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(54) **Cooling device**

(57) The present invention relates to a cooling device for containing and cooling a plurality of glasses, each glass defining a specific height and a specific maximum diameter. The cooling device comprises a base portion (21) to be mounted on a supporting surface and defining a height (24) exceeding the specific height of each of the glasses, and a cooling channel (30) having a first opening (32) constituting a top opening and a second opening (34) constituting a bottom opening and extending between the first (32) and second (34) openings and defining a height substantially exceeding the specific height of each of the glasses. The cooling channel (30) is connected to and supported by the base portion (21) at the second opening (34). The first opening (32) substantially exceeds the maximum diameter of each of the glasses for allowing the glasses to be received and contained within the cooling channel (30). The second opening (34) slightly exceeds the maximum diameter of each of the glasses for allowing the glasses to be discharged or manually removed from the cooling channel (30). The cooling channel (30) includes a cooling fluid circulating circuit (40) for allowing a cooling fluid to circulate through the cooling fluid circulating circuit (40) for cooling the glasses.

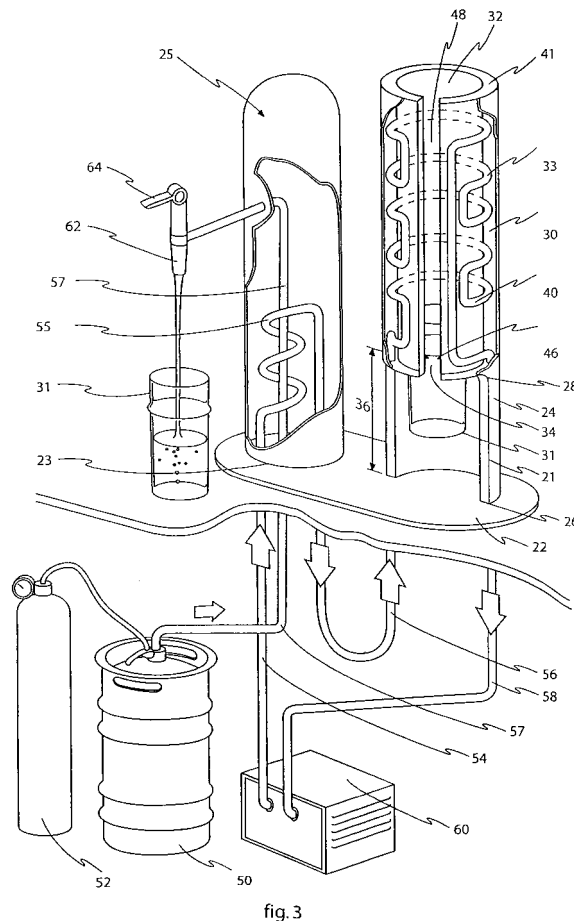


fig. 3

## Description

**[0001]** The present invention relates to a system for dispensing beverages into glasses, comprising a dispensing unit for dispensing said beverage and a cooling device.

**[0002]** Within the field of systems for dispensing beverages into glasses, assemblies for dispensing beverages from kegs or other containers and into glasses, e.g. draught beer dispensing assemblies at pubs or bars, are widely known and used. It is important that the beverage is served at a right temperature, for instance, an inefficient cooling may result in beverage being served at a too high temperature, which may affect both the taste of the beverage and the user satisfaction in a negative manner.

**[0003]** A lot of effort has been made in the prior art to develop different dispensing systems to achieve the desired cold temperature of the beverage, e.g. the draft beer. In order to achieve the desired cold temperature of e.g. draught beer, the beer has to be cooled down on the way between the keg and the site of dispensing. This is even the case when the keg is stored at a low temperature, e.g. in a refrigerator, since undesirable warming of the beverage may otherwise take place in the dispensing line between the keg and the tap. A technique to achieve the cold temperature of the beverage is disclosed in the applicant's prior patent application No. DK 2005 01146 corresponding to international patent application No. PCT/DK2006/000436, publication No. WO 07/019849.

**[0004]** From US 2,637,819 a water dispenser is known using a conveyor belt to guide glasses to be cooled. Further from US 2,628,009 an apparatus for chilling and dispensing draught beer tapped from kegs is known.

**[0005]** Moreover, US 2003/0164002 discloses a glass chilling method and apparatus. For bartending, in order to avoid batch chilling of beer glasses and the like in which the last glasses put into a refrigerator are the first pulled out and are thus not properly chilled, a last in, last out glass chilling system provides a supply of properly chilled beer glasses even when newly washed warm glasses are to be chilled. In one embodiment, the last in, last out glass chilling system includes a series of trays on a conveyor in the cabinet, with each tray loaded with glasses. The conveyor moves the trays upwardly in the chill cabinet, with the chilling occurring during the time that the tray of glasses moves from a bottom position to a top position. This assures that, unlike batch chilling, properly chilled glasses are always available. In one embodiment, a tray of glasses is inserted at the base of the chill cabinet, with the conveyor being motorised to move the trays within the chill cabinet in an upward direction. The topmost tray is presented at an upper aperture in the chill cabinet, with the chilled glasses being extractable from this upper aperture. In an embodiment, the trays are slanted downwardly so that glasses on the trays move by gravity towards this upper aperture.

**[0006]** However, the three above-mentioned US doc-

uments disclose a dispenser and two apparatuses, which are constituted by many complicated parts.

**[0007]** Generally, it is preferred, in particular during a hot summer season, to have a beverage, such as beer and/or a soft drink, served in a glass at a temperature lower than the surrounding temperature of 20 - 25 degrees. However, in the bar when the bar is busy i.e. when selling a lot of beer in glasses, the beer glasses often have been dishwashed a few minutes before use. The glasses therefore have reached the temperature of the dishwasher, e.g. 30 - 60 degrees which temperature is far higher than the desired drinking temperature of the beer. Thus an inefficient cooling may result in the beer being served at a too high temperature, which may affect both the taste of the beer and the user satisfaction in a negative manner.

