



(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
14.06.2006 Bulletin 2006/24

(51) Int Cl.:
B67D 1/00 (2006.01) B67D 1/14 (2006.01)

(21) Application number: 05257591.7

(22) Date of filing: 09.12.2005

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI
SK TR
Designated Extension States:
AL BA HR MK YU

- Carter, David Peter
Warwickshire B49 6EU (GB)
- Adams, Rodney
Warwickshire B49 6EU (GB)
- Holland, Joseph Eugene
Warwickshire B49 6EU (GB)

(30) Priority: 09.12.2004 GB 0426969

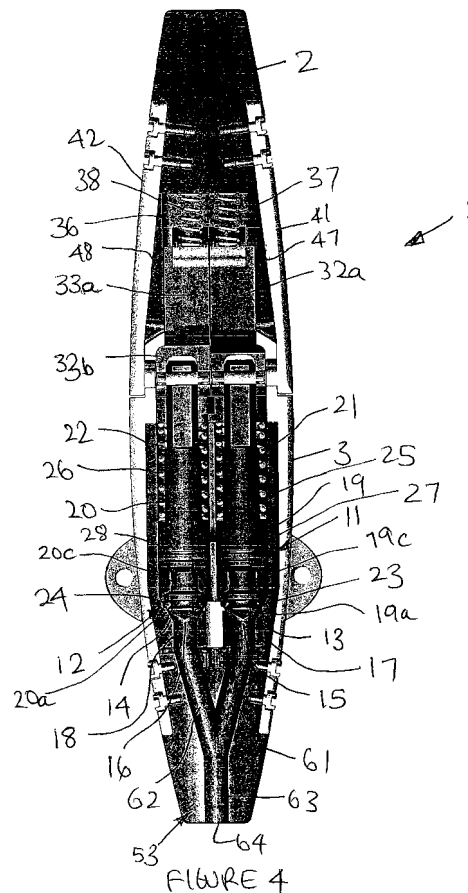
(74) Representative: Wightman, David Alexander
Barker Brettell
138 Hagley Road
Edgbaston,
Birmingham B16 9PW (GB)

(71) Applicant: IMI CORNELIUS (UK) LIMITED
Alcester
Warwickshire B49 6EU (GB)

(72) Inventors:
• Cook, Christopher Michael
Warwickshire B49 6EU (GB)

(54) Dispensing tap for multiple beverages

(57) A manually operable tap (1) has dispense valves (11,12) connected to fluid sources and operable by a common actuator (2) for opening each valve (11,12) to dispense fluid from the fluid source connected thereto. The actuator (2) may be configured to open the valves (11,12) to dispense a mixture of both fluids or to open the valves (11,12) to dispense the fluids separately.



Description

[0001] This invention relates to apparatus for dispensing beverages and in particular, but not exclusively, to manually operable taps for dispensing carbonated beverages, especially carbonated alcoholic beverages such as beer, lager, cider and the like. The invention also relates to methods of dispensing beverages using such apparatus.

[0002] Manually operable taps for dispensing beer, lager, cider and the like are known and generally comprise an inlet for connection to a source of the beverage and an outlet for dispensing beverage into a receptacle such as a glass. Between the inlet and outlet there is a valve for controlling flow of beverage from the inlet to the outlet. The valve is operable by a handle mounted on the tap body for pivotal movement to open and close the valve to control dispense of the beverage.

[0003] These taps are only capable of dispensing beverage from a single source and this can be a disadvantage when the source, e.g. a keg or barrel, runs out and has to be changed. Also, each source requires a separate tap and this can be a disadvantage where the available counter top space to install the taps is limited.

[0004] The present invention seeks to provide a dispense tap capable of dispensing beverage from more than one source and methods of dispensing beverages from such a tap.

[0005] The present invention also seeks to provide a dispense tap capable of dispensing a beverage or a beverage mixture and methods of dispensing beverages from such a tap.

[0006] According to one aspect of the present invention, there is provided a dispense tap for dispensing beverages, the tap having first and second inlets for connection to respective fluid supply lines, a first valve for controlling flow of fluid from the first inlet to an outlet, a second valve for controlling flow of fluid from the second inlet to an outlet, and a manually operable handle for operating the first and second valves.

[0007] In one preferred application, the fluid supply lines are connected to sources of the same or different beverages. For example, carbonated beverages that can be alcoholic such as beer, lager, cider or non-alcoholic such as lemonade, cola, soda water and non-carbonated beverages such as fruit juices and still water.

[0008] In one arrangement, the handle operates both valves simultaneously to dispense beverage from the beverage supply lines connected to the first and second inlets at the same time. In this arrangement, the beverage supply lines may be connected to sources of the same beverage. In this way, the time to dispense a given volume of beverage, for example a pint or half-pint, may be reduced. Alternatively, the beverage supply lines may be connected to sources of different beverages. In this way, a mixture of beverages can be dispensed, for example beer and lemonade.

[0009] In another arrangement, the handle operates

each valve independently of the other to dispense beverage from the beverage supply line connected to the first and second inlets at different times. In this arrangement, the beverage supply lines may be connected to sources of different beverages. In this way, one or other of the beverages or a mixture of the beverages can be dispensed via a single tap. Alternatively, the beverage supply lines may be connected to sources of the same beverage. In this way, if one of the sources runs out, the tap may still be operated to dispense beverage from the other source while the source that has run out is being changed.

[0010] In another preferred application, one fluid supply line is connected to a beverage source and the other fluid supply line is connected to a source of a fluid that can be added to the beverage to modify a property of the beverage such as taste, flavour, strength or carbonation level. For example, the beverage may be a carbonated or non-carbonated alcoholic or non-alcoholic beverage and the fluid may be a liquid concentrate such as a syrup to alter the flavour or taste of the beverage.

