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(71) Applicant (for all designated States except US): **CINCH PAK PTY LTD** [AU/AU]; 335 A Edgecliff Road, Woollahra, NSW 2025 (AU).

(71) Applicant and

(72) Inventor: **DE LA VEGA, Alejandro, Jose** [AU/AU]; 335 A Edgecliff Road, Woollahra, NSW 2025 (AU).

(72) Inventors; and

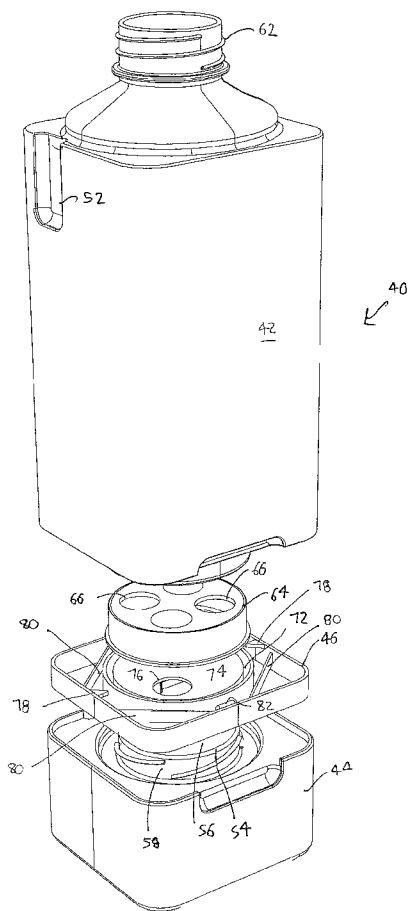
(75) Inventors/Applicants (for US only): **DE LA VEGA, Lynette, Margaret** [AU/AU]; 335 A Edgecliff Road, Woollahra, NSW 2025 (AU). **TILLER, Robert, Bruce** [AU/AU]; 31 Trouton Street, Balmain, NSW 2041 (AU). **RYAN, Garth, Andrew, Rodney, Hogan** [AU/AU]; 1 Harper Street, Helensburg, NSW 2508 (AU). **LEAVENS, Benjamin, John** [AU/AU]; 2B/4 Buckhurst Avenue, Point Piper, NSW 2027 (AU).

(74) Agent: **PHILLIPS ORMONDE & FITZPATRICK;** Level 23, 367 Collins Street, Melbourne, VIC 3000 (AU).

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(54) Title: STORAGE DEVICE FOR SELECTIVELY ADDING SUBSTANCE TO A LIQUID



(57) Abstract: The disclosed invention relates generally to a liquid storage device, more particularly to a liquid storage device adapted to permit a substance to be selectively added to a liquid and an associated method of selectively adding a substance to a liquid. The invention has been primarily developed for use in water bottles that allow the selective addition of powdered vitamin supplements and will be described hereunder with reference to this application. However, the invention is not limited to this particular application and is also suited for use in storage of numerous other liquids and the selective addition of numerous other substances, as will be explained in this document.

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AMENDED CLAIMS

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1. A liquid storage device including:
a liquid reservoir;
5 a substance reservoir, the substance reservoir being connectable to the liquid reservoir for handling as a single item without causing liquid transmission between the substance reservoir and the liquid reservoir; and
manually operable means to selectively allow liquid transmission
between the substance reservoir and the liquid reservoir.
10
2. A liquid storage device according to claim 1, wherein the manually operable means includes valve and/or seal means associated with one or both of the substance reservoir and the liquid reservoir.
- 15 3. A liquid storage device according to claim 1 or 2, wherein the manually operable means is operable by twisting or turning the substance reservoir, or an associated housing, relative to the liquid reservoir.
4. A liquid storage device according to claim 1 or 2, wherein the manually
20 operable means is operable by deforming the liquid reservoir.
5. A liquid storage device according to any one of claims 1 to 4, wherein the liquid reservoir is accessible, for receiving or releasing fluid, whilst connected to the liquid reservoir without causing liquid transmission between
25 the substance reservoir and the liquid reservoir.
6. A liquid storage device according to any one of claims 1 to 5, wherein the liquid reservoir includes an opening that is remote the substance reservoir.
- 30 7. A liquid storage device according to claim 6, wherein the opening is closed by a cap or lid.