**[0008]** Further, beer served in such hot glasses is not pleasant to consume since the glasses are too hot to handle and further give the impression that any beer present in the glasses has the same too high temperature.

**[0009]** It is therefore convenient when the beer glass prior to be filled with beer is already either rather cold or, preferably, at least has a temperature close to the preferred temperature of the beer, e.g. the temperature of the beer when it is supplied from a beer keg.

**[0010]** This calls for an efficient cooling device in which beer glasses are stocked and cooled down e.g. to the preferred temperature of the beer. Hereby it is avoided that the beer glass contributes to any undesired heating up of the beer when the beer is poured into the glass.

**[0011]** Therefore, it is an object of the present invention that the cooling device is able of cooling down several beer glasses simultaneously and subsequently maintain the cooled down temperature of the beer glasses as long as the glasses are stocked within the cooling device.

**[0012]** A requirement in a competitive world is that such cooling device need be user-friendly to operate and be constituted of simple and easy manufactureable parts.

**[0013]** The cooling device should be operational and ready to use when connected to a dispensing unit, typically being part of a beverage dispensing system, i.e. a unit having a faucet and a handle controlling the supply of the beer from a keg or a container containing beer in carbonised form.

**[0014]** Therefore, it is another requirement that the cooling device should be able to be operated and used in connection with the dispensing unit and connectable to any cooling fluid applied in the dispensing unit of the beverage dispensing system to cool the beer therein so that the glasses - which are dispensed from the cooling device - are also cooled properly using the same cooling fluid.

**[0015]** Moreover, the cooling device should maintain the relatively low temperature of the cooled down glasses as long as the glasses are stocked in the cooling device.

**[0016]** It is an object of the present invention to provide a cooling device, which is simple to manufacture with as

few parts as possible.

**[0017]** It is a further object of the present invention to provide a cooling device, which is easy to operate.

**[0018]** It is a still further object of the present invention to provide a cooling device operable in connection with a dispensing unit of a beverage dispensing system.

**[0019]** It is a further additional object of the present invention to use the cooling fluid provided from the dispensing unit to the cooling device to cool the beer glasses, which beer glasses subsequently are to be dispensed from the cooling device.

**[0020]** The present invention is new and inventive by providing a system for dispensing a beverage into glasses, comprising a dispensing unit for dispensing said beverage, a storing unit containing said glasses, a cooling unit for cooling the glasses in said storage unit and for cooling the beverage.

**[0021]** The inventive system for dispensing beverage cools the glasses in the storage unit before the beverage is dispensed into them. This provides the advantage that the beverage may be served at a desired temperature in an effective way. It should be noted that a lot of effort has been put into cooling of the beverage before the beverage is dispensed into the glass in prior art. If the cold beverage is dispensed into a warm glass, the effort could be effect- less to a drinker.

**[0022]** A second advantage of the present invention is that the system prolongs the time for which the beverage is kept at a desired temperature.

**[0023]** An even further advantage of the invention is that a drinker experiences a "cold feeling" of the beverage when being served with a cold glass.

**[0024]** The above objects, the above requirements, the above advantages, and the above features together with numerous other objects, requirements, advantages and features, which will be evident from the below detailed description of the present invention, are in accordance with the teaching of the present invention obtained by a cooling device for containing and cooling a plurality of glasses, each glass defining a specific height and a specific maximum diameter, the cooling device comprising:

a base portion to be mounted on a supporting surface and defining a height exceeding the specific height of each of the glasses,  
a cooling channel having a first opening constituting a top opening and a second opening constituting a bottom opening and extending between the first and second openings and defining a height substantially exceeding the specific height of each of the glasses, the cooling channel being connected to and supported by the base portion at the second opening,  
the first opening substantially exceeding the maximum diameter of each of the glasses for allowing the glasses to be received and contained within the cooling channel,  
the second opening slightly exceeding the maximum diameter of each of the glasses for allowing the

glasses, one at a time to be discharged or manually removed from the cooling channel, and  
the cooling channel including a cooling fluid circulating circuit for allowing a cooling fluid to circulate through the cooling fluid circulating circuit for cooling the glasses contained within the cooling channel, the cooling fluid circulating circuit being connectable to an external cooling fluid circulating system, such as a cooling fluid circulating system cooling a dispensing unit of a beverage dispensing system.

**[0025]** The term "glass" is in this context to be construed as being any receptacle or vessel suitable for drinking a beverage, said glass may be made of any material.

The storing unit of the system may comprise an inlet station for receiving said glasses and an outlet station for discharging said glasses, the storing unit being arranged to convey the glasses from said inlet station to said outlet station. This leads to the advantage that the glasses may be stored in an effective manner. Another advantage is that the glasses may be unloaded so that the glass that has been stored for the longest time, and thus has been cooled for the longest period, is the glass that is unloaded first, i.e. first in first out.

**[0026]** Also, an additional cooling unit may be arranged for providing additional cooling to the beverage.

**[0027]** The storing unit of the system may be arranged for receiving glasses arranged on trays. This leads to the advantage that the glasses may be loaded in the storage unit in an effective and easy way. A further advantage is that the trays may be the same trays as those used in a dishwasher. The storage unit of the system may further comprise a transportation unit for supporting and transportation of said trays.

**[0028]** The storage unit of the system may be integrated in the dispensing unit, which leads to the advantage of that the system could be compact and mobile.

**[0029]** The dispensing unit of the system may be in the form of a dispensing tower, the storage unit being arranged in said dispensing tower.

