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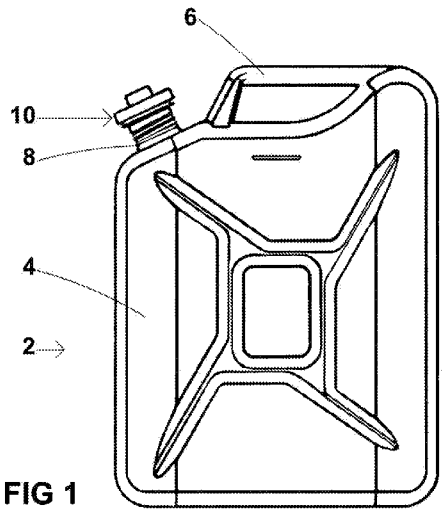

FIG 1

(57) Abstract: A portable fuel container including a tank; a spout including a sealing surface and an internal screw thread; a cap assembly including a cap body, a plug body and a sealing element; the plug body includes an external screw thread and can mesh with the screw thread of the spout; the cap body being mounted on the plug body rotates relatively via clutch means; when a user grips and rotates the cap body in a first sense, the sealing element engages with the sealing surface with a predetermined degree of compression and further rotation causes operation of the clutch means so that the cap body rotates relatively to the plug body and predetermined degree of compression is maintained; rotation of the cap body in opposite to the first sense, can rotate cap body and plug body in unison and remove the cap assembly from the spout; and the cap assembly does not include a vent or pressure relief valve.

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IMPROVED PORTABLE FUEL CONTAINER

[0001] This invention relates to a portable fuel container.

[0002] More particularly, the invention relates to a portable fuel container which is provided with a novel spout and cap which is capable of providing a reliable sealing of the container and is able to withstand pressure and drop tests required for compliance with various standards relating to fuel tanks.

[0003] The invention is an improvement of the type of portable fuel container disclosed in Australian Innovation Patent No. 2012100678, the contents of which are incorporated herein by cross-reference.

[0004] The object of the invention is to provide modifications to the portable fuel container disclosed in the aforementioned patent in order to obtain improved performance.

[0005] According to the present invention there is provided a portable fuel container, the fuel container including:

a tank;

a spout located on an upper part of the tank for permitting fluid to be placed into and poured from the tank;

the spout having a sealing surface and an internal screw thread having more than one convolution of thread;

a cap assembly for closing the spout;

the cap assembly including a cap body, a plug body and a sealing element, the plug body including an external screw thread which can mesh with the screw thread of the spout;

the cap body being mounted on the plug body for relative rotation via clutch means, the arrangement being such that a user can grip the cap body and rotate it in a first sense so that threads of the plug body and spout mesh whereby the sealing element is brought into sealing engagement with the sealing surface with a predetermined degree of

compression and further rotation of the cap body causes operation of the clutch means so that the cap body rotates relative to the plug body whereby said predetermined degree of compression of the sealing element is maintained, and the clutch means is such that rotation of the cap body by the user a second sense, opposite to the first sense, enables the cap body and plug body to be rotated in unison for removal of the cap assembly from the spout; and

wherein the cap assembly does not include a vent or pressure relief valve.

[0006] The invention also provides a portable fuel container, the fuel container including:

a tank;

a spout located on an upper part of the tank for permitting fluid to be placed into or poured from the tank;

the spout having a sealing surface and an internal screw thread having more than one convolution of thread;

a lockable cap assembly for closing the spout;

the cap assembly including a cap body, a plug body and a sealing element, the plug body including an external screw thread which can mesh with the screw threads of the spout;

the cap body being mounted on the plug body for relative rotation via clutch means, the arrangement being such that a user can grip the cap body and rotate it in a first sense so that threads of the plug body and spout mesh whereby the sealing element is brought into sealing engagement with the sealing surface with a predetermined degree of compression and further rotation of the cap body causes operation of the clutch means so that the cap body rotates relative to the plug body whereby said predetermined degree of compression of the sealing element is maintained, and the clutch means is such that rotation of the cap body by the user a second sense, opposite to the first sense, enables the cap body and plug body to be rotated in unison for removal of the cap assembly from the spout,

the clutch means including one or more resilient fingers which are engageable with ribs and rotate in unison until said predetermined degree of compression is reached

whereon one or more of the fingers resiliently deflect and pass over the ribs,

a key operated locking mechanism which causes selective movement of the one or more fingers between extended and retracted positions such as when the cap assembly is mounted on the spout and said one or more fingers are in their retracted positions of rotation of the cap body in the first or second sense does not cause rotation of the plug body and wherein the said one or more fingers are in their extended positions, rotation of the cap body causes rotation of the plug body, subject to the operation of the clutch means, and

wherein the cap assembly does not include a vent or pressure relief valve.

[0007] Preferably, the screw thread of the spout includes about 2.05 full convolutions of thread (excluding lead-in and lead-out portions of the thread).

[0008] Preferably, the cap body is made from high density polyethylene and more preferably is made from PRM01 Lupolen 4261 AG.

[0009] Preferably further, the plug body is made from high density polyethylene and more preferably is made from RM006 Lupolen 4261 AG. This material is relatively elastic so that it can better conform to the complementary shape of the thread of the spout so as to provide a better grip therewith. This enhances the ability of the container to withstand pressure and drop tests.

[0010] Preferably further, the clutch means when a tightening torque of about 5Nm is applied to the cap body.

[0011] The invention also provides a cap assembly for a portable fuel container having a spout which permits fluid to be placed into or poured from the tank;

the spout having a sealing surface and an internal screw thread having more than one convolution of thread;

the assembly including the cap assembly including a cap body, a plug body and a sealing element, the plug body including an external screw thread which can mesh with the screw threads of the spout;

the cap body being mounted on the plug body for relative rotation via clutch means, the arrangement being such that a user can grip the cap body and rotate it in a first sense so that threads of the plug body and spout mesh whereby the sealing element is brought into sealing engagement with the sealing surface with a predetermined degree of compression and further rotation of the cap body causes operation of the clutch means so that the cap body rotates relative to the plug body whereby said predetermined degree of compression of the sealing element is maintained, and the clutch means is such that rotation of the cap body by the user a second sense, opposite to the first sense, enables the cap body and plug body to be rotated in unison for removal of the cap assembly from the spout,

characterised in that the cap assembly does not include a vent or pressure relief valve.

[0012] The portable fuel container may supply in combination with a pourer. In this case the pourer has a screw thread which can mesh with the screw thread of the spout after the cap assembly has been removed.

[0013] The invention will now be further described with reference to accompanying drawings, in which:

Figure 1 is schematic side view of a fuel container constructed in accordance with the invention;

Figure 2 is a plan view of a container;

Figure 3 is an end view of the container;

Figure 4A is a side view of the spout of the container of the invention;

Figure 4B is an axial view of the spout;

Figure 4C is a cross-sectional view along the line 4-4;

Figure 4D is a cross-section through the spout and cap assembly;

Figure 5 is a plan view of a plug body which forms part of the cap assembly;

Figure 6 is a side view of the plug body;

Figure 7 is an underside view of the cap body which forms part of the cap assembly;

Figures 8 and 9 are schematic views showing operation of the clutch mechanism of the cap assembly;

Figure 10 is a fragmentary view of part of a lockable cap assembly with the cap in the locked position;

Figure 11 is a similar view to Figure 10 but with the lock in the unlocked position;

Figure 12 is a schematic plan view of the plug body of the lockable cap assembly;

Figure 13 is a side view of a pourer which can be used with the container of the invention;

Figure 14 is a schematic longitudinal cross-section along the line 14-14; and

Figure 15 is an enlarged cross-sectional view of the proximal end of the pourer.

[0014] Figure 1 shows a jerry can 2 constructed in accordance with the invention. In the illustrated arrangement, it includes a 20 litre container 4 which is formed from pressed metal in the usual way. The container includes a handle assembly 6 welded to the top of the container 4. The top of the container 4 includes a spout 8 and cap assembly 10 of the invention.

[0015] Figures 4A to 4C show more details of the spout 8 of the jerry can 2. The spout 8 is a hollow cylindrical tubular body welded to the top surface 12 of the container 4. The spout 8 includes an internal screw thread 14 which is preferably rolled into the sidewall of the spout. As shown in Figure 4A, the thread 14 includes a tapered lead-in portion 15 and a tapered lead-out portion 17. The thread 14 extends more than one convolution of the spout. In the illustrated arrangement, the thread 14 extends through 738° which is about 2.05 complete convolutions, excluding the lead-in and lead-out portions 15 and 17, as best seen in Figures 4A and 4B. The profile of the thread is preferably similar to that which is typically used in the filler spout of automotive fuel tanks. The pitch of the thread is

preferably about 6.35mm. As can be seen in Figure 4C, the outer edge 16 of the spout is rolled down so that it is U-shaped in cross-section. This provides strength as well as the profile giving a generally annular sealing surface 18.