8. A liquid storage device according to any one of claims 1 to 5, wherein the liquid reservoir includes an opening that passes through the substance reservoir.
- 5 9. A liquid storage device according to claim 8, wherein the opening is a tube closed by a cap or lid.
- 10 10. A liquid storage device according to any one of claims 1 to 5, wherein the substance reservoir includes a passage or duct in fluid communication with an opening in the liquid reservoir.
- 15 11. A liquid storage device according to any one of claims 1 to 10, wherein the substance reservoir includes at least one frangible part adapted for cutting or rupturing by at least one cutter in the liquid reservoir, in response to relative movement between the liquid reservoir and the cutter.
- 20 12. A liquid storage device according to claim 11, wherein the substance reservoir includes two opposed frangible parts adapted for cutting or rupturing by two opposed cutters in the liquid reservoir, in response to relative movement between the liquid reservoir and the cutters.
- 25 13. A liquid storage device according to claim 11 or 12, wherein the substance reservoir is adapted for insertion into the liquid reservoir in a first position, in which the cutter(s) are remote the frangible part(s), and movable to a second position, in which the cutter(s) are adjacent the frangible part(s).
- 30 14. A liquid storage device according to claim 13, wherein the substance reservoir is rotatable about its longitudinal axis between the first and second positions.
15. A liquid storage device according to claim 13 or 14, wherein the substance reservoir includes one or more recesses extending longitudinally along the substance reservoir, in which the cutter(s) travel whilst in the first position.

16. A liquid storage device according to any one of claims 11 to 15, wherein the frangible part(s) is/are foil seal(s).
17. A liquid storage device according to claim 16, wherein the foil seal(s)
5 extend longitudinally along the substance reservoir.
18. A liquid storage device according to any one of claims 11 to 17, wherein the cutter(s) is/are associated with a cap part connectable to the liquid reservoir.
10
19. A liquid storage device according to claim 18, wherein the cutter(s) form part of the cap part.
20. A liquid storage device according to claim 18 or 19, wherein the liquid
15 reservoir and cap part include corresponding engagement formations.
21. A liquid storage device according to claim 21, wherein the corresponding engagement formations include at least one protuberance near each end of the liquid reservoir and at least one groove in the cap part.
20
22. A liquid storage device according to any one of claims 18 to 21, wherein the cap part is grooved to allow relative axial rotation between the liquid reservoir and the cap part when either end of liquid reservoir is substantially adjacent the cap part.
25
23. A liquid storage device according to any one of claims 1 to 22, wherein the liquid reservoir includes a tab to facilitate manual gripping of the liquid reservoir.
- 30 24. A liquid storage device according to claim 23, wherein the tab is adjacent an end of the liquid reservoir.
25. A liquid storage device including:
a liquid reservoir having at least one first opening,

a substance reservoir having at least one first opening, closed by a seal; and a joiner adapted for engagement with the liquid reservoir and the substance reservoir, the joiner including a cutter adapted to rupture said seal during engagement of the substance reservoir with the joiner;

5 wherein the liquid reservoir is selectively movable relative to the substance reservoir between a first position preventing liquid transmission between the at least one first opening of the liquid reservoir and the at least one first opening of the substance reservoir and a second position permitting liquid transmission between the at least one first opening of the liquid reservoir and the at least one first opening of the substance reservoir.

26. A liquid storage device according to claim 25, wherein the liquid reservoir includes at least one second opening, the at least one second opening being closable by a lid.

15

27. A liquid storage device according to claim 26, wherein the liquid reservoir at least one first opening and at least one second opening are on opposed ends of the liquid reservoir.

20 28. A liquid storage device according to claim 26 or 27, wherein the liquid reservoir has two first openings and one said second opening.

29. A liquid storage device including:

 a liquid reservoir;

25 a substance reservoir having at least one opening that is closed by a seal; and

 a joiner adapted for engagement with the liquid reservoir and the substance reservoir, to rupture said seal during said engagement with the substance reservoir; and selectively prevent or allow liquid transmission
30 between the liquid reservoir and the substance reservoir.

30. A liquid storage device according to claim 29, wherein the liquid reservoir has two first openings on one end and one second opening on its other end.

31. A liquid storage device according to claim 29 or 30, wherein the substance reservoir has one first opening.

32. A liquid storage device according to claim 31, wherein the substance
5 reservoir first opening is adjacent a threaded cylindrical part, which threaded cylindrical part is adapted to engage a corresponding threaded cylindrical recess on the joiner.

33. A liquid storage device according to any one of claims 29 to 32, wherein
10 the joiner includes at least one tooth adapted to rupture the seal during engagement of the substance reservoir with the joiner.