**[0030]** Furthermore, the glasses may be stacked in the storage device.

**[0031]** The invention and its many advantages will be described in more detail below with reference to the accompanying schematic drawings, which for the purpose of illustration show some non-limiting embodiments and in which

Fig. 1 shows a system for dispensing beverage into a glass,

Fig. 2 shows an embodiment of a storage unit,

Fig. 3 is a perspective view of a first embodiment of a cooling device,

Fig. 4a is a perspective view of a second embodiment of the cooling device,

Fig. 4b is a sectional view of the second embodiment of the cooling device,

Fig. 5a is a perspective view of a third embodiment of the cooling device, and

Fig. 5b is a sectional view of the third embodiment of the cooling device.

**[0032]** All the figures are highly schematic, not necessarily to scale, and they show only parts, which are necessary in order to elucidate the invention.

**[0033]** Throughout the below description and in the drawings, identical components or elements present in different figures of the drawings are designated the same reference numerals, and components or elements differing from a previously described components or elements, respectively, however serving basically the same functional purpose as the previously described components or elements, respectively, are designated the same reference numeral as the previously described components or elements, respectively, however added a marking for indicating the geometrical difference from the previously described component or element, respectively.

**[0034]** Figs. 1 and 2 show an embodiment of a system 1 for dispensing a beverage into glasses. The system 1 comprises a dispensing unit 2 and a storage unit 3.

**[0035]** The dispensing unit 2 is of the kind described in applicant's prior patent application No. DK 2005 01146 corresponding to international patent application No. PCT/DK2006/000436, publication No. WO 07/019849. The dispensing unit 2 comprises a cooling chamber (not visible), a cooling unit (not visible), a pressure chamber (not visible), a container inside the pressure chamber (not visible), a pressure chamber lid with an opening for a dispensing line (not visible), a dispensing line channel (not visible), a tower 4, a dispensing tap 5 and a tap actuator 6. The function of the dispensing unit 2 will not be described further due to the invention not being limited to a dispensing unit 2 according to applicant's prior patent application No. DK 2005 01146 corresponding to international patent application No. PCT/DK2006/000436, publication No. WO 07/019849, and due to the invention also including other dispensing units that are well known in prior art. In this embodiment the storage unit 3 is located adjacent to the dispensing unit 2.

**[0036]** Fig. 2 shows the storage unit 3 comprising an inlet station 7, an outlet station 8, a first cooling unit 9 and a transportation unit 10, and trays 11. The inlet station 7 is located on the front side of the storage unit 3 and comprises an inlet opening 12 and an inlet door 13. The outlet station 8 is located on the upper side of the storage unit 3 and comprises an outlet opening 14 and an outlet door 15. The cooling unit 9 is located adjacent to the storage unit 3 and arranged to blow cold air through the storage unit 3. The transportation unit 10 comprises two conveying means 16 that are located on the inner lateral sides of the storage unit 3. Each conveying means 16 comprises a first and a second reel 17, 18 and a conveying belt 19 that is mounted on said first and second reel 17, 18. The conveying belt 19 of one of the conveying means 16 has a number of tray means 20 that are aligned

with tray means 20 on the other conveying belt 19 of the conveying means 16 for supporting and transportation of a tray 11.

**[0037]** To load the system 1 for dispensing beverage into a glass with glasses, the inlet door 13 is opened and a first tray 11 filled with glasses is pushed through the inlet opening 12. The first tray 11 is pushed onto corresponding tray means 20 of the conveying means 16. Thereafter the inlet door 13 is closed. The transportation unit 10 transports the first tray 11 upwards so that a second tray 11 can be loaded into the storage unit 3. The first cooling unit 9 continuously blows cold air through the storage unit 3 and onto the glasses and thus the temperature of the glasses on the trays 11 is lowered. When the storage unit 3 is filled with trays 11, the first tray 11 has been transported upwards to be located adjacent to the outlet station 8. When the beverage should be dispensed, the outlet door 15 of the outlet station 8 is opened and a cold glass from the first tray 11 is picked up and led out of the storage unit 3 through the outlet opening 14 of the outlet station 8. Thereafter, the beverage is dispensed into the cold glass from the dispensing tap 5 of the dispensing unit 2 and served to a drinker.

**[0038]** When all the glasses from the first tray 11 have been picked up, the first tray 11 is removed from the storage unit 3 through the outlet opening 14 of the outlet station 8. After the first tray 11 has been removed, the transporting unit 10 transports the second tray 11 upwards, so that the second tray 11 is located adjacent to the outlet station 8 and the glasses on the second tray 11 could be picked. After the first tray 11 has been removed from the storage unit 3 it (or another tray) may be filled with glasses and once again be loaded into the storage unit 3 via the inlet station 7. The system 1 can thus continuously be loaded with glasses so that there are always cold glasses to dispense the beverage into. The principle of first in first out ensures that the glasses are exposed to the cold air for the longest time possible in the system 1.

**[0039]** It should also be noted that the invention is not limited to glasses on trays 11, separate glasses may also be used. Said separate glasses may for instance be stacked and placed in the storage unit as a stack.

**[0040]** The trays 11 may be of the same size that is used in a dishwasher and thereby allow that a tray 11 with glasses that have been washed can be loaded directly into the storage unit 3.

**[0041]** A regulating unit (not shown) may be comprised in the cooling unit 9 and arranged to regulate the cooling unit 9 to cool the glasses in the storage unit 3 to a preset temperature. The regulating unit may, in order to save energy, regulate the cooling unit 9 to turn off the cooling unit 9 when the outlet door 15 or the inlet door 13 is opened.

**[0042]** Pipes may be arranged to convey part of the cold air from the cooling unit of the dispensing unit 2 to the storage unit 3. By doing this the advantages of lowering the costs of the system is achieved.