[0011] In one arrangement, the handle operates both valves simultaneously to dispense beverage from the beverage supply line and liquid concentrate at the same time. In this way, a flavoured beverage can be dispensed such as blackcurrant and soda or blackcurrant and beer or cider. In this arrangement, the valves may be of different size to provide a mixture of the beverage and concentrate in the desired ratio.

[0012] In another arrangement, the handle operates each valve independently of the other to dispense beverage and liquid concentrate at different times. In this way, the beverage can be dispensed with or without the addition of liquid concentrate. In this arrangement, the ratio of beverage and concentrate can be controlled manually by adjusting the volume of beverage and concentrate that is dispensed.

[0013] Preferably, each valve includes a valve member that is resiliently biased to a closed position and is moveable against the resilient biasing to an open position in response to actuation of the handle.

[0014] Advantageously, each valve member is operatively connected to the handle via a cam member for moving the valve member to the open position in response to pivotal movement of the handle.

[0015] The cam members may be arranged so that both valves open simultaneously on pivotal movement of the handle in one direction from a rest position in which both valves are closed.

[0016] Alternatively, the cam members may be arranged so that one valve opens and the other remains closed on pivotal movement of the handle in one direction from the rest position and the other valve opens and said one valve remains closed on pivotal movement of the handle in the other direction.

[0017] The cam members may be configured to control opening of the associated valve and thus the ratio of the fluids in the dispensed beverage. For example the degree

and/or timing of opening of each valve may be controlled by the profiles of the cam members to dispense the fluids in any desired ratio.

[0018] Where the valves can be opened by pivotal movement of the handle in the same direction, the cam profiles may be configured so that the valves open the same or different amounts at the same or different times to dispense the required amount of each fluid. In this way, where only a small amount of one of the fluids is to be added to the other fluid such as when adding a concentrate flavour, the associated valve may be opened/closed to add the fluid at the end of the dispense of the other fluid or at any other time during the dispense of the other fluid.

[0019] Where the valves can be opened by pivotal movement of the handle in opposite directions, the cam profiles may be configured so that the valves open the same or different amounts to dispense the required amount of each fluid.

[0020] The valves may be connected to separate outlets. This may be beneficial if the inlets to the valves are connected to sources of different fluids. In this way, any fluid remaining between the valve and the outlet on completion of a dispense of one fluid is not dispensed when the other fluid is dispensed. As a result, the fluids can be dispensed separately without risk of cross-contamination.

[0021] Alternatively, the valves may be connected to a common, single outlet. For example, the tap may have a nozzle with a single dispense outlet in fluid communication with both valves. With this arrangement, we may provide an air inlet to drain any fluid between the valves and outlet on completion of a dispense to reduce any cross-contamination when different fluids are dispensed.

[0022] According to a second aspect of the present invention, there is provided a method of dispensing beverages comprising providing a dispense tap having at least two dispense valves, connecting each dispense valve to a fluid source, and operating the valves separately or in combination with a common handle.

[0023] By this invention, one handle can be used to open the valves one at a time so that fluid is dispensed from a single valve or simultaneously so that fluid is dispensed from at least two valves.

[0024] The fluid sources may be beverages such as carbonated and non-carbonated beverages that can be alcoholic such as beer, lager, cider or non-alcoholic such as lemonade, cola, soda, fruit juices or still water. Alternatively, one fluid source may be a beverage and the other fluid source may, when added to the beverage, modify a property of the beverage such as taste, flavour, strength or carbonation level. For example, the beverage may be a carbonated or non-carbonated alcoholic or non-alcoholic beverage and the fluid may be a liquid concentrate such as a syrup to alter the flavour or taste of the beverage.

[0025] According to a third aspect of the present invention, there is provided apparatus for dispensing bev-

erages comprising providing a dispense head having a plurality of dispense valves manually operable by a common actuator.

[0026] The dispense valves may be connectable to sources of the same or different fluids and the actuator may be operable to open the valves separately or in combination for dispensing a single fluid or a mixture of fluids.

[0027] The fluid sources may be beverages such as carbonated and non-carbonated beverages that can be alcoholic such as beer, lager, cider or non-alcoholic such as lemonade, cola, soda, fruit juices or still water. Alternatively, one fluid source may be a beverage and the other fluid source may, when added to the beverage, modify a property of the beverage such as taste, flavour, strength or carbonation level. For example, the beverage may be a carbonated or non-carbonated alcoholic or non-alcoholic beverage and the fluid may be a liquid concentrate such as a syrup to alter the flavour or taste of the beverage.

[0028] According to a fourth aspect of the present invention, there is provided a manually operable tap having a plurality of dispense valves each connected to a fluid source and operable by a common actuator for opening each valve to dispense fluid from the fluid source connected thereto.

[0029] The actuator may be configured to open the valves together to dispense a mixture of both fluids or to open the valves independently to dispense the fluids separately.

[0030] According to a fifth aspect of the present invention, there is provided a method of dispensing a beverage comprising providing a source of a first fluid and a source of a second fluid, and controlling dispense of the first and second fluids to provide a beverage comprising either a mixture of the first and second fluids or one of the first and second fluids.

[0031] In one arrangement, the first and second fluid sources may each comprise a beverage such as carbonated and non-carbonated beverages that can be alcoholic such as beer, lager, cider or non-alcoholic such as lemonade, cola, soda, fruit juices or still water. In this way, the dispensed beverage may comprise either one of the beverages or a mixture of both beverages.

[0032] A mixture may comprise any desired ratio of both beverages. For example, we may mix beer and lemonade to produce shandy or we may mix beer with water to alter the strength of the beer.

[0033] In another arrangement, one fluid source may be a beverage and the other fluid source may, when added to the beverage, modify a property of the beverage such as taste, flavour, strength or carbonation level. For example, the beverage may be a carbonated or non-carbonated alcoholic or non-alcoholic beverage and the fluid may be a liquid concentrate such as a syrup to alter the flavour or taste of the beverage. For example, we may mix beer, lager or cider with a fruit flavour such as blackcurrant.