34. A liquid storage device according to claim 33, wherein the joiner includes four teeth.

15

35. A liquid storage device according to any one of claims 32 to 34, wherein the engagement is screwing engagement.

36. A liquid storage device according to claim 35 when dependent on claim
20 34, wherein the tooth or teeth are adjacent the threaded cylindrical recess.

37. A liquid storage device according to any one of claims 29 to 36, wherein the liquid reservoir and the joiner include corresponding formations adapted to, upon the liquid reservoir and the joiner being screwed together, selectively
25 allow or prevent relative rotation between the liquid reservoir and the joiner.

38. A liquid storage device according to claim 37, wherein relative rotation is prevented by the formations abutting one another in a natural state and relative rotation is allowed by the formations clearing one another in deformed
30 state.

39. A liquid storage device according to claim 37 or 38, wherein the joiner is adapted such that manual squeezing moves the formations out of engagement to allow the relative rotation.

40. A liquid storage device according to claim 39, wherein the manual squeezing is of opposed sides of the joiner.
41. A liquid storage device according to any one of claims 29 to 40,
5 including a seal between the liquid reservoir and the joiner.
42. A liquid storage device according to claim 41, wherein the seal is an elastomeric seal.
- 10 43. A liquid storage device according to claim 41 or 42, wherein the seal includes one opening corresponding to the first opening in the liquid reservoir.
44. A liquid storage device according to claim 43, wherein the seal includes two openings corresponding to two first openings in the liquid reservoir.
- 15 45. A liquid storage device according to any one of claims 29 to 44, wherein the substance reservoir includes means to enable releasable connection to a like substance reservoir.
- 20 46. A liquid storage device according to claim 45, wherein the means to enable releasable connection is in the form of corresponding threaded cylindrical parts and recesses on respective opposed ends of the substance reservoir.
- 25 47. A method of selectively adding a substance to a liquid, the method including the steps of:
adding liquid to a liquid reservoir having at least one first opening and at least one second opening, the at least one second opening being closable by a lid;
30 adding a substance to a substance reservoir having at least one first opening;
closing the at least one first opening of the substance reservoir with a seal;

connecting the substance reservoir to a cutter which is adapted to pierce said seal during the connection to the cutter or the substance reservoir; and

5 moving the liquid reservoir relative to the substance reservoir from a first position preventing liquid transmission between the at least one first opening of the liquid reservoir and the at least one first opening of the substance reservoir and a second position permitting liquid transmission between the at least one first opening of the liquid reservoir and the at least one first opening of the substance reservoir.

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48. A method according to claim 47, further including rotating the liquid reservoir relative to the substance reservoir between the first and second positions.

15 49. A method of selectively adding a substance to a liquid, the method including the steps of:

adding liquid to a liquid reservoir;

adding a substance additive to a substance reservoir having at least one opening;

20

sealing the substance reservoir at least one opening;

connecting the liquid reservoir to the substance reservoir;

rupturing the seal whilst maintaining the connection of liquid reservoir to the substance reservoir; and

25 opening a liquid transmission path between the liquid reservoir and the substance reservoir whilst maintaining the connection of liquid reservoir to the substance reservoir.

50. A method according to claim 49, further including rupturing the seal during connection of the liquid reservoir to the substance reservoir.

30

51. A method according to claim 49 or 50, further including connecting the liquid reservoir to the substance reservoir via a joiner.

52. A liquid storage device including:

a liquid reservoir having at least one first opening;
a substance reservoir adapted for introduction into the liquid reservoir
via the at least one first opening;
means adapted for rupturing the substance reservoir;
5 wherein the rupturing means is activatable from the exterior of the liquid
storage device.

53. A liquid storage device according to claim 52, wherein the rupturing
means is manually activatable from the exterior of the liquid storage device.

10

54. A liquid storage device according to claim 52 or 53, further including a
lid adapted for closing the at least one first opening.

55. A liquid storage device according to claim 54, wherein the lid includes a
15 flow selectable drinking nozzle therein.

56. A liquid storage device according to claim 54 or 55, wherein the lid
includes a member adapted for rupturing the substance reservoir that is
connected to an externally operable flange.

20

57. A liquid storage device according to claim 56, wherein the flange is an
annular flange around the nozzle.

58. A liquid storage device according to any one of claims 52 to 56, further
25 including a carrier adapted for introduction into the liquid reservoir via the at
least one first opening and able to receive the substance reservoir therein.

