CLAIMS

1. A liquid dispensing device comprising:

a cartridge comprising:

a tubular cartridge body;

a base wall located at a first end of the cartridge body, a liquid dispensing opening provided in the base wall;

a plunger provided in the cartridge body, the plunger comprising a pushrod and a disc seal provided at a first end of the pushrod to define a cavity in the cartridge between the disc seal and the base wall, the plunger being moveable forward towards the base wall to push liquid contained in the cavity out through the liquid dispensing opening, the pushrod comprising a number of teeth successively provided along at least part of its length, each tooth comprising a sloped annular surface facing the base wall and an actuating surface facing a second end of the cartridge body;

a pusher actuatable from the second end of the cartridge body to move the plunger forward upon application of a forward axial force on the pusher, the pusher comprising a number of forwardly projecting cantilever arms provided in continuous biased contact with the pushrod, each of the cantilever arms having an end surface to contact with and transmit the forward axial force onto the actuating surface of each of the teeth to move the plunger forward, each of the cantilever arms further having a sloped arm surface facing the second end of the cartridge body for backward sliding engagement with the sloped annular surface of each tooth without causing movement of the plunger when the pusher is returned to a rest position upon release of the forward

axial force on the pusher; and

a return mechanism provided in the cartridge body to return the pusher to the rest position;

a dispenser pen comprising:

a pen body for receiving and removably attaching therein the cartridge; the pen body having an open first end for insertion and removal of the cartridge into the pen body; and

a push-button mechanism provided at a second end of the pen body to apply the forward axial force on the pusher of the cartridge; and

a base for receiving the first end of the pen body thereon to keep the dispenser pen in an upright position, wherein one of a top of the base and a rim of the first end of the pen body is provided with an annular magnet and the other of the top of the base and the rim of the first end of the pen body is provided with a ferromagnetic ring to magnetically attach the pen body to the base.

2. The liquid dispensing device of claim 1, wherein the cartridge comprises a stopper provided in the cartridge body against which the pusher rests in the rest position, and wherein the return mechanism comprises a cartridge spring in axial engagement with the pusher and the stopper to return the pusher to the rest position upon release of the forward axial force on the pusher.

3. The liquid dispensing device of claim 2, wherein the stopper comprises an end plate of a tubular sleeve fixedly provided within the cartridge body, the end plate having a central through hole for passage of at least the cantilever arms therethrough.

4. The liquid dispensing device of any one of claims 1 to 3, wherein the teeth are provided on an external surface of the pushrod, and wherein the cantilever

arms of the pusher are at least partially provided around the pushrod between the pushrod and a wall of the cartridge body.

5. The liquid dispensing device of any one of claims 1 to 3, wherein the pushrod comprises a hollow tube and the teeth are provided on an internal surface of the pushrod, and wherein the cantilever arms of the pusher are at least partially provided within the pushrod.

6. The liquid dispensing device of any one of the preceding claims, further comprising an external annular recess provided on an external surface of the cartridge body to engage an internal protrusion provided within a dispenser pen for retaining the cartridge within the dispenser pen.

7. The liquid dispensing device of any one of the preceding claims, wherein the push-button mechanism comprises a dispenser button extending partially out of the second end of the pen body, the dispenser button being depressible into the pen body upon application of the forward axial force on the dispenser button, the push-button mechanism further comprising a button extender to transmit the forward axial force from the dispenser button to the pusher of the cartridge.

8. The liquid dispensing device of claim 7, wherein the push-button mechanism further comprises a button housing provided within the second end of the pen body around a part of the dispenser button provided in the pen body, the button housing containing therein a dispenser spring in axial engagement with the dispenser button to bias the dispenser button in a direction out of the second end of the pen body.

9. The liquid dispensing device of claim 8, wherein the dispenser button is rotatable within the button housing between an unlocked position and a locked position, wherein in the unlocked position, the dispenser button is depressible into the pen body

to dispense liquid from the cartridge, and wherein in the locked position, the dispenser button cannot be depressed into the pen body to dispense liquid from the cartridge.

10. The liquid dispensing device of claim 9, wherein the dispenser button comprises a protruding tab to engage a rim of the button housing in the locked position to prevent depression of the dispenser button into the pen body, and wherein the button housing is provided with an axial slot to receive the protrusion in the unlocked position to allow depression of the dispenser button into the pen body.

11. The liquid dispensing device of any one of the preceding claims when dependent on claim 6, wherein the internal protrusion comprises a laterally-biased cartridge catch collar provided in the pen body, the cartridge catch collar being laterally displaceable against the lateral bias to disengage from the annular recess of the cartridge to allow removal of the cartridge from the pen body.

12. The liquid dispensing device of any one of the preceding claims, further comprising a transparent portion provided at the first end of the pen body to allow the disc seal to be seen when the disc seal is at the base wall of the cartridge.

13. The liquid dispensing device of claim 12 when dependent on claim 11, wherein the transparent portion comprises a laterally depressible catch button provided to laterally displace the cartridge catch collar against the lateral bias.

14. The liquid dispensing device of any one of the preceding claims, wherein the base contains therein a vibration mechanism to provide a vibration to a bottom of the base for imparting a vibration to a skin surface that the bottom of the base is placed in contact with together with liquid dispensed from the liquid dispensing device in order to enhance application of the liquid on the skin surface.

15. The liquid dispensing device of any one of the preceding claims, wherein the base is weighted to provide stability to the liquid dispensing device.

16. The liquid dispensing device of any one of claims 1 to 14, further comprising a cap for covering the first end of the pen body to close the liquid dispensing opening of the cartridge when the cartridge is in the dispenser pen.