**[0043]** Advantageously, the storage unit (not shown) is integrated in the dispensing unit, i.e. the tower, whereby a simple construction is provided which may easily be incorporated in existing dispensing systems without major construction-wise modifications. Furthermore, the existing tubing for cooling the tower may be used to provide cooling to the storage device.

**[0044]** Fig. 3 illustrates a perspective view of a first and presently preferred embodiment of a cooling device. The cooling device is provided with a base portion 21 which enables the cooling device to be mounted on a supporting surface, e.g. on top of a bar disk or on a table. The base portion 21 may, as an option, comprise a base plate 22. The base plate 22 has an extended size allowing a dispensing unit 25 to be mounted to or with the cooling device. Alternatively or additionally, the base plate 22 is provided with an opening or aperture 23 allowing the dispensing unit 25 to be mounted through the aperture to the cooling device.

**[0045]** A main component of the cooling device is a cooling channel 30 formed as a chute. The cooling channel 30 allows one or more glasses 31 to be cooled when stocked within the cooling channel 30.

**[0046]** The cooling channel 30 defines a top opening 32 allowing glasses 31 to be cooled to be received, contained and stacked on top of one another within the cooling channels. This provides for an efficient and space-consuming solution allowing many glasses e.g. 5, 10, 15, 20, etc. to be simultaneously stocked and cooled.

**[0047]** Each glass has a specific height and a specific maximum diameter. Preferably all the glasses to be cooled have substantially the same specific maximum diameter. The top opening 32 of the cooling channel 30 exceeds substantially the maximum diameter of the glasses to enable and allow glasses to be positioned through the top opening 32 and be placed into the cooling channel 30 of the cooling device. Hereby glasses may one by one or several at a time be stacked and stocked within the cooling channel 30.

**[0048]** The cooling channel 30 has at its other end - opposite the top opening 32 - a bottom opening 34. The bottom opening 34 preferably has a smaller diameter than that of the top opening 32, i.e. the diameter of the bottom opening 34 only slightly exceeds the specific maximum diameter of the glasses to avoid that the glasses simply fall through and out of the cooling channel 30.

**[0049]** The smaller diameter of the bottom opening 34 captures the glass at the bottom end 34 of the cooling channel 30 and thereby ensures and allows that the glasses stocked higher up in the cooling channel 30 may be discharged or manually removed, typically one at a time, from the cooling channel 30 at the bottom opening 34 thereof.

**[0050]** The cooling channel 30 of the cooling device is provided with a front opening 48.

**[0051]** The opening 48 enables the user to inspect glasses 31 received within the cooling channel 30 and also allows the user to move glasses within the cooling

channel 30, e.g. a particular glass which is stuck within the cooling channel.

**[0052]** The openings or one of the openings also serve (s) the purposes of avoiding that a glass with a diameter greater than the specific maximum diameter is splintered since the openings allow the wall 41 of the cooling channel 30 to flex away and to be flexible and thus elastic.

**[0053]** The cooling channel 30 is preferably formed as a chute which tapers from the top opening 32 to the bottom opening 34. The tapering allows that glasses may slide after entering the top opening 32 and ensures that the glasses, when they reach the bottom opening 34, are stopped from sliding.

**[0054]** Alternatively or additionally, the bottom opening 34 is provided with a sealing 46, e.g. a lip seal or a thin O-ring, which allows the glass 31 reaching the bottom opening 46 to be retained partially within the cooling channel. As shown, only the bottom part of such a glass extends out from the bottom opening 34 of the cooling channel 30 since the frictional force between the partially retained glass and the sealing 46 is greater than the gravitational force on the glass.

**[0055]** The cooling channel 30 is connected to and thus supported by the base portion 21 at the bottom opening 34 of the cooling channel 30. The bottom opening 34 of the cooling channel 30 is located over a surface, e.g. a bar disk or a table, in a height 36 higher than the specific height of a glass to allow the glass to be removed from the bottom opening 34 of the cooling channel 30. The bottom end 34 of the cooling channel 30 is e.g. separated from the base portion 21 by a wall 24. The wall 24 is connected to the cooling channel 30 at its top end 28 and to the base portion 21 by a bottom end 26.

**[0056]** In order to cool the glasses contained within the cooling channel 30, the cooling channel 30 is provided with a cooling fluid circulating circuit 40 constituting a tortuous tubing 33 within a wall 41 constituting the cooling channel 30. The cooling fluid circulating circuit 40 extends within the wall 41 of the cooling channel 30. The cooling fluid circulating circuit 40 is connectable to an external fluid circulation system, which is a cooling fluid circulating system cooling a dispensing unit of a beverage dispensing system.

**[0057]** The beverage dispensing system comprises a pressurised CO<sub>2</sub> container 52 connected to a beer keg 50. The CO<sub>2</sub> contained in the container 52 carbonises the beer in the beer keg 50 and further pressurises the beer. Through a dispensing line 57 the beer is provided to a faucet 62 having a tapping handle 64. When operating the tapping handle 64 to the position shown in Fig. 3, the beer keg 50 delivers beer through the dispensing line 57 out of the faucet 62 to the previously cooled glass 31.

**[0058]** The beverage dispensing system is further provided with a cooling fluid circulating system including tubing 54, 55, 56 and 58 and is controlled by a cooling unit 60. The cooling fluid is supplied from the cooling unit 60 through the tubing 54 to the dispensing unit 25 to the

tubing 55 constituting a beverage cooling tubing as the tubing 55 surrounds the dispensing line 57. The beverage cooling tubing 55 is connected to the tubing 56 through which the cooling fluid is supplied to the cooling fluid circulating circuit 40 of the cooling channel 30. The cooling fluid is returned from the cooling circulating circuit 40 to the cooling unit through the tubing 58. In Fig. 3, one and the same cooling fluid system serves to cool the beverage supplied through the dispensing line 57, and the glass is contained within the cooling channel 30, however, in an alternative embodiment, separate cooling circulating systems may be used for cooling the dispensing line 57 of the dispensing unit 25, and for cooling the glasses 31 contained within the cooling channel 30. The cooling fluid may, as is well known in the art, be constituted by a gas or alternatively a liquid such as a cooling liquid or water or brine, and the cooling gas may be constituted by atmospheric air or an inert gas such as carbon dioxide or nitrogen.