[0016] Figure 4D is a schematic cross-sectional view showing the cap assembly 10 mounted in the spout 8 so as to effectively seal the container.

[0017] The cap assembly 10 includes a cap body 20, plug body 22 and an O-ring 24. The plug body 22 includes a cylindrical skirt 26 formed with external threads 28 which mesh with the thread 14 of the spout 8. In the illustrated arrangement there are at least two full convolutions in the external threads 28. A user can close the container 4 by inserting the skirt portion 26 into the spout and rotating it (clockwise for a right-hand thread) in order to cause the threads 14 and 28 to mesh and move the assembly downwardly so that the O-ring 24 engages the sealing surface 18. Continued rotation of the cap body 20 will cause resilient compression to a pre-determined degree of the O-ring and then a clutch mechanism 30 (not shown in Figure 4B) will operate to prevent further rotation of the plug body 22 so that the correct degree of compression of the O-ring 24 is maintained. It is preferred that the clutch mechanism operates when the user applies a torque greater than about 5Nm. A torque of this magnitude produces the correct degree of compression of the O-ring 24 and also provides stronger tightening of the cap compared to the cap disclosed in the aforementioned patent. The O-ring 24 can be of circular cross-section as shown in the drawings or alternatively may include a circumferential slot so that it is generally C-shaped in cross-section. The cap assembly 10 can be removed by the user gripping the cap body 20 and rotating it in a counter-clockwise direction. In this mode of operation the clutch mechanism 30 is such that the cap body 20 and plug body 22 always rotate in unison so that the cap assembly 10 can be removed.

[0018] Figures 5 to 9 illustrate schematically one arrangement for providing the clutch mechanism 30 in the cap assembly 10. In this arrangement, the plug body 22 includes an integral upper annular flange 31 upon which are formed three resilient fingers 32. The resilient fingers 32 are integrally formed by moulding with the plug body 22 and are

resiliently flexible in a radial direction. Each of the fingers 32 includes an inclined face 34 which terminates in a radial face 36. The inner face of the fingers 32 include a part-circular recess 38 which defines an integral hinge 40 which facilitates radial resilient flexing of the fingers 32. In the illustrated arrangement, the fingers 32 are located above the plane of the annular flange 31 of the plug body 22. Located adjacent to the fingers 32 are upstanding guide plates 42 which assist in maintaining axial alignment and rotation of the cap body 20 relative to the plug body 22.

[0019] As best seen in Figures 4B and 7, the cap body 20 is moulded so as to have a transverse gripping bar 50 on its upper surface 52. The cap body 20 includes a downturned flange 54 which has inwardly-directed resilient projections 53 which engage the underside of the annular flange 31 of the plug body 22 so that the plug body 22 is effectively interlocked with the cap body 20.

[0020] It will be seen that the inner side of the flange 54 is provided with a plurality of ribs 56. Each of the ribs has a radial face 58 and a sloping face 60. The ribs 56 cooperate with the fingers 32 to form a clutch mechanism, as will be described. When a user grips the cap body 20 by the gripping bar 50 and rotates it clockwise, the threads 14 and 28 will engage so as to cause sealing engagement of the O-ring 24 with the sealing surface 18. If the user continues to rotate the cap body 20, compression of the O-ring 24 will occur and resistance to further tightening will increase. At this point, the ribs 56 will engage the sloping face 60 of the fingers, as diagrammatically shown in Figure 8. Further rotation will cause resilient deflection of the finger 32 and continued rotation will cause deflection of the fingers to the point where there is relative rotation between the fingers 32 and the rib 56 in engagement therewith (the rib moving anti-clockwise as shown in the underside view of Figure 8). When a predetermined level of compression of the O-ring 24 occurs, the rib 56 will disengage the finger 32 as seen in Figure 9 and the finger 32 will resume its non-deflected shape. Further rotation of the cap body 20 in the same sense will cause the finger 32 to engage the next rib but it will deflect the finger and slide over it. In this way the user cannot over-tighten the cap assembly and the correct sealing engagement occurs between the O-ring 24 and the sealing surface 18. When the cap is rotated in an anti-clockwise

direction for removal of the cap assembly from the spout 8 the radial face 58 of the ribs will engage the radial face 36 of the finger 32 so that rotation of the cap body 20 (clockwise as shown in Figure 9) will cause counter-clockwise rotation of the plug body 22 by virtue of the engagement of the faces 36 and 58 for removal of the cap assembly 10 from the spout 8.

[0021] Prototypes of the cap assembly 10 have been constructed and tested and the prototypes comply with Australian Standard AS2906.2001. A 20 litre prototype jerry can performed satisfactorily when subjected to a 1200 mm drop test. The can was also capable of withstanding internal pressures of 6.5 bar. In one drop test, the cap body 20 separated from the plug body 22 but the plug body 22 remained firmly engaged in the spout and no leakage occurred.

[0022] It will be appreciated that the cap assembly 10 can be readily formed by injection moulding of the cap body 20 and plug body 22. The O-ring 24 can be of any suitable type of elastomeric material which is resistant to petrol or diesel. The preferred materials for the components are as follows:

(i)	cap body 20	PRM01 Lupolen 4261 AG;
(ii)	plug body 22	RM006 Lupolen 4261 AG; and
(iii)	O-ring 24	Specification: ASTM D2000 M4BK 704 A24 EF21 Z1 to Z8

[0023] It has been found that the particular type of high density polyethylene for the cap body 20 specified above provides good strength and impact resistance. The high density polyethylene for the plug body 22 provides good strength with some degree of elasticity which enables the threads of the body 22 to better conform to the complementary thread 14 of the spout so as to provide enhanced grip therewith.

[0024] It is also possible to provide an alternative arrangement which has a key locking feature to prevent unauthorised removal of a cap assembly from the spout 8. Figures 10, 11 and 12 schematically illustrate one arrangement of this type and the same reference numerals have been used to denotes parts which are the same as or corresponding to those

of the earlier embodiment. In this arrangement, locking cap assembly 68 has a cap body 20 which includes a locking mechanism 70 which projects downwardly from the underside of the cap body 20. The locking mechanism 70 need not be described in detail because it can be the same as or similar to those which are sometimes used on caps for automotive fuel tanks. It is important to note however that an automotive fuel tank cap cannot be used as a cap for a fuel container because they are normally vented and/or include pressure relief valves. The locking mechanism 70 includes a retractable resilient finger 72. The resilient finger 72 can be operated by a key mechanism in a manner which is known and need not be described. Figure 10 shows the resilient finger 72 in its retracted position. In this position, the finger is in use located within a circle 74 shown in broken lines in Figure 12. In this mode, unauthorised users attempting to rotate the cap body 20 cannot rotate the plug body 22 because the retractable finger 72 will lie within the circle 74 and will not engage the inwardly projecting ribs 76 which are formed on the inner side of the annular flange 31. When authorised opening or closing of the assembly 68 is required, the user uses a key (not shown) to move the finger 72 to its extended position (as shown in Figure 11). In this mode, the finger 72 will engage one of the ribs 76 so that rotation of the cap body 20 will cause corresponding rotation of the plug body 22. When however the required closure compression has been applied to the O-ring 24, the finger 72 will resiliently retract against the action of the spring 80 so as to slide over the ribs 76. It will be seen that the leading edge 78 of the finger 72 is sloped and profile of the ribs 76 is rounded to facilitate this movement. As can also been seen in Figure 11, the finger 72 is biased into its extended position by means of a compression spring 80.

[0025] It will be appreciated that in all embodiments of the invention, the assembly does not include a vent or pressure relief valve for relieving the internal pressure within the container 4.

[0026] A prototype of the container has been constructed and tested. It has been found to perform satisfactorily in a drop test of 1.8 metres and an internal pressure test of at least 250Kpa.

[0027] It is also possible to provide a pourer (not shown) which is provided with a base portion which is similar in shape to the plug body 22 so that it can be screw threaded into the spout 8. The pourer can be provided with an internal vent tube which vents the airspace at the top of the container 4 during pouring. The base part of the pourer can be provided with a projection or the like (not shown) which corresponds with a complementary projection (not shown) formed on the spout 8 so as to ensure that the vent tube is open to the top of the tank rather than at a level below the top of the fuel being poured from the spout 8. In an alternative optional embodiment, the spout 8 could be formed with a projection to control the position of the pourer when it is mounted on the spout 8 so that the vent tube is in an upward position so as to minimise fuel entering the vent tube.

[0028] Figures 13 to 15 illustrate one form of pourer 90 which can be used with the jerry can 2 of the invention. In the axial cross-sectional view shown in Figure 15, the cross-section is taken slightly off said relative to the centre line of the pourer. The pourer 90 includes a proximal end body 92, flexible tube 94 and pourer tip 96. In the illustrated arrangement, the proximal end body 92 is formed in two parts, as best seen in Figure 15. More particularly, the proximal end body 92 includes a moulded portion 98 and a hollow metallic coupling portion 97. The moulded portion 98 is preferably moulded from the same plastics material as the cap body 20 and includes external threads 100 which are preferably the same as the external threads 28 of the plug body 22. The moulded portion 98 includes a recess for receipt of an O-ring 102 which functions in a similar way to the O-ring 24, that is to say it engages the sealing surface 18 of the spout when the pourer is mounted on the container 4 by meshing of the threads 100 with the internal screw thread 14 of the spout 8.

