designed to extend longitudinally plunging into the liquid conditioning bottle.

22. A bottle for conditioning a liquid in a sterile state, comprising: a peripheral wall which is elastically and reversibly deformable for dispensing a liquid out of said bottle due to manual compression of said wall and which returns spontaneously to its initial shape due to air intake from outside the bottle compensating for the liquid dispensed out when said manual compression is released,
a dispenser head having an annular body for tight connection in a neck of said bottle and a terminal dropper tip with an outside orifice for liquid expulsion and alternate air intake,
a filtering device with a semi-permeable interface membrane for ensuring alternative passage of air and liquid through said dropper tip and managing liquid flow and air flow between inside and outside the bottle based on a difference in pressure between either sides of said interface membrane,
wherein said interface membrane in said filtering device comprises hydrophilic tubular filters for liquid expulsion having walls made of a membrane material selectively permeable to liquid in the presence of air, said hydrophilic tubular filters extending longitudinally into the bottle from a transverse disk plate mounted across said head through which they emerge out on an upper side of said transverse disk plate,

and wherein said interface membrane further comprises a hydrophobic membrane surface that is selectively permeable to air in the presence of liquid and is located in the vicinity of said plate.

23. A bottle according to claim 22, wherein said filtering device comprises at least one hydrophobic tubular filter for air intake having walls made of a hydrophobic membrane material selectively permeable to air in the presence of liquid that form said hydrophobic membrane surface, and wherein said at least one hydrophobic tubular filter for air intake emerges out through same said transverse disk plate as said hydrophilic tubular filters for liquid expulsion on said upper side of said transverse disk plate.

24. A bottle according to claim 23, wherein said filtering device further comprises a non-perforated sheath encasing a bundle of said hydrophilic tubular filters for liquid expulsion, said at least one hydrophobic tubular filter for air-intake being outside said sheath.

25. A bottle according to claim 22, wherein said filtering device comprises hydrophobic tubular filters for air intake with walls made of a hydrophobic membrane material selectively permeable to air in the presence of liquid that form said hydrophobic membrane surface, said hydrophobic tubular filters being disposed surrounding a bundle of said hydrophilic tubular filters in the vicinity of said transverse disk plate.