**[0059]** Figs. 4a and fig. 4b illustrate a second embodiment of the cooling device. In the second embodiment of the cooling device the cooling fluid circulating circuit 40' is implemented as a spiral 40' and the opening 48 is omitted. The spiral 40' is encapsulated within the wall 41' constituting the cooling channel 30'.

**[0060]** Figs. 5a and fig. 5b illustrate a third embodiment of the cooling device. In the second embodiment of the cooling device the spiral 40' is supported by the wall 41. In the third embodiment of the cooling device the wall 41' is omitted and the spiral 40" is made from a stiff material such as stainless steel or aluminium.

**[0061]** It should be understood that the invention is not limited to a dispensing unit or use in connection with a dispensing unit as described in applicant's prior patent application No. DK 2005 01146 corresponding to international patent application No. PCT/DK2006/000436, publication No. WO 07/019849, but can also be constituted by or used in connection with other dispensing units or beverage dispensing systems.

**[0062]** Although the present invention has been described in connection with preferred embodiments of the invention, it will be evident for a person skilled in the art that several modifications are conceivable without departing from the invention as defined by the following claims.

## Claims

1. A cooling device for containing and cooling a plurality of glasses, each glass defining a specific height and a specific maximum diameter, said cooling device comprising:

a base portion (21) to be mounted on a supporting surface and defining a height (24) exceeding said specific height of each of said glasses, a cooling channel (30) having a first opening (32)

constituting a top opening and a second opening (34) constituting a bottom opening and extending between said first (32) and second (34) openings and defining a height substantially exceeding said specific height of each of said glasses,

said cooling channel (30) being connected to and supported by said base portion (21) at said second opening (34),

said first opening (32) substantially exceeding said maximum diameter of each of said glasses for allowing said glasses to be received and contained within said cooling channel (30),

said second opening (34) slightly exceeding said maximum diameter of each of said glasses for allowing said glasses, one at a time to be discharged or manually removed from said cooling channel (30), and

said cooling channel (30) including a cooling fluid circulating circuit (40) for allowing a cooling fluid to circulate through said cooling fluid circulating circuit (40) for cooling said glasses contained within said cooling channel (30), said cooling fluid circulating circuit (40) being connectable to an external cooling fluid circulating system, such as a cooling fluid circulating system cooling a dispensing unit of a beverage dispensing system.

2. The cooling device according to claim 1, said cooling fluid circulating circuit (40) of said cooling channel (30) including tubes of said cooling fluid circulating circuit extending through said base portion (21) or alternatively constituting said base portion (21).
3. The cooling device according to claim 1 or 2, said base portion (21) further comprising a base plate (22) having an opening (23) for receiving and mounting said dispensing unit.
4. The cooling device (9') according to any of the preceding claims, said cooling channel (30) being provided with a longitudinal opening (48,49) extending fully or partially between said first opening (32) and said second opening (34) of said cooling channel (30), and said longitudinal opening (48,49) allowing for inspection of said glasses received within said cooling channel (30) and said cooling channel (30) and/or for access to said glasses received within said cooling channel (30) for manually moving said glasses within said cooling channel (30) between said first opening (32) and said second opening (34).
5. The cooling device (9') according to claim 4, said longitudinal opening (48,49) allowing said cooling channel (30) to be flexible so as to avoid said glasses to be splintered and/or to prevent a glass with a diameter exceeding said specific maximum diameter

to be permanently stuck within said cooling channel (30).

6. The cooling device (9') according to any of the preceding claims, said cooling channel tapering from said first opening (32) to said second opening (34), and said tapering allowing said glasses to slide down when passing said first opening (32) and said glasses to be stopped from sliding when reaching and extending partly out from said second opening (34).
7. The cooling device (9') according to any of the preceding claims, said second opening (34) of said cooling (30) channel being provided with a sealing (46), e.g. a lip-seal, allowing a glass to be retained at said second opening (34) against a gravitational force in that said sealing retains said glass at least partially within said cooling channel (30).