[0029] In the illustrated arrangement, the moulded portion 98 includes a one-way valve 104 to permit air to pass therethrough to enter the interior of the container as fuel is poured therefrom. In the illustrated arrangement, the one-way valve includes a cylindrical valve chamber 106 formed into the moulded portion 98 and communicates with an air passage 108 which communicates with the hollow interior of the moulded portion 98, as shown in

Figure 15. A valve ball 110 is loosely fit within the valve chamber 106 but held captive therein by means of a valve seat 112. In the illustrated arrangement, the valve seat 112 is preferably moulded from plastics material and press fit into the end of the valve chamber 106. The valve seat includes an internal bore 114 and the ball 110 can engage the inner face of the bore so as to form a seal therewith. This prevents fuel from the tank escaping through the bore 114 of the valve. A fine mesh 116 which spans an air port at the distal end of the bore 114 of the one-way valve. The function of the mesh 116 is to substantially prevent any splashes of fuel being discharged from the bore 114 when a user initially commences to pour fuel from the jerry can through the pourer. In the preferred form of the invention, the mesh 116 is heat welded into the body of the valve seat 112 which is in turn press-fit into the open end of the valve chamber 106. The mesh 116 is preferably made from brass or stainless steel wire and is relatively fine having an opening percentage of about 30%. The wire may have a diameter of 0.2286mm and an opening size of 0.28mm (50 x 50 per 2.55mm). Alternatively, the mesh could be a fine mesh of synthetic material such as nylon or the like which would facilitate heat welding of it to the moulded portion 98.

[0030] The moulded portion 98 is moulded with an internal bore 120 into which the hollow connecting portion 97 is press fit, as shown in Figure 15. The connecting portion 97 includes a distal portion 122 of narrower diameter and the proximal end of the tube 94 is mounted onto the portion 122. The hollow connecting portion 97 has a flare 123 at its proximal end. Preferably the portion 97 is retained in the moulded portion 98 by means of a press fit.

[0031] The flexible tube 94 preferably has a diameter of about 25mm and is about 150mm to 180mm in length. The flexible tubular portion 94 is preferably made from helically wound metallic strip formed in a manner which is known in the art and need not be described in detail.

[0032] The pourer tip 96 is preferably press fit onto the distal end of the flexible tube 94 again by means of press fit. It includes a pourer at its end so as to permit fuel to be poured

therefrom, in the usual way. In the illustrated arrangement, a filter element 130 is mounted in the tube 94 adjacent to the tip 96, as best seen in Figure 14. The mesh size of the filter element 130 is preferably relative fine bt not as fine as the mesh 116. Typically the filter element has a 400 micron mesh size. It can be made from wire and/or synthetic material.

[0033] In a further refinement of the pourer, the moulded portion 98 can be moulded with a projection (not shown) diametrically opposite to the one-way valve 104. In this way a user can grip the projection and the one-way valve 104 so that it functions analogously to the transverse gripping bar 50 of the cap assembly 10. In this arrangement, the user can tighten the pourer 90 on the spout 8 without danger of his or her fingers being caught between the pourer and the spout and/or container 4.

[0034] Many modifications will be apparent to those skilled in the art without departing from the spirit and scope of the invention.

[0035] LIST OF PARTS

jerry can	2
20 litre container	4
handle assembly	6
spout	8
cap assembly	10
top surface	12
internal screw thread	14
lead-in portion	15
outer edge	16
lead-out portion	17
sealing surface	18
cap body	20
plug body	22
O-ring	24
cylindrical skirt	26
external threads	28
clutch mechanism	30
annular flange	31
three resilient fingers	32
inclined face	34
radial face of the fingers	36
part-circular recess	38
integral hinge	40
guide plates	42
transverse gripping bar	50
upper surface	52
projections	53
downturned flange	54
plurality of ribs	56

radial face of the ribs	58
sloping face	60
locking cap assembly	68
locking mechanism	70
retractable resilient finger	72
circle	74
ribs	76
leading edge	78
compression spring	80
pourer	90
proximal end body	92
flexible tube	94
pourer tip	96
moulded portion	98
hollow metallic coupling portion	97
external threads	100
O-ring	102
one-way valve	104
cylindrical valve chamber	106
air passage	108
valve ball	110
valve seat	112
internal bore	114
fine mesh	116
internal bore	120
distal portion	122
flare	123
filter element	130

CLAIMS:

1. A portable fuel container, the fuel container including:

a tank;

a spout located on an upper part of the tank for permitting fluid to be placed into and poured from the tank;

the spout having a sealing surface and an internal screw thread having more than one convolution of thread;

a cap assembly for closing the spout;

the cap assembly including a cap body, a plug body and a sealing element, the plug body including an external screw thread which can mesh with the screw thread of the spout;

the cap body being mounted on the plug body for relative rotation via clutch means, the arrangement being such that a user can grip the cap body and rotate it in a first sense so that threads of the plug body and spout mesh whereby the sealing element is brought into sealing engagement with the sealing surface with a predetermined degree of compression and further rotation of the cap body causes operation of the clutch means so that the cap body rotates relative to the plug body whereby said predetermined degree of compression of the sealing element is maintained, and the clutch means is such that rotation of the cap body by the user a second sense, opposite to the first sense, enables the cap body and plug body to be rotated in unison for removal of the cap assembly from the spout; and

wherein the cap assembly does not include a vent or pressure relief valve.

2. A portable fuel container, the fuel container including:

a tank;

a spout located on an upper part of the tank for permitting fluid to be placed into or poured from the tank;

the spout having a sealing surface and an internal screw thread having more than one convolution of thread;

a lockable cap assembly for closing the spout;

the cap assembly including a cap body, a plug body and a sealing element, the plug

body including an external screw thread which can mesh with the screw threads of the spout;

the cap body being mounted on the plug body for relative rotation via clutch means, the arrangement being such that a user can grip the cap body and rotate it in a first sense so that threads of the plug body and spout mesh whereby the sealing element is brought into sealing engagement with the sealing surface with a predetermined degree of compression and further rotation of the cap body causes operation of the clutch means so that the cap body rotates relative to the plug body whereby said predetermined degree of compression of the sealing element is maintained, and the clutch means is such that rotation of the cap body by the user a second sense, opposite to the first sense, enables the cap body and plug body to be rotated in unison for removal of the cap assembly from the spout,

the clutch means including one or more resilient fingers which are engageable with ribs and rotate in unison until said predetermined degree of compression is reached whereon some one or more of the fingers resiliently deflect and pass over the ribs,

a key operated locking mechanism which causes selective movement of the one or more fingers between extended and retracted positions such as when the cap assembly is mounted on the spout and said one or more fingers are in their retracted positions of rotation of the cap body in the first or second sense does not cause rotation of the plug body and wherein the said one or more fingers are in their extended positions, rotation of the cap body causes rotation of the plug body, subject to the operation of the clutch means, and

wherein the cap assembly does not include a vent or pressure relief valve.

3. A cap assembly for a portable fuel container having a spout which permits fluid to be placed into or poured from the tank;

the spout having a sealing surface and an internal screw thread having more than one convolution of thread;

the assembly including the cap assembly including a cap body, a plug body and a sealing element, the plug body including an external screw thread which can mesh with the screw threads of the spout;

the cap body being mounted on the plug body for relative rotation via clutch means,

the arrangement being such that a user can grip the cap body and rotate it in a first sense so that threads of the plug body and spout mesh whereby the sealing element is brought into sealing engagement with the sealing surface with a predetermined degree of compression and further rotation of the cap body causes operation of the clutch means so that the cap body rotates relative to the plug body whereby said predetermined degree of compression of the sealing element is maintained, and the clutch means is such that rotation of the cap body by the user a second sense, opposite to the first sense, enables the cap body and plug body to be rotated in unison for removal of the cap assembly from the spout,

characterised in that the cap assembly does not include a vent or pressure relief valve.

4. A container as claimed in claim 1 or 2, wherein there are at least two full convolutions of thread on the spout.

5. A container as claimed in claim 4, wherein there are about 2.05 convolutions of thread.

6. A container as claimed in claim 4 or 5, wherein there are about two full convolutions of thread on the plug body.

7. A container as claimed in any preceding claim, wherein the clutch means operates when a torque of about 5Nm is applied to the cap body.

8. A container as claimed in any preceding claim, wherein the cap body and plug body are made from high density polyethylene.

9. A container as claimed in claim 8, wherein the cap body is made from PRM01 Lupolen 4261 AG.

10. A container as claimed in claim 8 or 9, wherein the plug body is made from RM006 Lupolen 4261 AG.

11. A portable fuel container as claimed in any preceding claim in combination with a pourer having a pourer screw thread which can mesh with the screw thread of the spout.