[0034] Mixing may occur in the vessel into which the

fluids are dispensed or during dispense. For example we may provide a dispense head with separate outlets, one for each fluid. In this arrangement, mixing occurs outside the dispense head and the fluids can be dispensed in turn from each outlet and mixed in the vessel or the fluids can be dispensed together and the fluid streams kept separate on leaving the outlets to mix in the vessel or brought together on leaving the outlets to mix as the streams flow into the vessel. Alternatively, we may provide a dispense head with a common outlet for both fluids. In this arrangement, mixing can occur within the dispense head if both fluids are dispensed at the same time or outside the dispense head if the fluids are dispensed in turn.

[0035] One suitable form of dispense head for dispensing a beverage according to this aspect of the invention is provided by the dispense tap according to the first aspect of the invention. It will be understood, however, that other types and forms of dispense head may be employed.

[0036] The invention will now be described in more detail, by way of example only, with reference to the accompanying drawings whereas:

Figure 1 is a perspective view of a dispense tap according to the invention with the tap handle shown in an inoperative position;

Figure 2 is an exploded isometric view of the component parts of the dispense tap shown in Figure 1;

Figure 3 is a sectional view, to an enlarged scale, of the tap body and support arm showing the first and second inlets and the first and second valve seats;

Figure 4 is a sectional view of the tap shown in Figure 1 with the first and second dispense valves shown in the closed position; and

Figure 5 is a sectional view of the tap at right angles to the sectional view in Figure 4 with the first and second dispense valves again shown in the closed position.

[0037] Referring to the drawings, there is shown a manually operable dispense tap 1 according to the invention for dispensing beverages, especially carbonated beverages. In particular, the tap 1 may be employed to dispense alcoholic beverages such as beer, lager, cider or the like and non-alcoholic beverages such as lemonade, colas or the like. It will be understood, however, that the tap 1 may also be employed to dispense non-carbonated alcoholic and non-alcoholic beverages. The beverages may be liquids or semi-frozen liquids (so called slush beverages).

[0038] The tap 1 has a handle 2 pivotally mounted on a body 3. The body 3 has an integral support arm 4 that

extends at right angles to the body 3. A distal end of the support arm 4 is provided with through holes 5,6 for screws (not shown) to mount the body 3 on a front or similar counter top fitting (not shown) at the point of sale, for example in a bar.

[0039] The support arm 4 has two inlets 7,8 for connection to separate beverage supply lines (not shown). The beverage supply lines may be connected to sources of beverage remote from the point of sale. For example, where the beverage is beer, lager, cider or the like, the beverage sources may be kegs located in a cellar or cold room to store the beverage at a required temperature, for example 6 to 12 degrees C, and the supply line may include additional cooling to reduce the temperature of the beverage to a desired dispense temperature, for example 0 to 4 degrees C. Such additional cooling may be provided by any known means such as an ice bank cooler or thermoelectric cooler.

[0040] Inlet passageways 9,10 extend from the inlets 7,8 respectively through the support arm 4 to separate dispense valves 11,12 housed in the body 3. Each valve 11,12 has a tapered valve seat 13,14 respectively provided with a port 15,16 that opens to an outlet passageway 17,18 respectively, and a valve member 19,20 respectively biased by a spring 21,22 to a closed position (see Figures 4 and 5).

[0041] Each valve member 19,20 has a frusto-conical head portion 19a,20a respectively provided with an O-ring 23,24 respectively that engages the associated tapered valve seat 13,14 to close the port 15,16 and prevent flow of fluid to the outlet passageway 17,18 in the closed position.

[0042] Each valve member 19,20 is mounted in a bore 25,26 respectively in the body 3 for axial sliding movement between the closed position and an open position in which the O-rings 23,24 are lifted clear off the valve seats 13,14 to allow fluid to flow to the outlet passageways 17,18 via the ports 15,16.

[0043] Each valve member 19,20 has a portion 19c, 20c of reduced cross-section behind the head portion 19a,20a where the inlet passageways 9,10 open to the bores 25,26 and a fluid tight seal is provided between each valve member 19,20 and the associated bore 25,26 by pairs of O-rings 27,28 respectively to prevent leakage during movement between the open and closed positions.

[0044] Each spring 21,22 is retained by an end cap 29 secured to the body 3 by screws 30,31 and tail portions 19b,20b respectively of the valve members 19,20 project through holes 29a,29b respectively in the end cap 29 and are connected to cam members 32,33 by pivot pins 34, 35 respectively.

[0045] The cam members 32,33 have stems 32a,33a respectively received in a recess 36 in the handle 2 and are biased by springs 37,38 respectively acting between the handle 2 and the cam members 32,33. Each cam member 32,33 has a cam lobe 32b,33b respectively that seats on the end cap 29. In this embodiment, the cam

members 32,33 are mounted with the cam lobes 32b, 33b facing in opposite directions (see Figure 5) for a purpose described in more detail later.

[0046] The handle 2 is mounted on the body 3 for pivotal movement about a horizontal axis by engagement of inwardly directed bosses 39,40 on a pair of connector members 41,42 in apertures 43,44 in a further pair of connector members 45,46. The connector members 41,42 are located in grooves 47, 48 respectively in the sides of the handle 2 and are secured to the handle 2 by pairs of screws 49,50 respectively. The connector members 45, 46 are located in grooves 51, 52 respectively in the sides of the body 3 and are secured to a nozzle 53 by pairs of screws 54,55 respectively.

[0047] The nozzle 53 is releasably secured to the body 3 by a screw 56. The nozzle 53 has inlets 57,58 aligned with the outlet passageways 17,18 in the body 3 and sealed by O-rings 59,60 respectively. The nozzle inlets 57,58 communicate with passageways 61,62 that merge into a single passageway 63 terminating in an outlet 64.

