

CLAIMS

WHAT IS CLAIMED IS:

1. A flow control device for delivering an ophthalmic formulation, the device comprising:
 - a reservoir, the reservoir comprising the ophthalmic formulation disposed therein, the ophthalmic formulation comprising an ophthalmic agent and a preservative;
 - a nozzle, the nozzle comprising:
 - an outlet,
 - an interior volume comprising a preservative removing device, and
 - one or more nozzle apertures fluidically connecting the interior volume with an exterior of the nozzle; and
 - a reservoir interface comprising one or more reservoir apertures, wherein upon rotation or translation of the nozzle relative to the reservoir interface, the one or more nozzle apertures are fluidically connected with the one or more reservoir apertures.
2. The flow control device of claim 1, wherein the preservative removing device comprises a polymeric matrix comprising absorbed molecules of the preservative from the ophthalmic formulation.
3. The flow control device of claim 2, wherein upon rotation or translation of the nozzle, the one or more nozzle apertures are fluidically disconnected from the one or more reservoir apertures, thereby preventing flow of the ophthalmic formulation between the interior volume of the nozzle and the reservoir and stabilizing a concentration of the preservative in the ophthalmic formulation.
4. The flow control device of claim 1, further comprising a bottle cap, wherein rotation of the bottle cap relative to the reservoir rotates or translates the nozzle relative to the reservoir interface, optionally wherein the bottle cap produces an audible or tactile click when moved into a closed state.
5. The flow control device of claim 4, wherein the bottle cap comprises a closure assembly which is resistant to manipulation from a child.
6. The flow control device of claim 1, wherein the nozzle comprises an outlet filter adjacent the outlet, optionally wherein the outlet filter comprises a mesh or a screen.
7. The flow control device of claim 1, wherein the nozzle comprises an inlet filter adjacent the one or more nozzle apertures, optionally wherein the inlet filter comprises a mesh or a screen.
8. The flow control device of claim 1, further comprising a bottle cap, wherein one or more nozzle apertures are aligned with the one or more reservoir apertures when the bottle cap

is removed and wherein one or more nozzle apertures are not aligned with the one or more reservoir apertures when the bottle cap is coupled to the nozzle.

9. The flow control device of claim 8, wherein, when the bottle cap is removed, the nozzle is in an aligned rotational position, optionally wherein rotation of the bottle cap about the axis of rotation relative to the reservoir rotates the nozzle about an axis of rotation relative to the reservoir.

10. The flow control device of claim 8, wherein the nozzle comprises a first one or more ridges on a bottle-cap facing surface, the first one or more ridges receivable by the bottle cap, optionally wherein the bottle cap comprises one or more alignment channels on an interior surface of the bottle cap, the first one or more ridges on the bottle-cap facing surface of the nozzle received within the one or more alignment channels.

11. The flow control device of claim 8, wherein the nozzle comprises a second one or more ridges on a reservoir interface facing surface, the second one or more ridges receivable by the reservoir interface.

12. The flow control device of claim 11, wherein the reservoir interface comprises one or more rotation guides, the second one or more ridges on a reservoir interface facing surface received by the one or more rotation guides, wherein the second one or more ridges on the reservoir interface facing surface received by the one or more rotation guides limits an angle of rotation of the nozzle relative to the reservoir interface.

13. The flow control device of claim 8, wherein, when the bottle cap is removed, the nozzle is in an aligned translational position.

14. The flow control device of claim 13, wherein a spring is disposed between the nozzle and the reservoir interface and wherein a restoring force of the spring translates the nozzle to the aligned translational position when the bottle cap is removed.

15. The flow control device of claim 14, wherein, when the bottle cap is in a closed state, the nozzle is not in the aligned position.

16. The flow control device of claim 15, wherein, when the bottle cap is in a closed state, the spring is at least partially compressed.

17. The flow control device of claim 15, further comprising a translation stop.

18. The flow control device of claim 16, wherein the translation stop comprises a plug configured to seal the one or more nozzle apertures.

19. The flow control device of claim 16, wherein the translation stop comprises a rotation stop for the bottle cap.

20. The flow control device of claim 1, wherein the nozzle comprises a housing configured to contain the preservative removing device, wherein the housing is translated in

relation to an exterior surface of the reservoir interface, optionally wherein a gasket provides a fluidic seal between the reservoir interface and the nozzle, optionally wherein an interference fit provides a fluidic seal between the reservoir interface and the nozzle.

21. A flow control device for delivering an ophthalmic formulation, the device comprising:

- a reservoir, the reservoir comprising an ophthalmic formulation disposed therein, the ophthalmic formulation comprising an ophthalmic agent and a preservative;

- a reservoir interface, disposed at a mouth of the reservoir, the reservoir interface comprising one or more apertures, the one or more apertures in the reservoir interface fluidically connecting an interior of the reservoir and an exterior of the reservoir;

- a nozzle, the nozzle comprising:

- an outlet and

- a nozzle seal, the nozzle seal comprising one or more apertures, the one or more apertures in the nozzle cap fluidically connecting the outlet and a surface of the nozzle oriented toward the reservoir interface; and

- an axis of rotation, wherein rotation of the nozzle about the axis of rotation relative to the reservoir aligns the one or more apertures in the reservoir interface with the one or more apertures in the nozzle seal.