12. A portable fuel container as claim in claim 11, wherein the pourer includes:
a pourer body upon which said pourer screw thread is located;
a flexible tube which extends from the pourer body; and
a pourer tip.

13. A portable fuel container as claimed in claim 12, wherein the pourer body includes first and second portions, the first portion being moulded from plastics material and includes said pourer screw thread, the second portion being a hollow metal tube, one end of which is sealingly coupled to the first portion and the other end of which projects from the first portion and has a proximal end to which the flexible tube is attached.

14. A portable fuel container as claimed in claim 13 including a pourer tip located at a distal end of the flexible tube.

15. A portable fuel container as claimed in any one of claims 11 to 14, wherein there are at least two full convolutions in the pourer thread.

16. A portable fuel container as claimed in claim 13, wherein a one-way valve is located in said first portion to permit air to flow therethrough as fuel is emptied from the tank.

17. A portable fuel container as claimed in claim 16, wherein the one-way valve includes a valve chamber, valve ball and valve seat, the valve ball being constrained for loose movement within the valve chamber and to sealingly engage the valve seat when fuel is poured from the tank.

18. A portable fuel container as claimed in claim 17, wherein the one-way valve includes an inlet port which includes a fine mesh which operates to prevent initial splashes of fuel entering the valve chamber from escaping through said port.