[0048] Pivotal movement of the handle 2 in the direction of arrow A (see Figure 5) from the upright position in which both valves 11,12 are closed causes cam member 32 to rotate and move cam lobe 32b to engage the end cap 29. As a result, cam member 32 is displaced into the handle 2 and simultaneously lifts valve member 19 to open port 15 and allow fluid to flow to nozzle outlet 64 via passageways 17,61,63. At the same time, cam member 33 rotates without bringing cam lobe 33b into engagement with the end cap 29. As a result, cam member 33 is not displaced and valve member 20 remains in the closed position.

[0049] Similarly, pivotal movement of the handle 2 in the direction of arrow B (see Figure 5) from the upright position in which both valves 11,12 are closed causes cam member 33 to rotate and move cam lobe 33b to engage the end cap 29. As a result, cam member 33 is displaced into the handle 2 and simultaneously lifts valve member 20 to open port 16 and allow fluid to flow to nozzle outlet 64 via passageways 18,62,63. At the same time, cam member 32 rotates without bringing cam lobe 32b into engagement with the end cap 29. As a result, cam member 32 is not displaced and valve member 19 remains in the closed position.

[0050] In use, the inlets 7,8 in the support arm 4 are connected to beverage sources via supply lines, for example inlet 7 may be connected to a source of beer (not shown) and inlet 8 connected to a source of lager (not shown). Pivotal movement of the handle 2 in the direction of arrow A opens valve 11 and valve 12 remains closed to dispense beer only. Pivotal movement of the handle 2 in the direction of arrow B opens valve 12 and valve 11 remains closed to dispense lager only.

[0051] In this way, the handle 2 can be operated to dispense beer or lager separately by opening the appropriate valve. As a result, beer or lager or a mixture of beer and lager can be dispensed as desired. Moreover, if one of the sources runs out, the tap may be used to dispense

beverage from the other source while the source that has run out is being changed.

[0052] In another arrangement, the inlets may be connected to sources of the same beverage. In another arrangement, the beverages may be of different strength, for example strong and weak beer that can be dispensed separately or in combination to dispense beer having a range of strengths. In yet another arrangement, the beverages may be of different temperature or different forms, for example liquid beer and semi-frozen (slush) beer that can be dispensed separately or in combination to dispense beer having a range of temperatures and/or consistency.

[0053] In a modification (not shown) the cam members 32, 33 can be arranged so that the cam lobes 32b,33b extend in the same direction. In this way, pivotal movement of the handle 2 in one direction opens both valves 11,12 to dispense beverage from both supply lines connected to the inlets 7,8 simultaneously. Both valves 11,12 remain closed if the handle 2 is pivoted in the opposite direction.

[0054] With this arrangement, both inlets 7,8 may be connected to sources of the same beverage, for example beer, lager or cider allowing faster dispense of a unit volume of the beverage. The inlets 7,8 may be connected to beverages having different properties, for example beer of different strength or temperature or form such as liquid and semi-frozen (slush).

[0055] Alternatively, the inlets 7,8 may be connected to sources of different beverages to dispense a mixture of both beverages simultaneously, for example to dispense beer and lemonade to produce shandy or beer and water to adjust the strength of the beer. Other combinations of beverages that may be dispensed simultaneously in this way will be apparent to those skilled in the art.

[0056] The valve members 19,20 may be of the same size (diameter) to dispense equal volumes of beverage. Alternatively, the valve members 19,20 may be of different sizes (diameter) to dispense unequal volumes of beverage. In this way, we may dispense a mixture of beverages in any desired ratio as required.

[0057] The cam members 32,33 may be of the same shape (profile) to open both valves 11,12 simultaneously. Alternatively, the cam members 32,33 may be of different shape (profile) to stagger opening of the valves 11,12. In this way we can control the dispense to provide two speeds of dispense by opening one or both valves. For example, we may open one valve at the start and/or end of a dispense and open both valves for the remainder of the dispense. The slower speed may be used when filling glasses and the faster speed used when filling large containers, for example a jug.

[0058] The cam members 32,33 may be of a shape (profile) to control the speed of opening of the valves 11,12. For example, the cam members 11,12 may be arranged so that the valves 11,12 are fully opened by a small movement of the handle 2 from the upright position.

The angular movement of the handle 2 to open/close the valves 11,12 may be varied as desired.

[0059] It will be appreciated that any combination of valve members 19,20 and cam members 32,33 may be employed to provide any desired opening/closing of the valves 11,12 to dispense beverages separately or as a mixture in any desired ratio.

[0060] It will be understood that the invention is not limited to the embodiments above described. Thus, the concept of providing a dispense tap with a plurality of valves operated by a common handle may be employed to provide dispense of more than two beverages separately or in combination with one or more other beverages simultaneously. Moreover, any of the features of the embodiments described herein may be employed separately or in combination as desired.

[0061] For example, we may provide a handle movable in the manner of a joystick to selectively control actuation of two or more dispense valves separately or in any combination.

[0062] All the dispense valves may be connected to a single outlet as described or each dispense valve may have a separate outlet to reduce the risk of contamination where the valves control dispense of different beverages. Alternatively or additionally, the nozzle may be provided with an air inlet to drain the nozzle on completion of a dispense.

[0063] In the above-described arrangements, if one of the sources runs out, it may be possible to use the tap to continue to dispense beverage from the other source while the source that has run out is being changed. For example, we may provide an on/off valve such as a solenoid valve in each supply line at or adjacent to each inlet that is arranged to close if the source runs out to prevent the supply line emptying if the tap is operated to open the dispense valve of the inlet connected to the empty source until the source has been changed.

[0064] In this way, beverage can be dispensed from the source connected to the other inlet and, when the empty source is changed, the solenoid valve opens to allow beverage to be dispensed from both sources again. As a result, the empty source can be changed at a time convenient to the user. A system for detecting when the source is empty and operating an on/off valve to prevent the supply line emptying is the subject of our published UK patent application No.2404651-A to which the reader is directed for further details.