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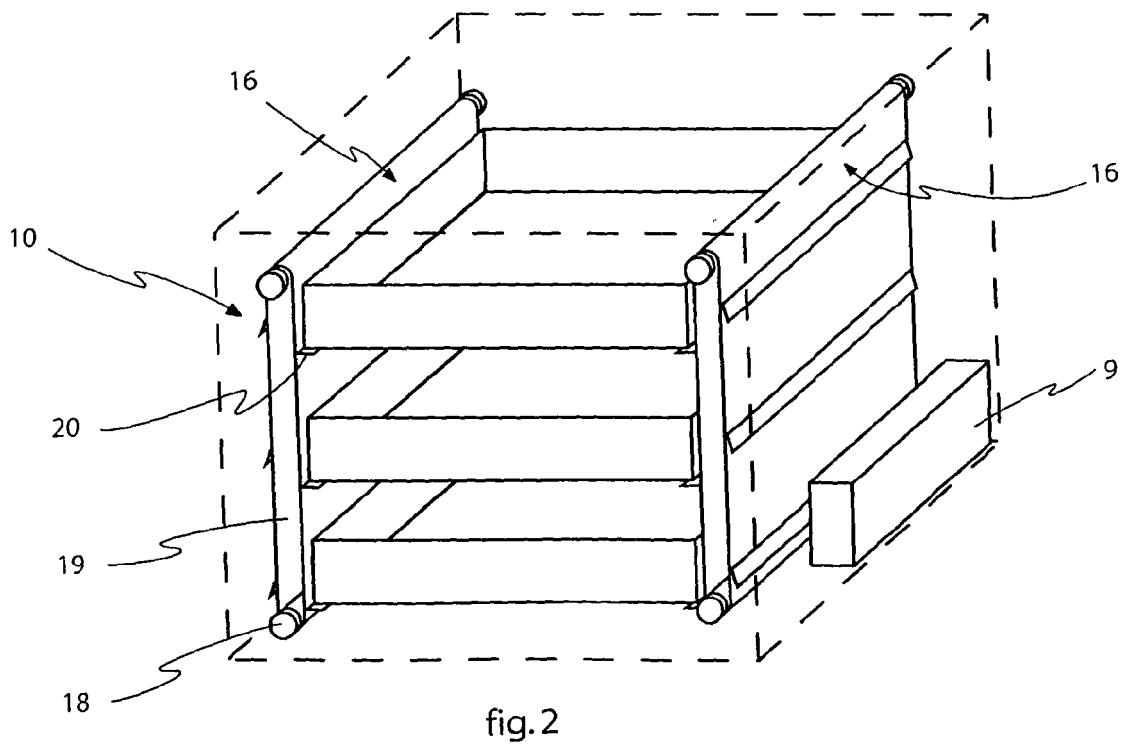
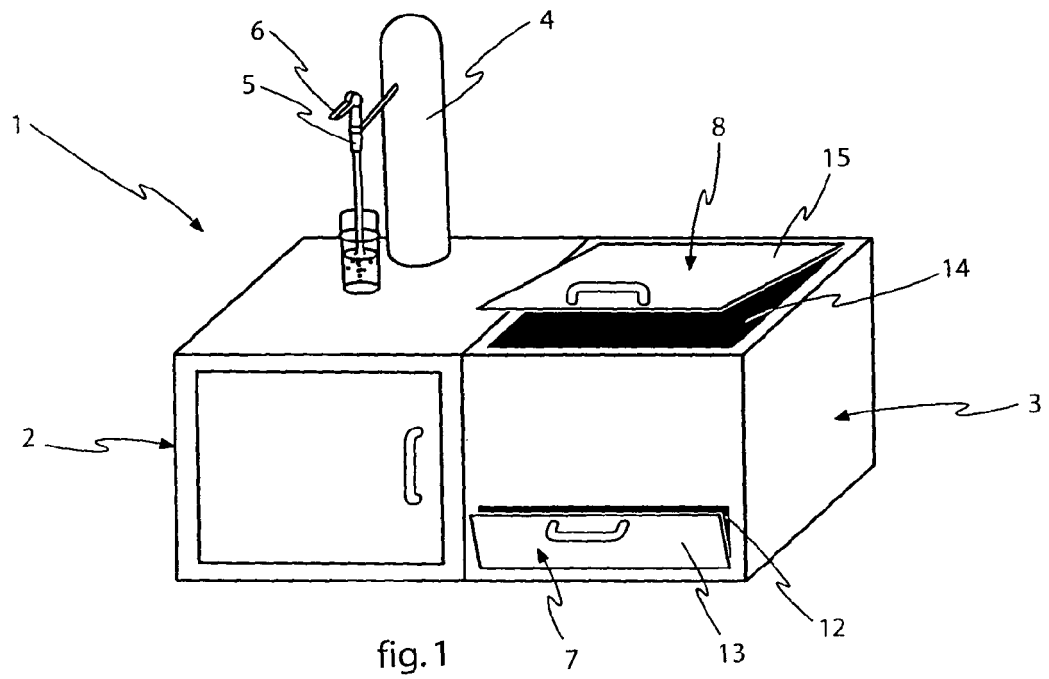