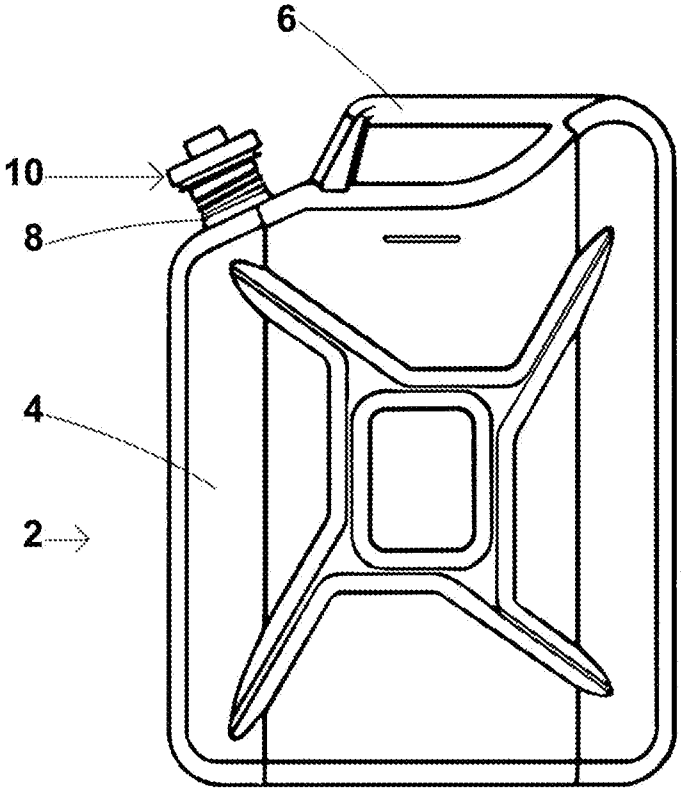

FIG 1

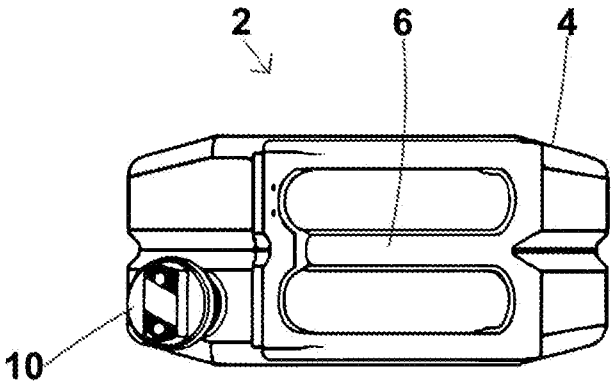

FIG 2

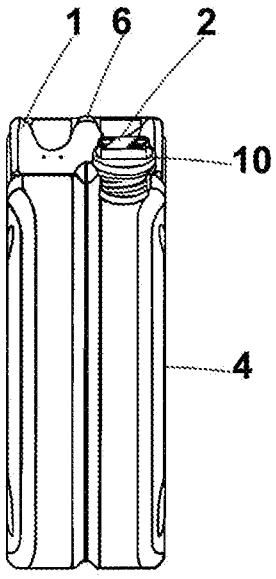

FIG 3

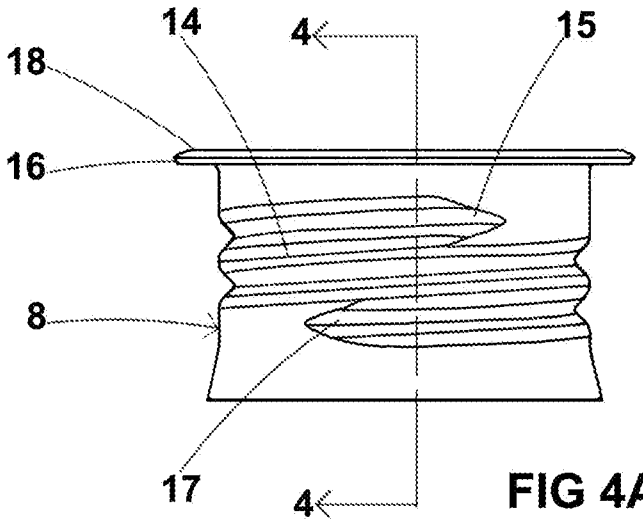

FIG 4A

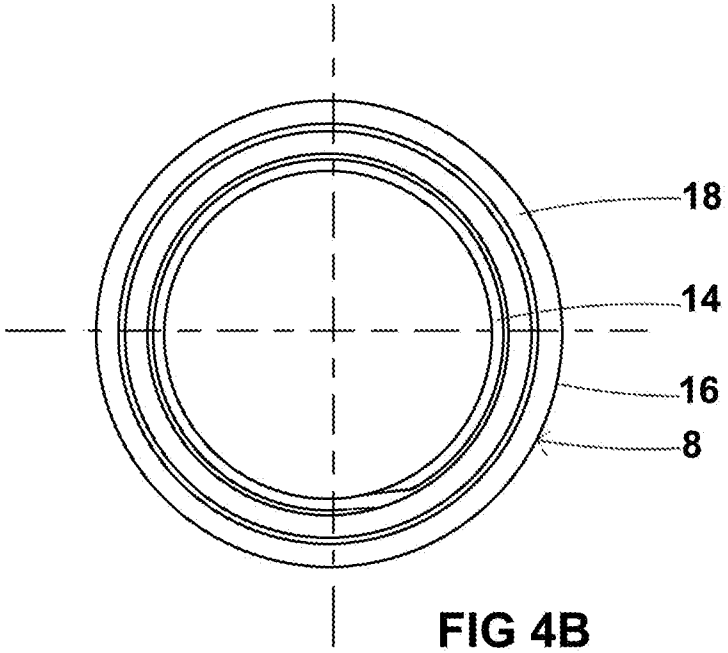

FIG 4B

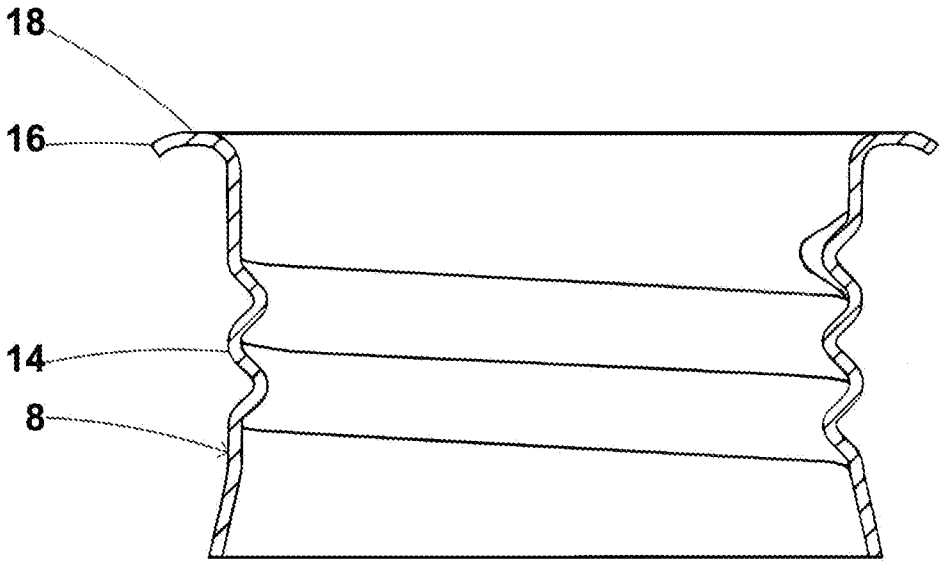

FIG 4C

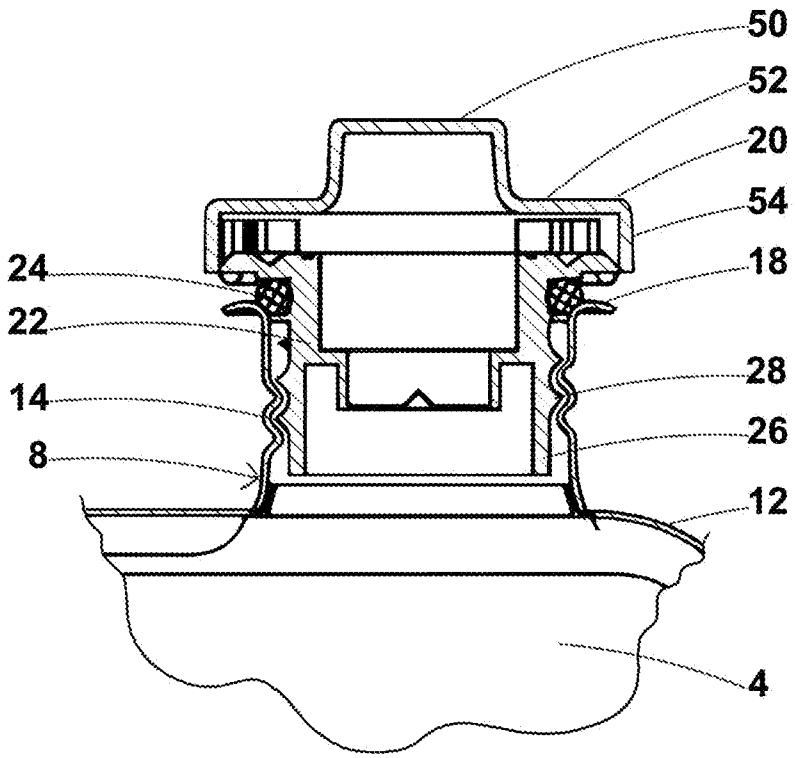

FIG 4D

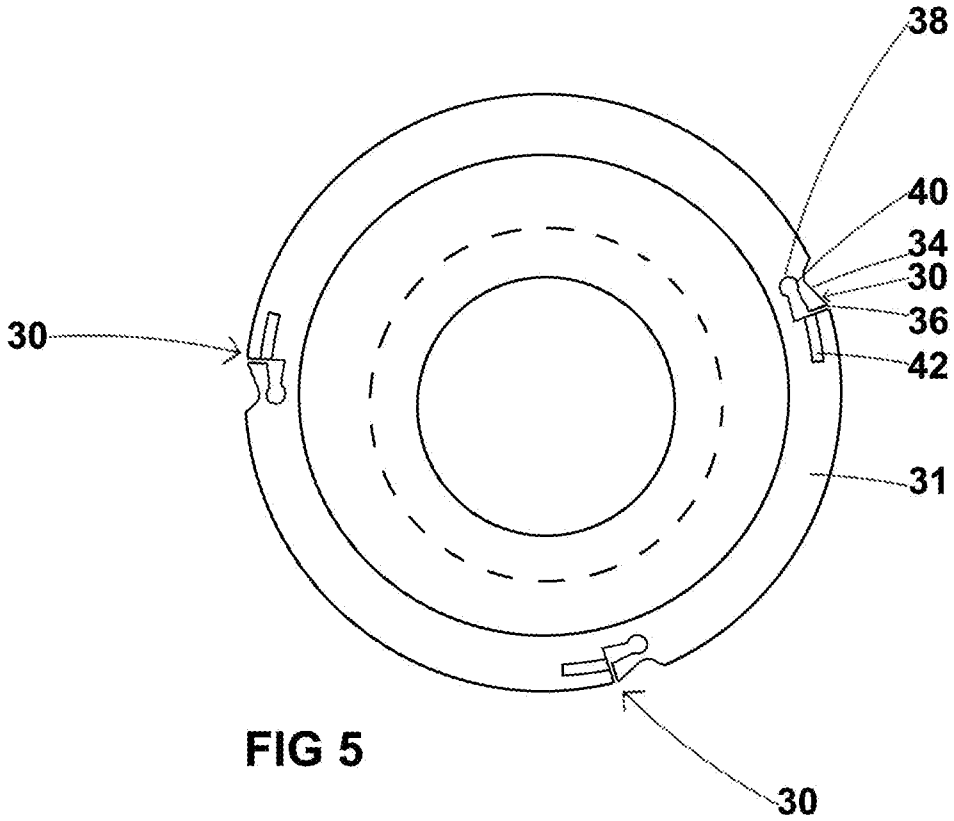

FIG 5

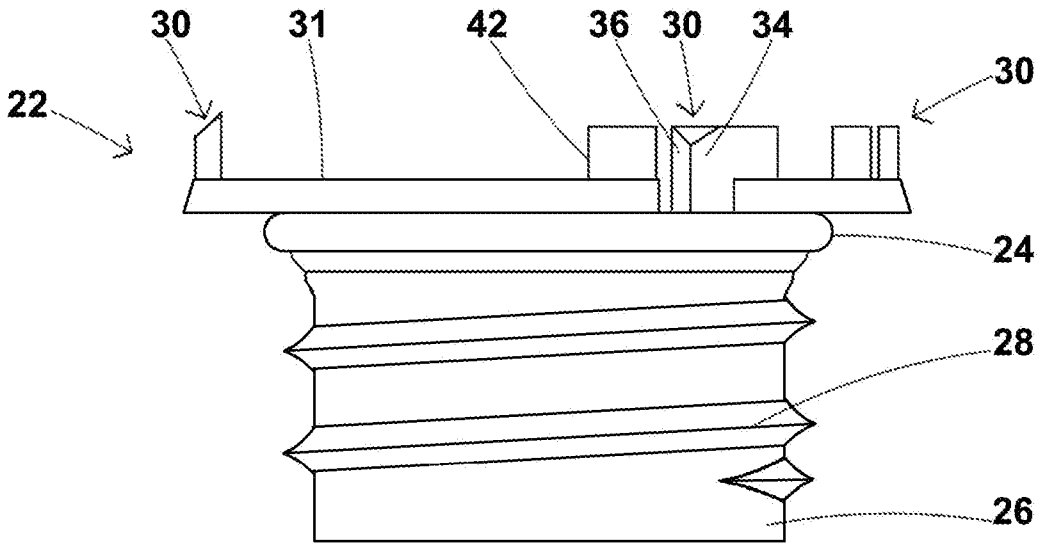

FIG 6

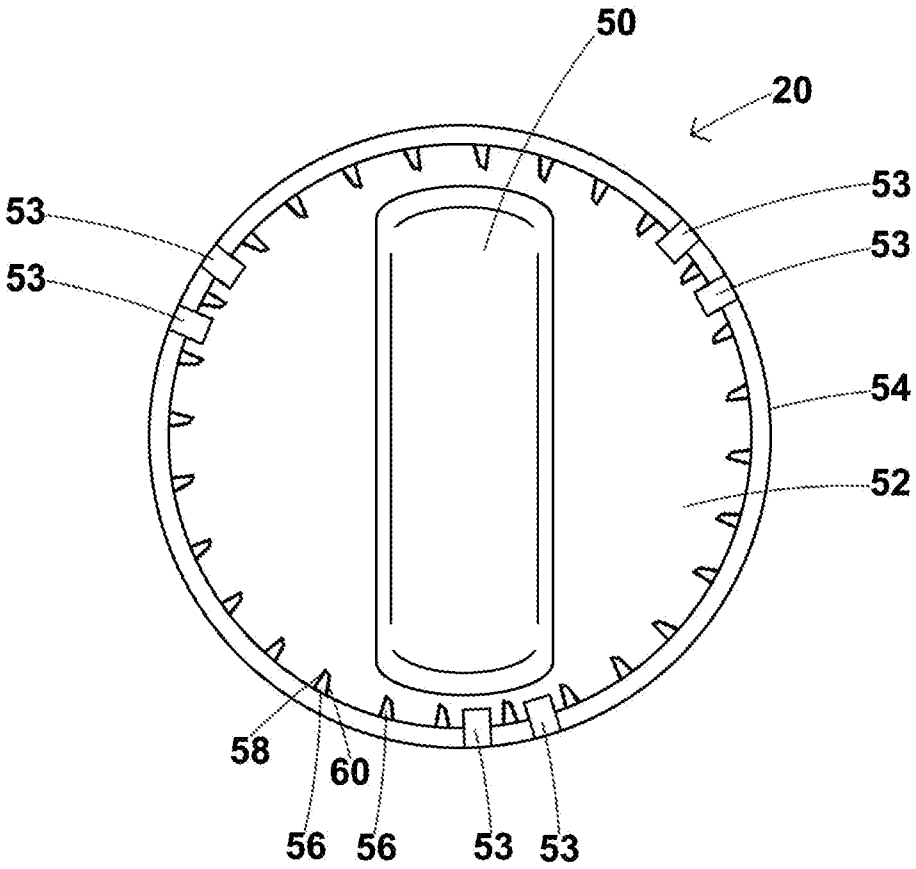

FIG 7

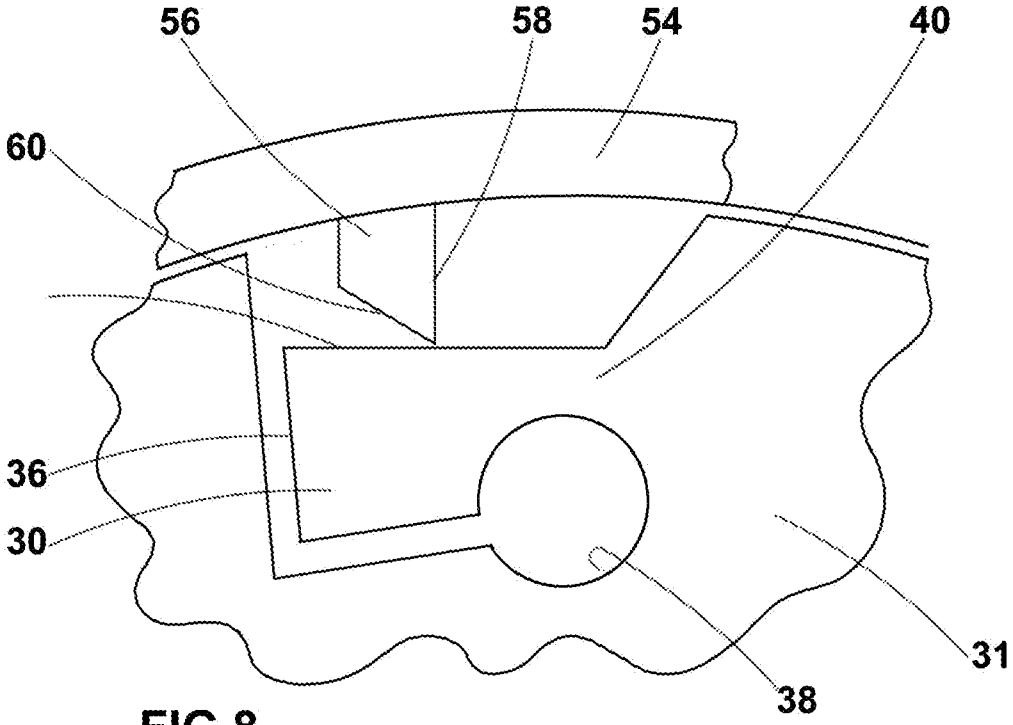

FIG 8

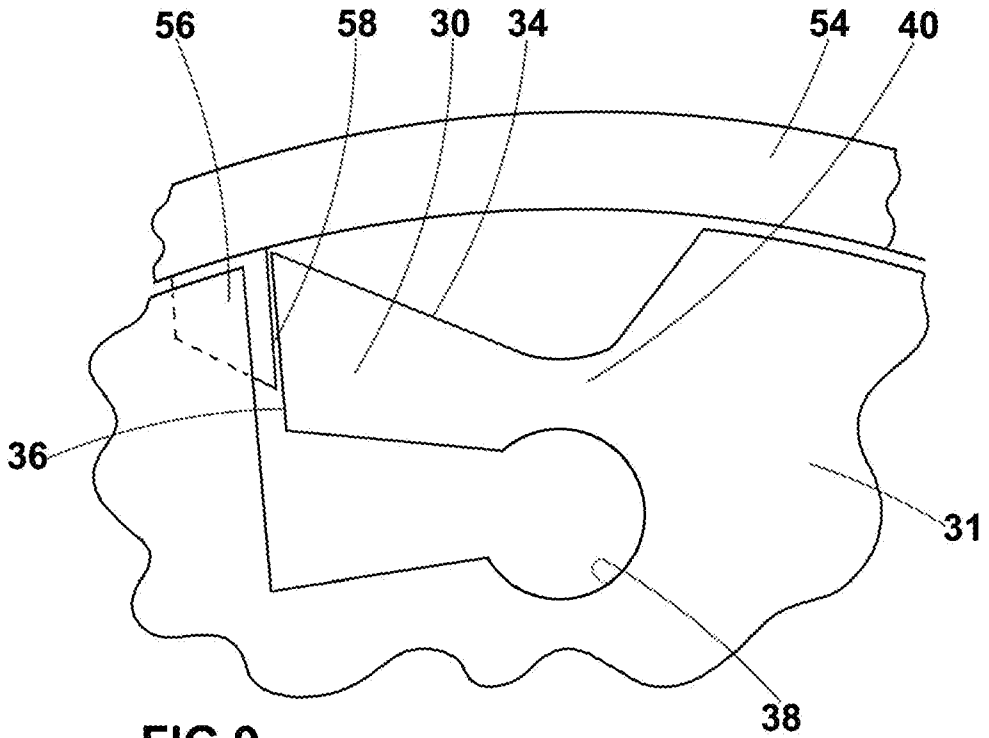

FIG 9

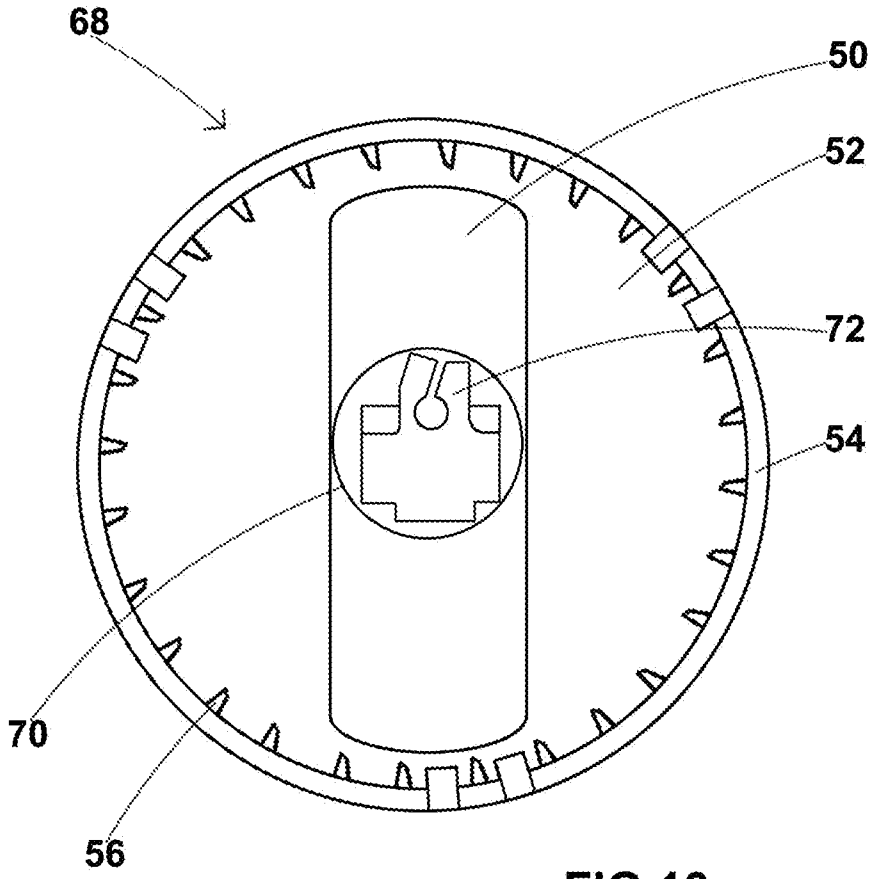

FIG 10

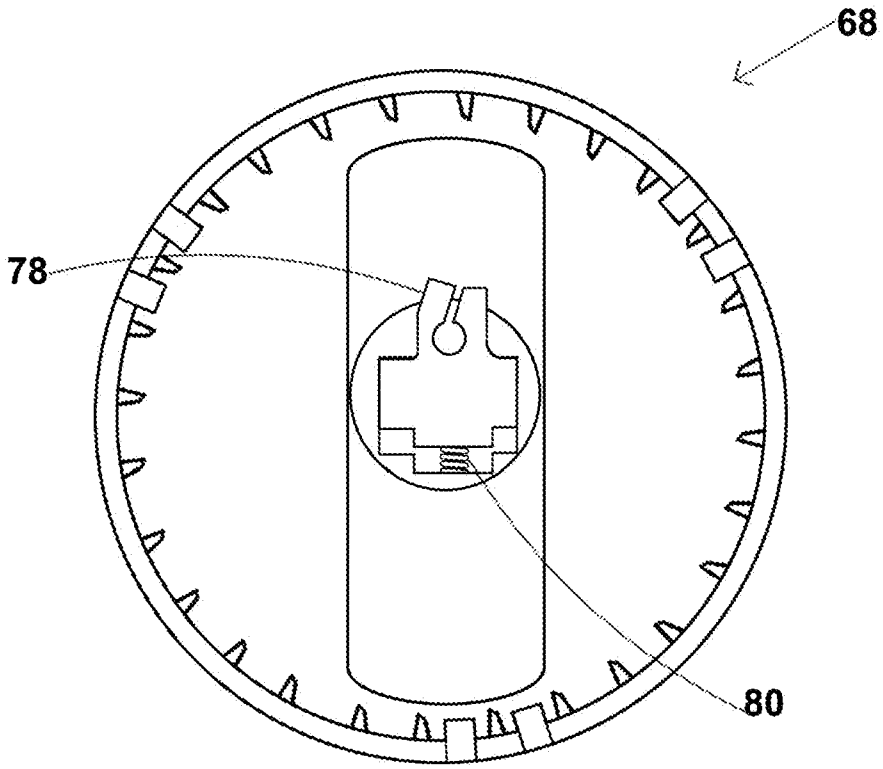

FIG 11

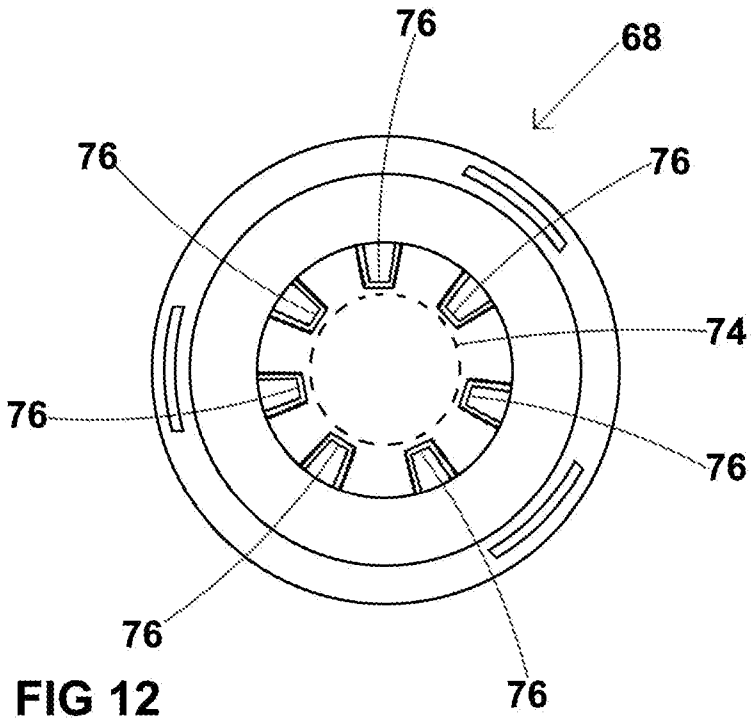

FIG 12

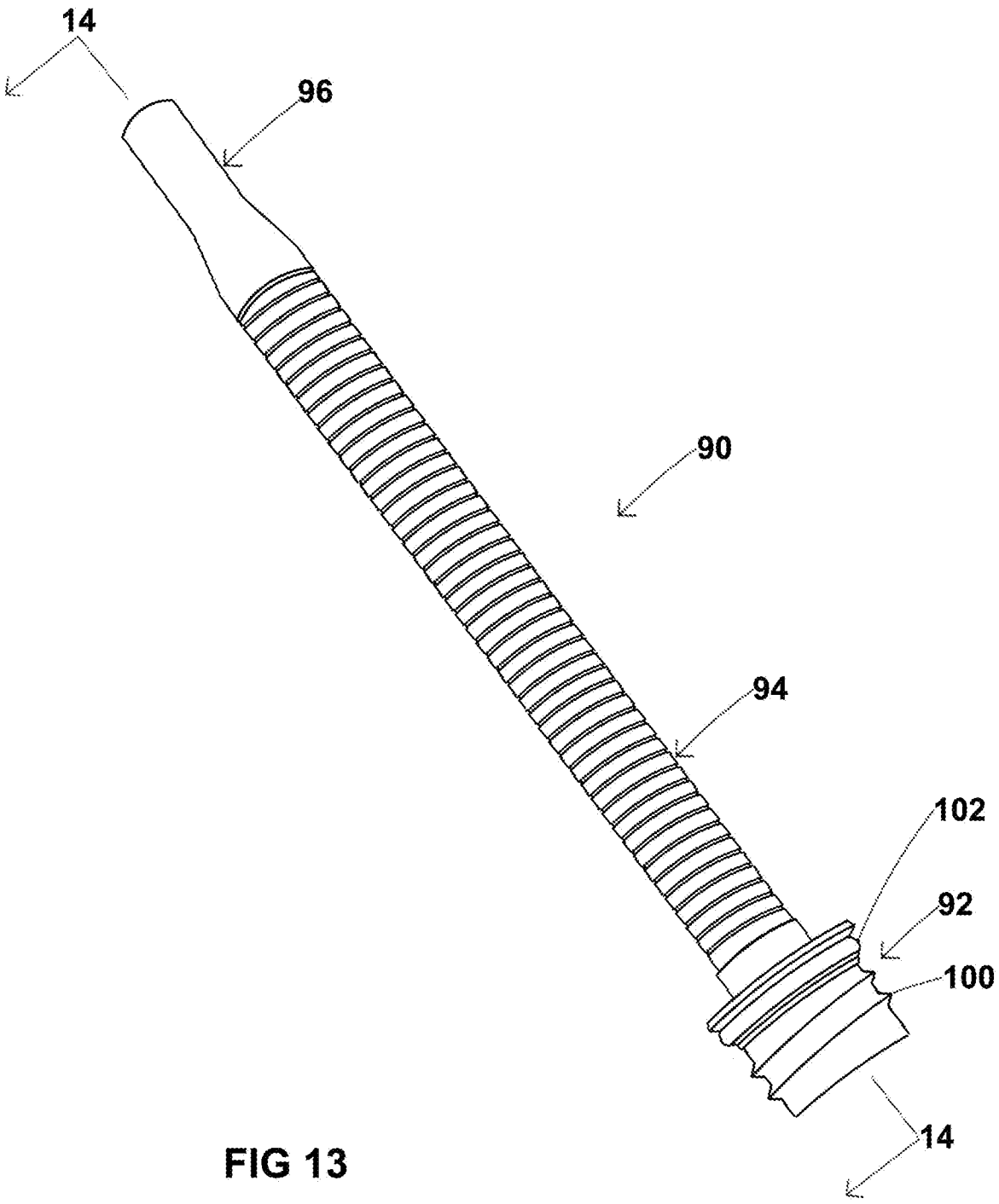

FIG 13

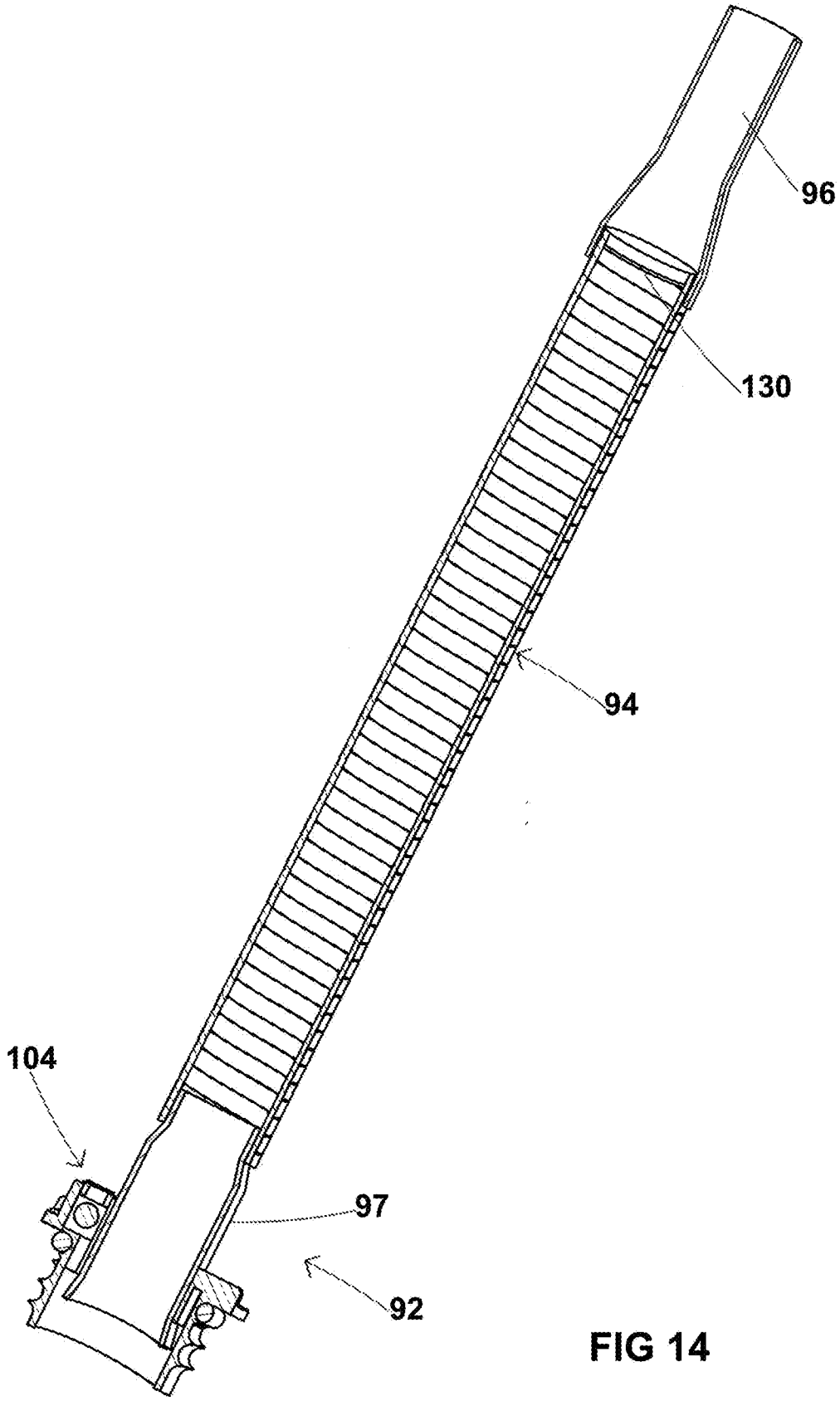

FIG 14

12/12

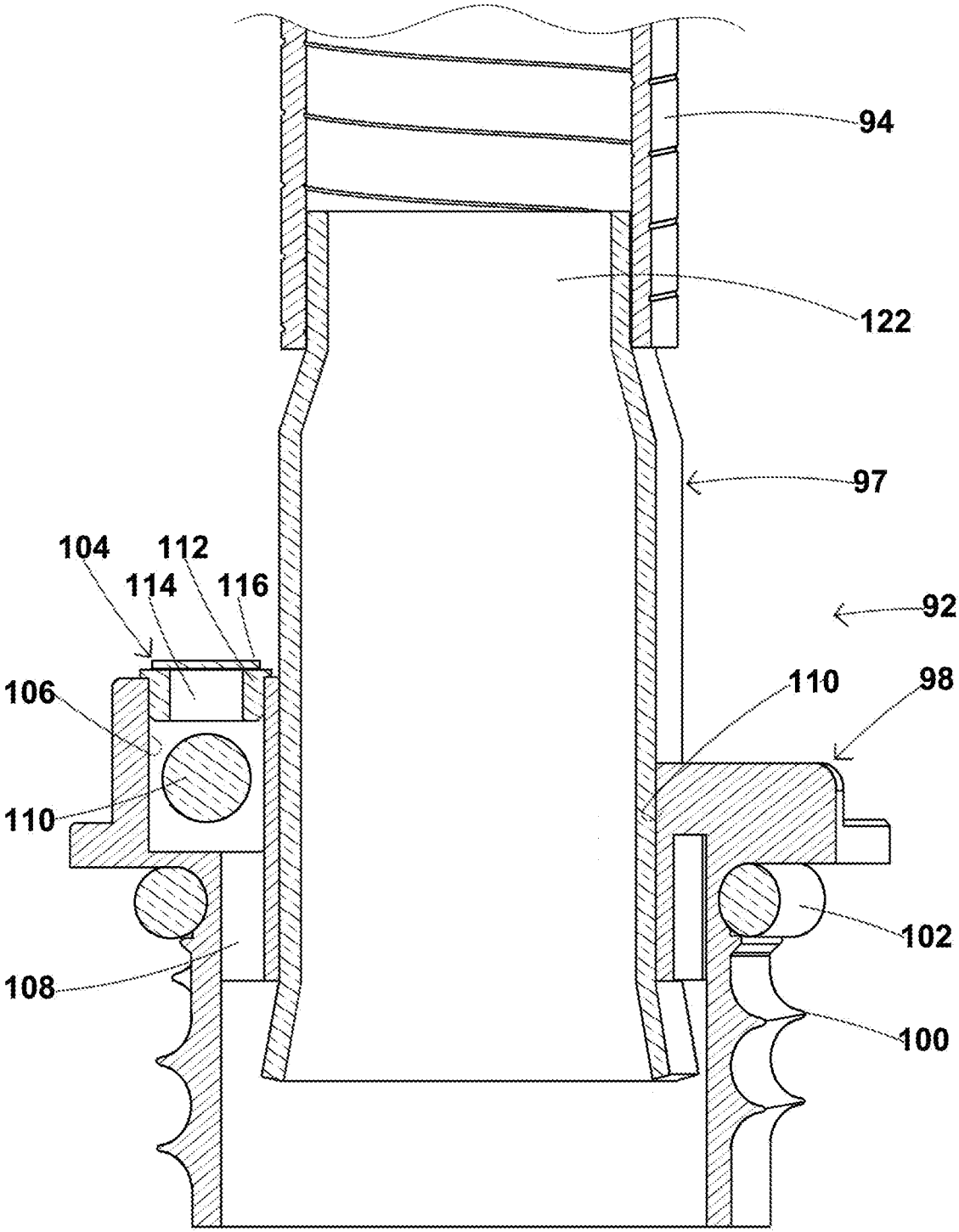

FIG 15

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU2015/050254

A. CLASSIFICATION OF SUBJECT MATTER