[0065] Although the invention is described in the above embodiments for the dispense of two or more beverages separately or in combination, it will be understood that the invention has wider application to the dispense of a beverage separately or in combination with a fluid to modify a property of the beverage such as taste or flavour. For example we may provide a tap connected to one or more beverage sources and one or more liquid concentrate sources such as syrup flavours.

[0066] Typically, the volume of liquid concentrate added will be relatively small compared to the volume of bev-

erage and the valve connected to the liquid concentrate may be of smaller size to provide greater control over the addition of the concentrate. Alternatively or additionally, we may control the opening of the associated valve and thus the ratio of the fluids in the dispensed beverage. For example, in the above-described embodiments, the degree and/or timing of opening of each valve may be controlled by the profiles of the cam members to dispense the fluids in any desired ratio.

Claims

1. A beverage dispense tap for dispensing beverages, the tap having first and second inlets for connection to respective fluid supply lines, a first valve for controlling flow of fluid from the first inlet to an outlet, a second valve for controlling flow of fluid from the second inlet to an outlet, and a manually operable handle for operating the first and second valves.
2. A tap according to claim 1 **characterised in that**, each valve includes a valve member that is resiliently biased to a closed position and is moveable against the resilient biasing to an open position in response to actuation of the handle.
3. A tap according to claim 2 **characterised in that**, each valve member is operatively connected to the handle via a cam member for moving the valve member to the open position in response to pivotal movement of the handle.
4. A tap according to claim 3 **characterised in that**, the cam members are arranged so that both valves open simultaneously on pivotal movement of the handle in one direction from a rest position in which both valves are closed.
5. A tap according to claim 3 **characterised in that**, the cam members are arranged so that one valve opens and the other remains closed on pivotal movement of the handle in one direction from the rest position and the other valve opens and said one valve remains closed on pivotal movement of the handle in the other direction.
6. A tap according to any preceding claim **characterised in that**, the valves are connected to a common outlet or separate outlets.
7. A method of dispensing a beverage comprising providing a dispense tap having at least two dispense valves, connecting each dispense valve to a fluid source, and operating the valves separately or in combination with a common handle.
8. A method according to claim 7 **characterised in**

that, the fluid sources are beverages such as carbonated and non-carbonated beverages that can be alcoholic such as beer, lager, cider or non-alcoholic such as lemonade, cola, soda, fruit juices or still water.

5

- 9.** A method according to claim 7 **characterised in that**, one fluid source is a beverage and the other fluid source may, when added to the beverage, modify a property of the beverage such as taste, flavour, strength or carbonation level, for example, the beverage may be a carbonated or non-carbonated alcoholic or non-alcoholic beverage and the fluid may be a liquid concentrate such as a syrup to alter the flavour or taste of the beverage.
- 10.** Apparatus for dispensing a beverage comprising providing a dispense head having a plurality of dispense valves for connection to a fluid source and manually operable by a common actuator configured to open the valves separately or in combination.