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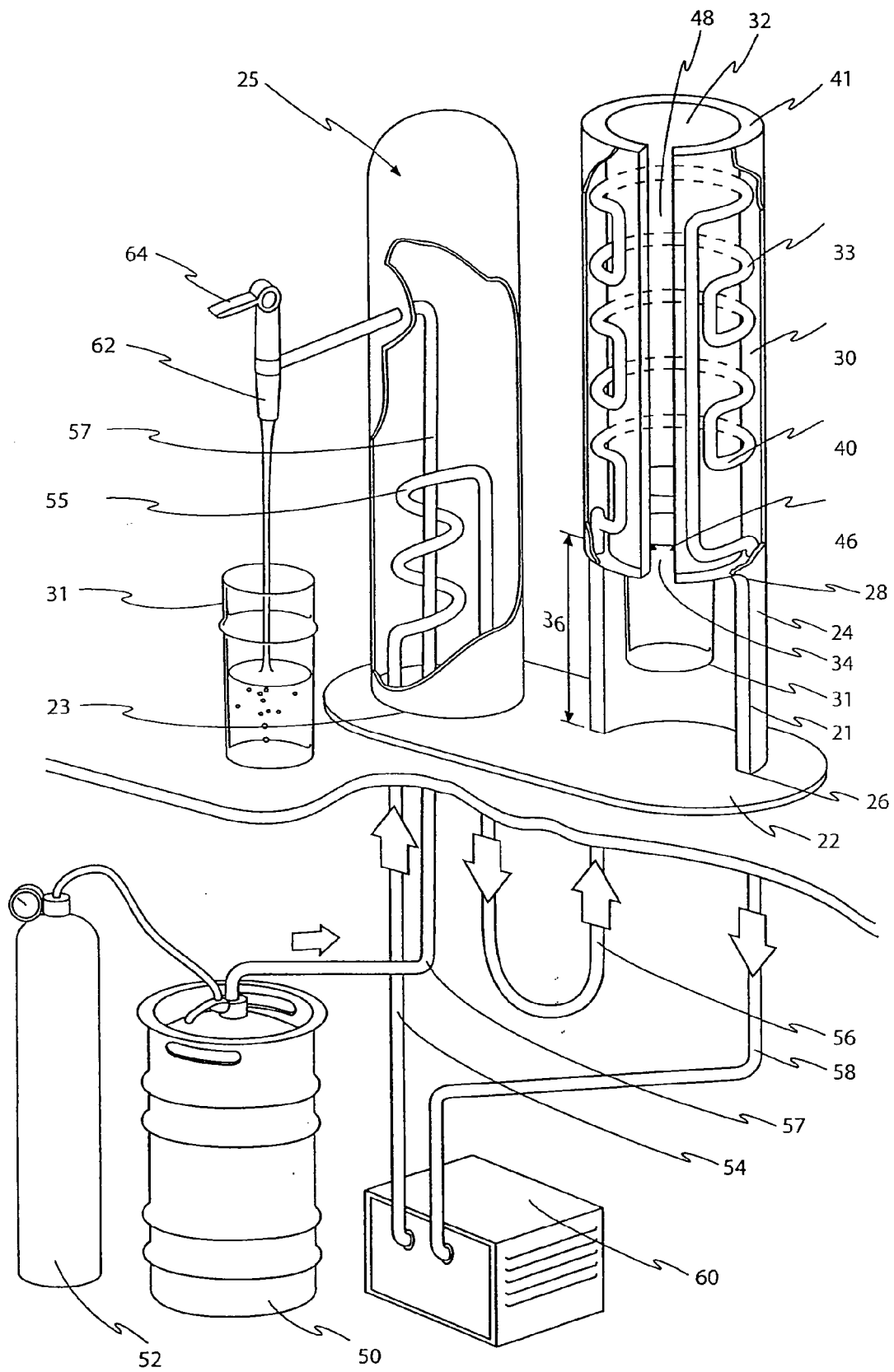
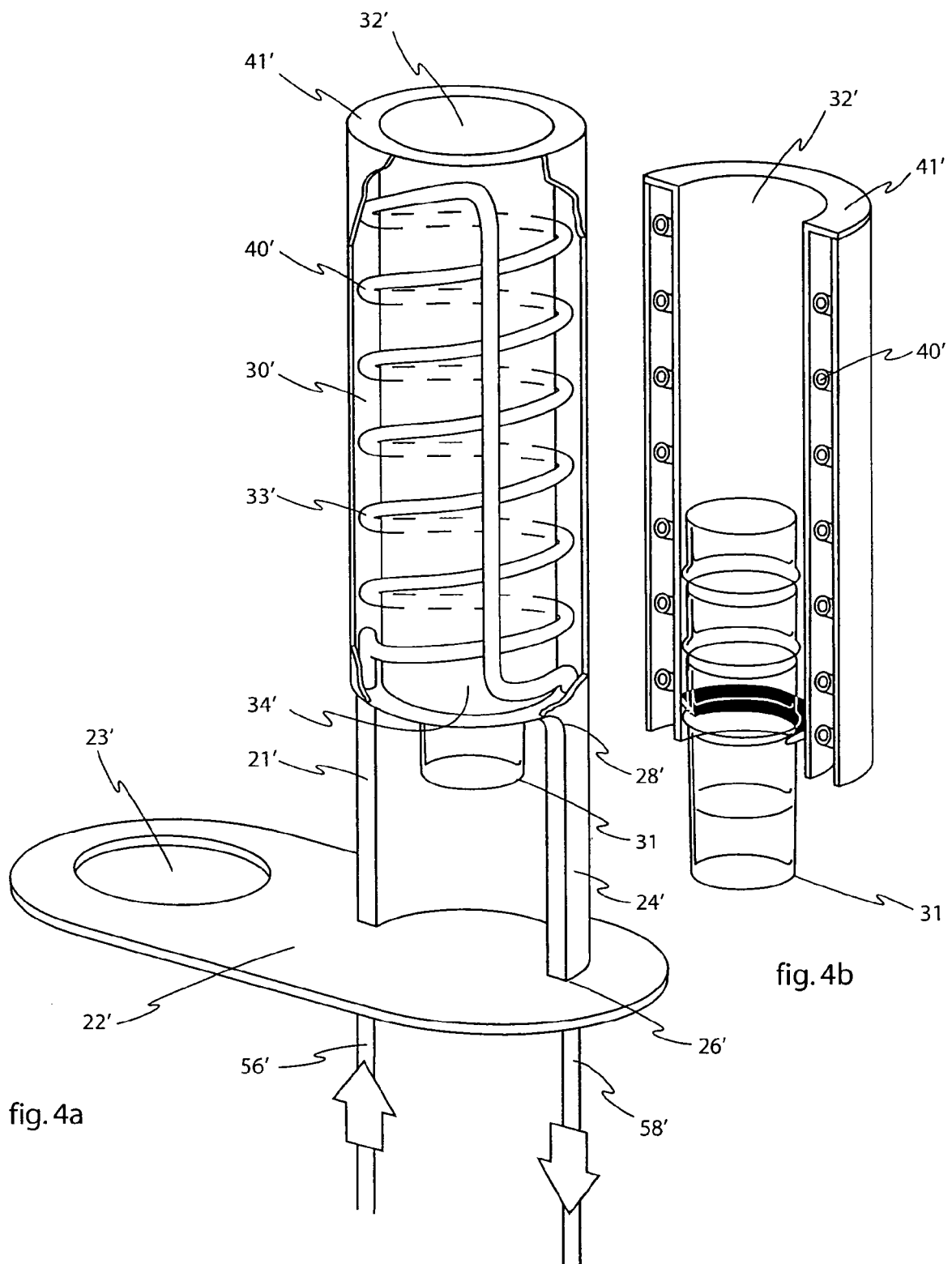
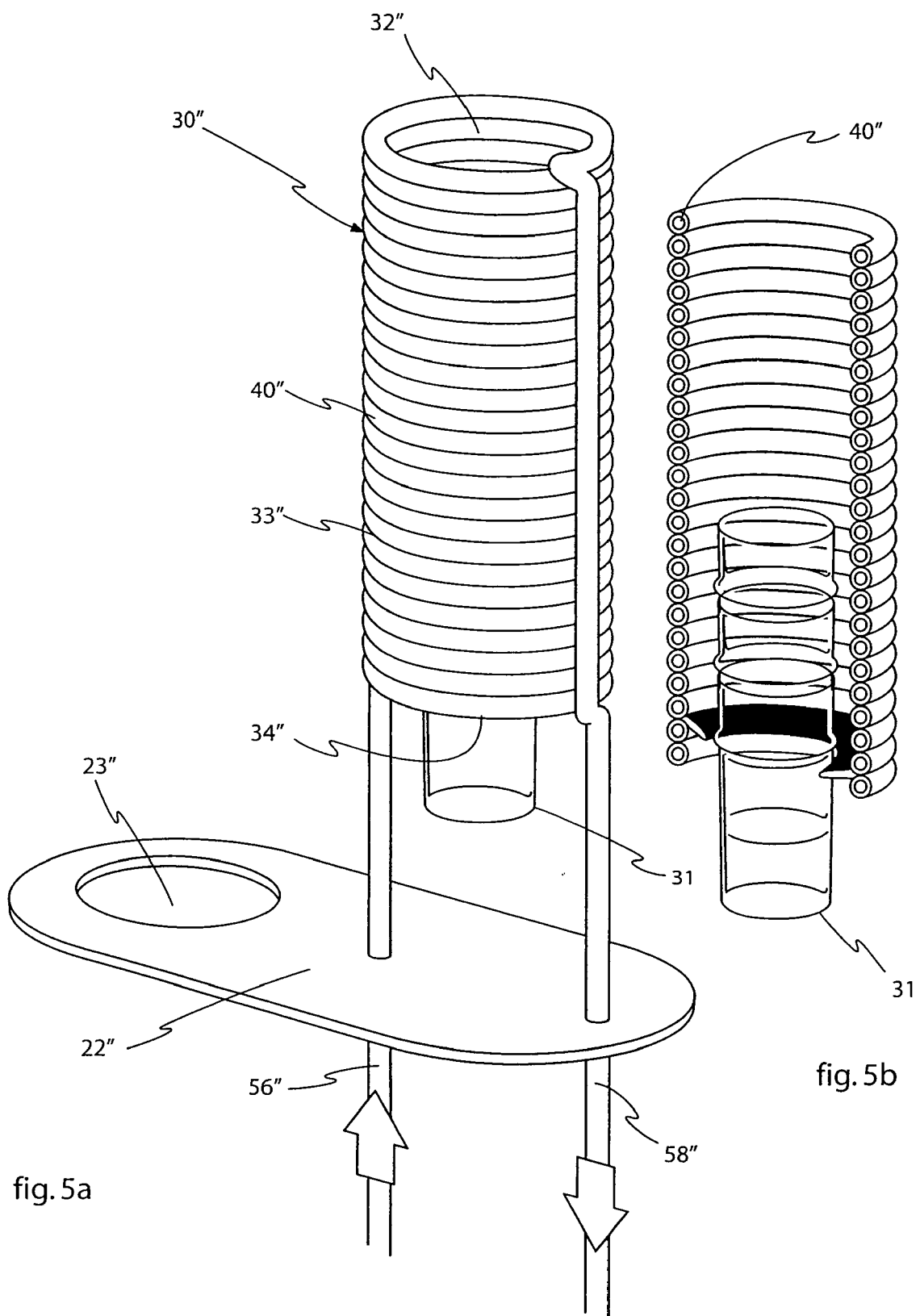