B65D 39/08 (2006.01) B65D 41/04 (2006.01) B65D 41/34 (2006.01) B65D 50/06 (2006.01) B65D 55/14 (2006.01)

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

SS1: WPIAP, EPODOC: CPC: B65D25/38/LOW; keywords: fuel, clutch (with similar keywords); SS2:WPIAP, EPODOC: IPC, CPC: B65D25/40, B65D25/42, B65D39/08, B65D41/04, B65D43/22, B65D41/34, B65D50/06, B65D51/18, B65D55/14; keywords: cap, fuel, clutch, vent (with similar keywords); SS3: X-Full search: EPODOC, WPIAP, TXPEA, TXPEB, TXPEC, TXPEE, TXPEF, TXPEH, TXPEI, TXPEP, TXTPEPEA, TXPES, TXPUSE0A, TXPUSE1A, TXPUSEA, TXPUSEB, TXPWOEA: IPC, CPC: B65D25/40, B65D25/42, B65D39/08, B65D41/04, B65D43/22, B65D41/34, B65D50/06, B65D51/18, B65D55/14; keywords: cap, fuel, clutch, seal, thread (with similar keywords); Google Patents, Espacenet, Patent Lens, AusPat, Google Scholar, Science Direct: portable, cap, fuel, clutch, seal, thread, vent (with similar keywords). Applicant and inventor search in databases provided by IP Australia, AUSPAT and ESPACENET databases: PQI; PRO, QUIP; HAINES, MARTIN.