10

15

20

25

30

35

40

45

50

55

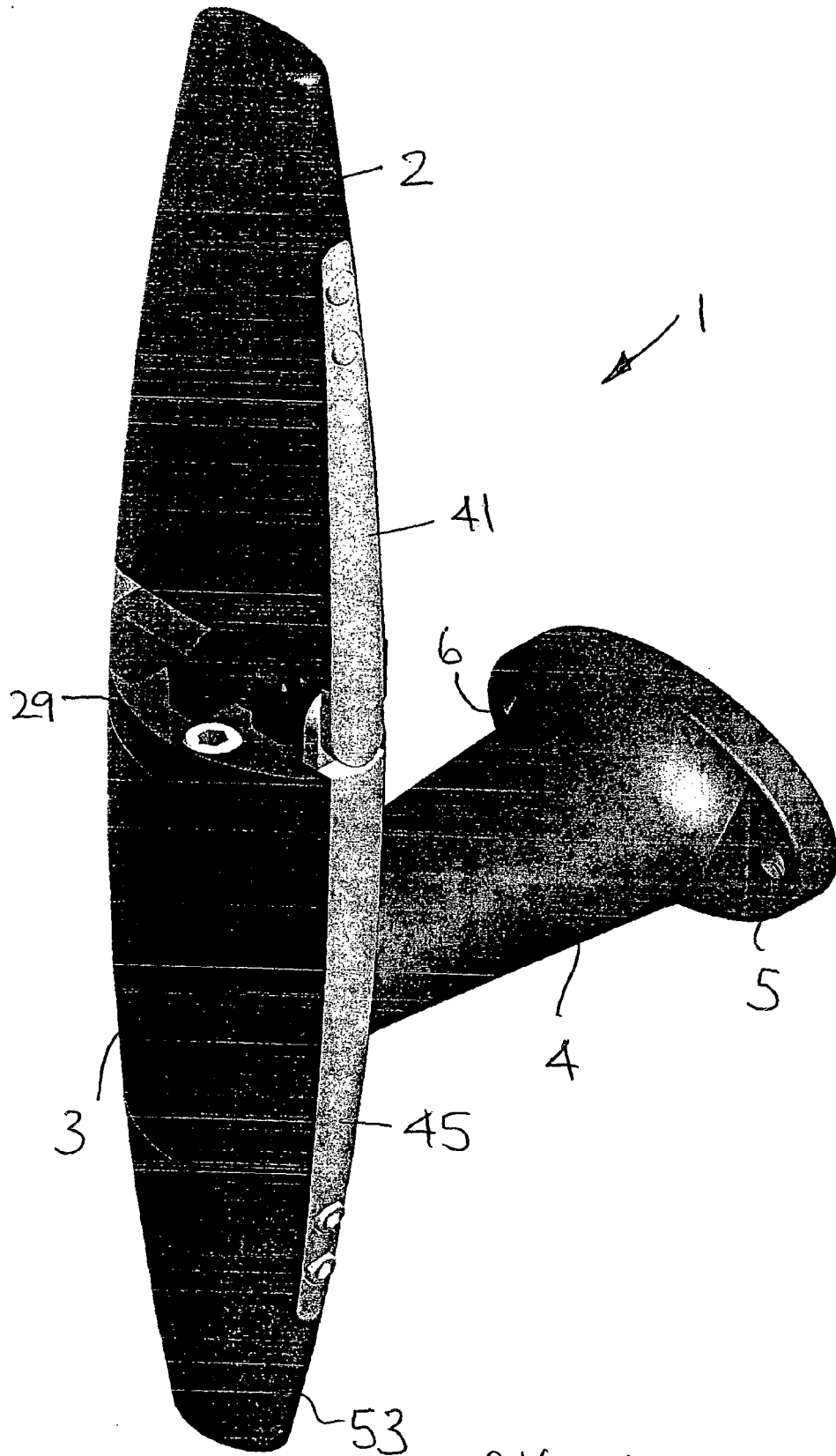


FIGURE 1.

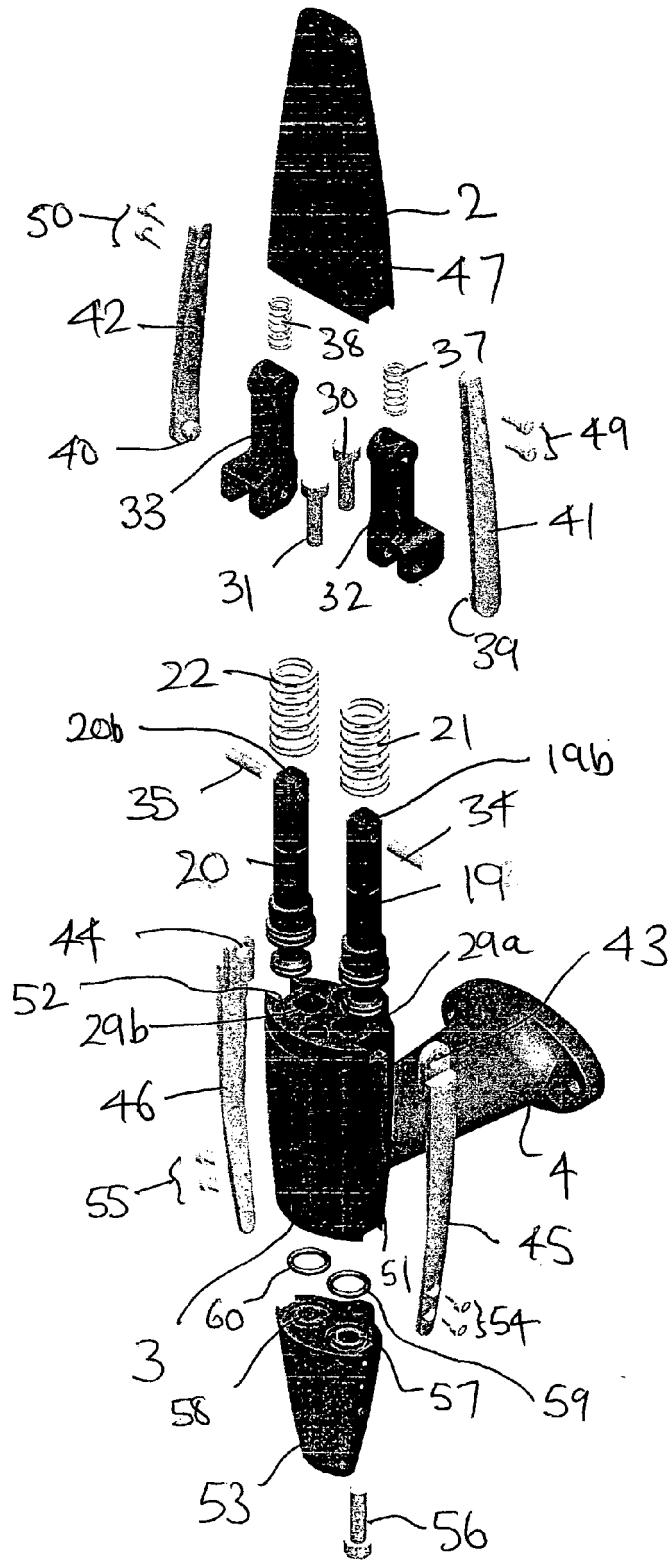


FIGURE 2.