fig. 3







## EUROPEAN SEARCH REPORT

Application Number  
EP 08 01 1578

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 29 October 2008	Examiner Correia dos Reis, I
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			

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EPO FORM 1503 03.82 (P04C01)



## EUROPEAN SEARCH REPORT

Application Number  
EP 08 01 1578

DOCUMENTS CONSIDERED TO BE RELEVANT				
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)	
A	US 2005/142268 A1 (SCULLION SIMON D [GB] ET AL) 30 June 2005 (2005-06-30) * figures 26-28 *	1-3		
A	US 2 182 032 A (OSCAR MULLER) 5 December 1939 (1939-12-05) * figures 1-6 *	1-3		
A	US 2 167 547 A (HOLDERLE FREDERICK W ET AL) 25 July 1939 (1939-07-25) * figure 1 *	1-3		
A	US 4 574 981 A (JEWETT HAROLD [US]) 11 March 1986 (1986-03-11) * figure 1 *	1,4		
A	DE 88 07 568 U1 (AGFA-GEVAERT AG, 5090 LEVERKUSEN, DE) 21 July 1988 (1988-07-21) * figure 1 *	1,4		
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A	JP 04 076366 A (EBARA CORP) 11 March 1992 (1992-03-11) * abstract * * figures 3,4 *	1		
A	US 3 010 293 A (NAIL LANCY E) 28 November 1961 (1961-11-28) * the whole document *	1		
A	US 1 638 402 A (LOCKER LANDO ET AL) 9 August 1927 (1927-08-09) * figure 2 *	1		
The present search report has been drawn up for all claims				
Place of search The Hague		Date of completion of the search 29 October 2008	Examiner Correia dos Reis, I	
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		

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EPO FORM 1503 03.82 (P04C01)

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

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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  
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29-10-2008

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