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Documents are listed in the continuation of Box C	

[X] Further documents are listed in the continuation of Box C [X] See patent family annex

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
7 August 2015	07 August 2015
Name and mailing address of the ISA/AU	**Authorised officer**
AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA Email address: pct@ipaustralia.gov.au	Konika Khan AUSTRALIAN PATENT OFFICE (ISO 9001 Quality Certified Service) Telephone No. 0262223659

INTERNATIONAL SEARCH REPORT C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		International application No. **PCT/AU2015/050254**
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	AU 2012100678 A4 (PQI PTY. LTD.) 21 June 2012 Claims 1-5	1-18
A	US 2013/0048639 A1 (WIESE et al.) 28 February 2013 Abstract, claims 1-20	1-18
A	US 20130334254 A1 (ROSE, S.) 19 December 2013 Abstract, claims 1-15	1-18
A	US 3961724 A (KAPSY) 08 June 1976 Abstract, claims 1-5	1-18

INTERNATIONAL SEARCH REPORT Information on patent family members	International application No. **PCT/AU2015/050254**

This Annex lists known patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document/s Cited in Search Report		**Patent Family Member/s**	
Publication Number	**Publication Date**	**Publication Number**	**Publication Date**
AU 2012100678 A4	21 June 2012		
US 2013/0048639 A1	28 February 2013	None	
US 20130334254 A1	19 December 2013	US 2013334254 A1	19 Dec 2013
		US 2014291359 A1	02 Oct 2014
US 3961724 A	08 June 1976	US 3961724 A	08 Jun 1976
		CA 1035727 A1	01 Aug 1978
		DE 2600794 A1	23 Sep 1976
		FR 2303731 A1	08 Oct 1976
		GB 1515355 A	21 Jun 1978
		HK 6679 A	16 Feb 1979
		JP S51108317 A	25 Sep 1976
		JP S5412644 B2	24 May 1979
		SE 7601160 A	14 Sep 1976

End of Annex

Due to data integration issues this family listing may not include 10 digit Australian applications filed since May 2001.