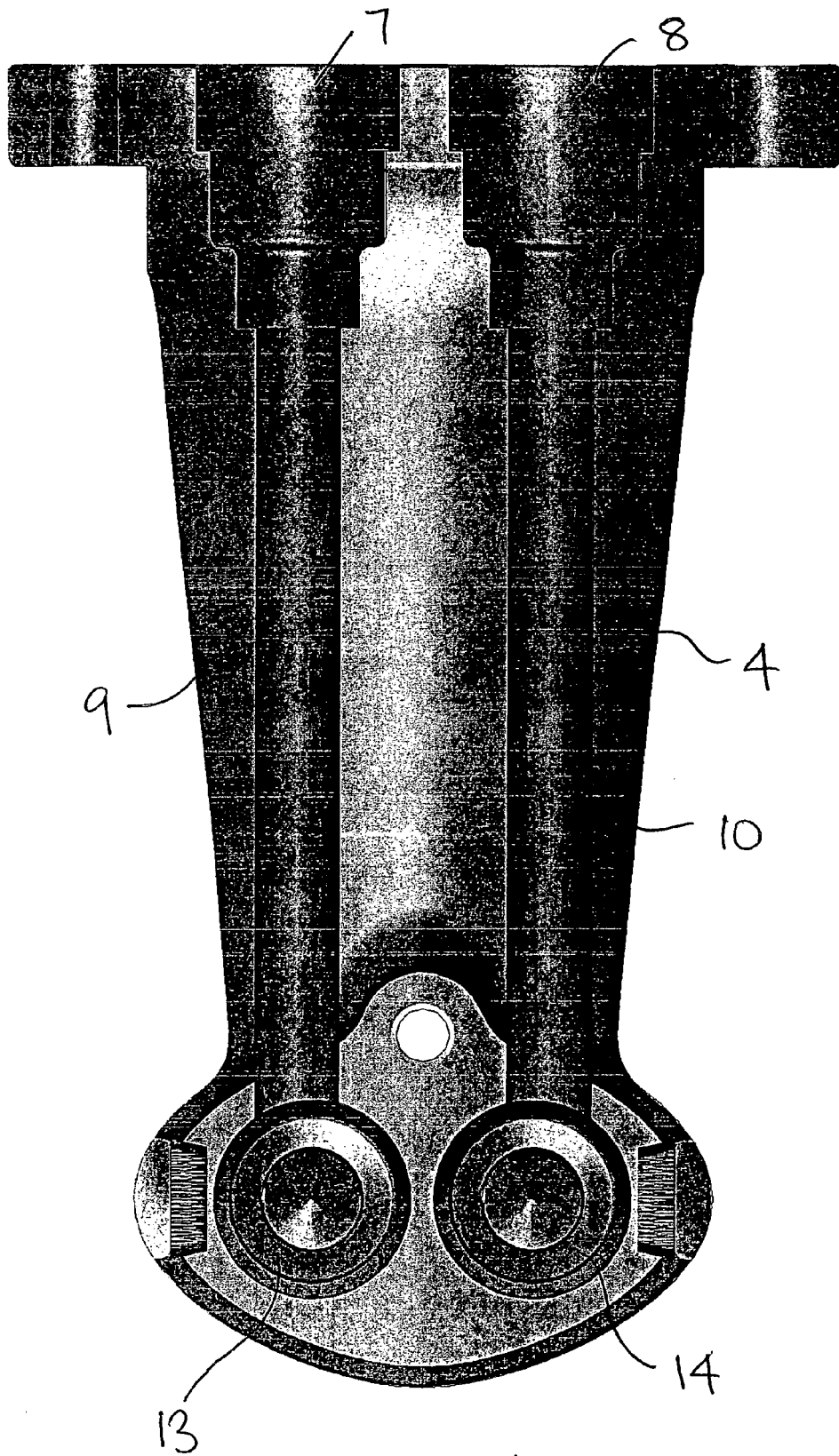
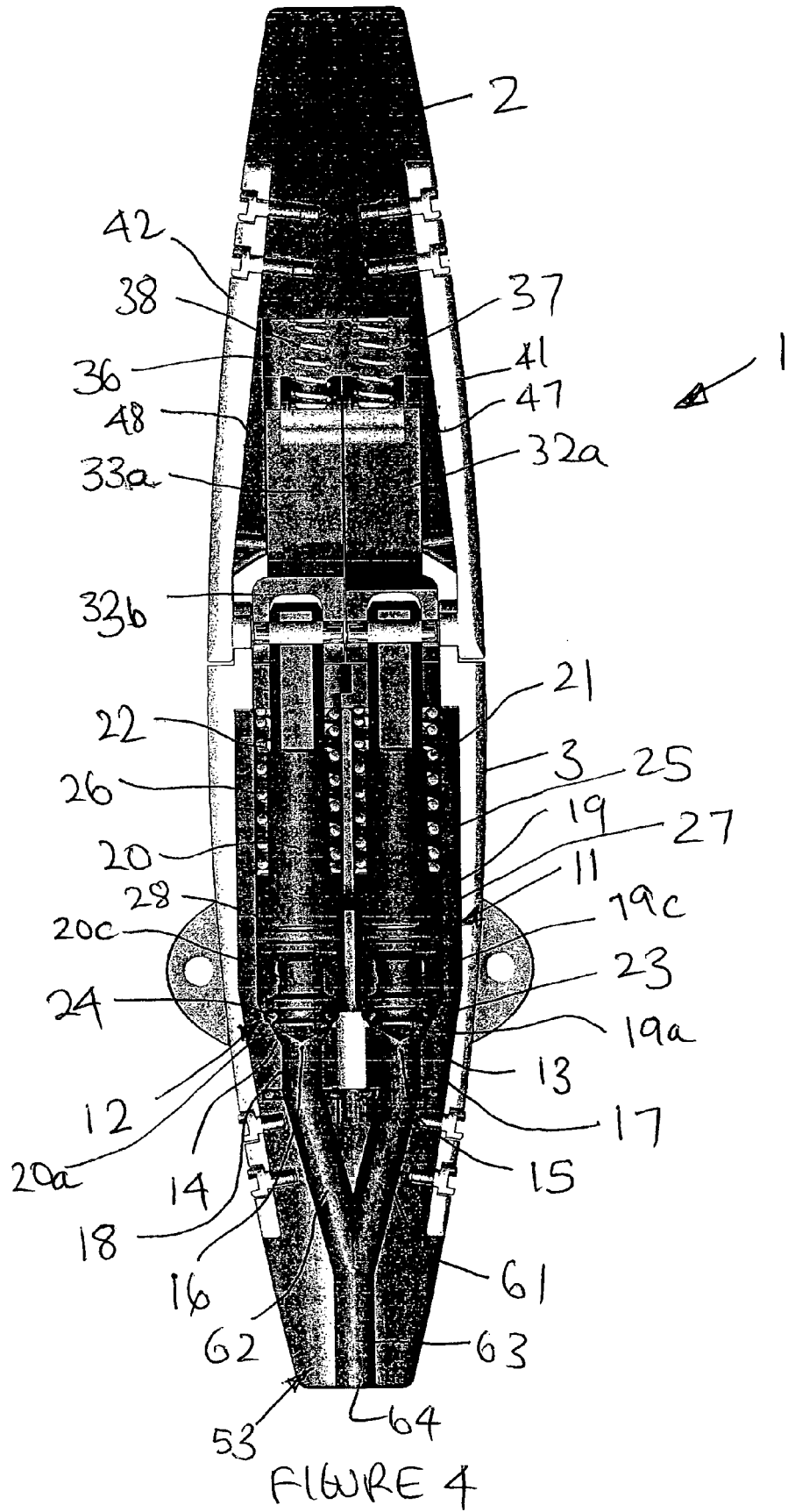
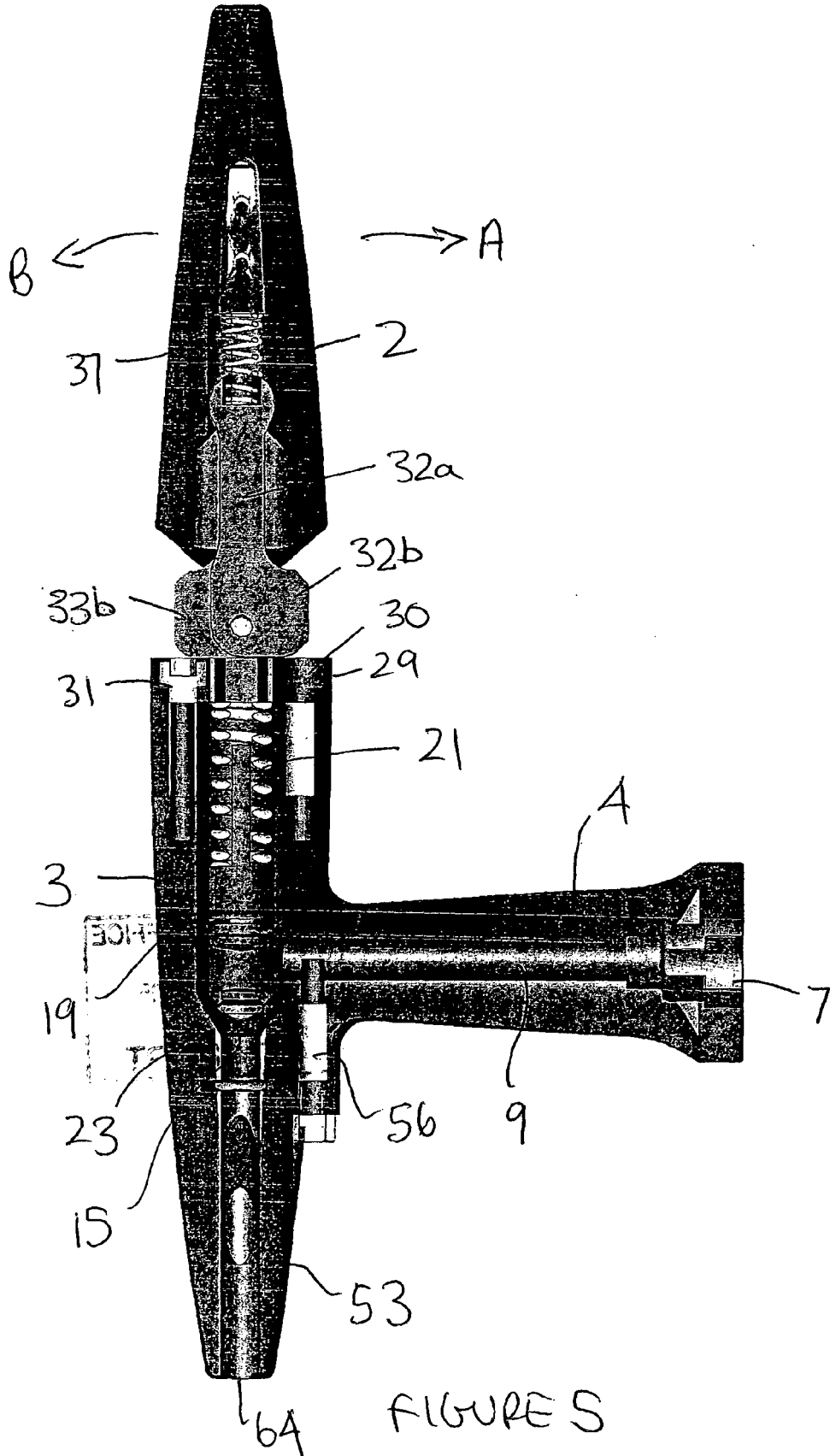