59. A liquid storage device according to claim 58, wherein the carrier
preferably has a series of holes therein.

30

60. A liquid storage device according to claim 58 or 59, wherein the carrier
has a flange on one end adapted for mounting to the liquid reservoir.

61. A liquid storage device according to claim 60, wherein the flange is retained by the lid.

62. A liquid storage device including:

- 5 a flexible liquid reservoir defining an interior; and
a substance reservoir, within the interior of the liquid reservoir, formed of a weaker material than that of the liquid reservoir;
wherein the substance reservoir is adapted for rupturing in preference to the liquid reservoir in response to deformation of the liquid reservoir.

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63. A liquid storage device according to claim 62, wherein the substance reservoir is adapted for rupturing in preference to the liquid reservoir in response to manual deformation of the liquid reservoir.

- 15 64. A liquid storage device according to claim 62 or 63, wherein the substance reservoir is flexible.

65. A liquid storage device according to any one of claims 62 to 64, wherein the substance reservoir is mounted to, or forms part of, the base of the liquid
20 reservoir.

66. A liquid storage device according to any one of claims 62 to 65, wherein the substance reservoir is formed from a material that has a lower burst or tear strength than that of the liquid reservoir.

25

67. A liquid storage device according to any one of claims 62 to 66, wherein the substance reservoir includes regions of weakness.

68. A liquid storage device including:

- 30 a liquid reservoir having at least one first opening;
a substance reservoir within the liquid reservoir, or adapted for introduction into the liquid reservoir via the at least one first opening, the substance reservoir having at least one second opening;

means adapted for closing the substance reservoir at least one second opening; and

means adapted for opening the substance reservoir,
wherein said rupturing means is activatable from the exterior of the
5 liquid storage device.

69. A liquid storage device according to claim 68, wherein the means adapted for closing the substance reservoir at least one second opening is a lid.

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70. A liquid storage device according to claim 69, wherein the means adapted for opening the substance reservoir is a pull-cord that is attached to the lid and of a length that reaches exterior of the liquid storage device.

15 71. A liquid storage device including:

a liquid reservoir having an open interior, a threaded part and a cutter;

a substance reservoir having a closed interior;

a corresponding threaded part, associated with the substance reservoir, and adapted for threaded engagement liquid reservoir threaded part; and

20 a device adapted to selectively restrict the extent of positioning of the liquid reservoir relative to the substance reservoir,

wherein, with the restricting device positioned between the liquid reservoir and the substance reservoir, the relative positioning of the liquid reservoir and the substance reservoir is restricted to prevent the cutter from
25 rupturing the substance reservoir to thereby prevent liquid transmission between the liquid reservoir interior and the substance reservoir interior and, with the restricting device removed from between the liquid reservoir and the substance reservoir, the liquid reservoir and the substance reservoir can be positioned relative to the substance reservoir to cause the cutter to rupture the
30 substance reservoir to thereby permit liquid transmission between the liquid reservoir interior and the opened substance reservoir interior.

72. A liquid storage device according to claim 71, wherein the device includes a housing adapted to contain the substance reservoir, and said corresponding threaded part forms part of the housing.
- 5 73. A liquid storage device according to claim 73 or 74, wherein the liquid reservoir and the housing have male and female threaded parts respectively.
74. A liquid storage device according to any one of claims 71 to 73, wherein the restricting device is preferably a removable peripheral band between the
10 male and the female threaded parts.
75. A liquid storage device according to any one of claims 71 to 74, wherein the substance reservoir has a passage, duct or tube therethrough that is in fluid communication with the interior of the liquid reservoir.
15
76. A liquid storage device according to claim 75, wherein the distal end of the passage, duct or tube is in fluid communication with an opening in the housing.
- 20 77. A liquid storage device according to claim 74, wherein the housing opening is closed by a removable, preferably a screw threaded, cap or lid.
78. A liquid storage device according to claim 71, wherein said corresponding threaded part forms part of the substance reservoir.
25
79. A liquid storage device according to claim 78, wherein the liquid reservoir and the substance reservoir have male and female threaded parts respectively.
- 30 80. A liquid storage device according to claim 78 or 79, wherein the restricting device is a removable peripheral band between the male and female threaded parts.

81. A liquid storage device according to any one of claims 78 to 80, wherein the substance reservoir has a passage, duct or tube therethrough that is in fluid communication with the interior of the liquid reservoir.
- 5 82. A liquid storage device according to claim 81, wherein the distal end of the passage, duct or tube is closed by a removable, preferably a screw threaded, cap or lid.