FIGURE 3







DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 4 474 214 A (IANNELLI ET AL) 2 October 1984 (1984-10-02) * column 4, line 3 - line 36 *	1-10	B67D1/00 B67D1/14
X	US 2 619 387 A (CORNELIUS RICHARD T ET AL) 25 November 1952 (1952-11-25) * column 4, line 18 - column 5, line 4 *	1-6	
X	US 2 921 605 A (BOOTH JACK J ET AL) 19 January 1960 (1960-01-19) * column 2, line 34 - line 70 * * column 3, line 5 - line 21; figures 5,6 *	1-4,6	
X	US 2 634 753 A (HORNER JACK E) 14 April 1953 (1953-04-14) * column 4, line 21 - line 63 *	1-3,6-10	
X	US 2 674 264 A (NICHOLAS ANDREW J) 6 April 1954 (1954-04-06) * column 3, line 75 - column 4, line 68 *	1-4,6-9	
			TECHNICAL FIELDS SEARCHED (IPC)
			B67D
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 7 March 2006	Examiner Desittere, M
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

2
EPO FORM 1503 03.02 (P04/C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 05 25 7591

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

07-03-2006

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 4474214	A	02-10-1984	NONE	
US 2619387	A	25-11-1952	NONE	
US 2921605	A	19-01-1960	NONE	
US 2634753	A	14-04-1953	NONE	
US 2674264	A	06-04-1954	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82