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(54) Title: DEVICE AND METHOD FOR DOSING COOLING MEDIUM FOR THE PURPOSE OF COOLING DRINKS

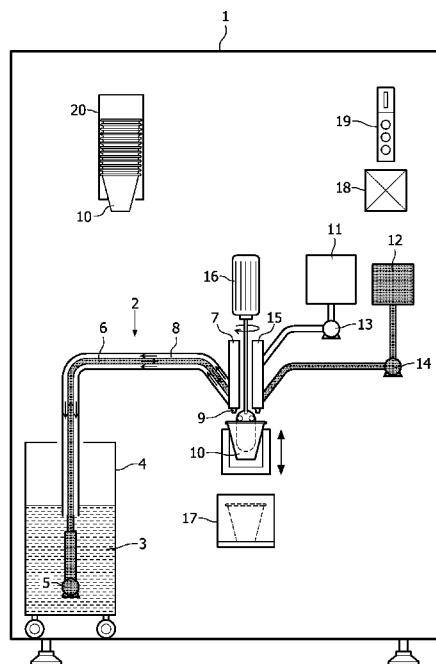


FIG. 1

(57) Abstract: The invention relates to a device for dosing a cooling medium, in particular for the purpose of cooling drinks. The device comprises at least one cooling medium supply container (4) for holding at least one liquid cooling medium with a boiling point lower than room temperature, at least one dosing element (7) connected to the cooling medium supply container via at least one supply conduit for the purpose of dosing a quantity of liquid cooling medium, in particular for cooling a drink by being mixed with the- drink, and at least return conduit (8) connected to the cooling medium supply container for cooling with substantially liquid cooling medium the supply conduit (6) provided with cooling medium.

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Device and method for dosing cooling medium for the purpose of cooling drinks

The invention relates to a device for dosing a cooling medium, in particular for the purpose of cooling drinks. The invention also relates to a dosing element for use in such a device. In addition, the invention relates to an assembly for use in a device according to the invention. The invention further relates to a method for dosing a cooling medium, in particular for the purpose of cooling drinks, making use of such a device.

Machine preparation of milkshakes generally takes place by arranging a water-comprising basic substance in a freezing cylinder. A fraction of the basic substance positioned close to the wall of the freezing cylinder will herein (partially) freeze. The actual cooled milkshake can be obtained by scraping the frozen fraction from the wall of the freezing cylinder, crushing and subsequently mixing it with the unfrozen fraction of the basic substance. The milkshake will generally also be aerated to provide the milkshake with a lighter character. Although this method is applied industrially on a large-scale in the market, this method for preparing, and in particular cooling, milkshakes has a number of drawbacks. A significant drawback of the known method is that a relatively large number of moving components, such as a scraper and breaking means for crushing the frozen fraction, are required to enable preparation of the milkshake, and this makes the preparation method relatively time-consuming. Furthermore, the equipment required to apply the known preparation method, provided with the scraper and the breaking means, is relatively complex and requires relatively frequent maintenance, and is therefore relatively expensive.

A solution to the above stated problems is described in non-published international patent application PCT/NL2008/050068. This patent application describes a device for cooling drinks, using which device a drink, such as a milkshake, can be cooled quickly and effectively by mixing the drink with a dosed quantity of liquid cryogenic cooling medium, in particular liquid nitrogen. In order to be able to prevent instantaneous freezing of the drink a vortex is applied to the drink by means of stirring while the cooling medium is being added to the drink. In addition to the method of adding the cryogenic cooling medium to the drink, the method of dosing the cooling medium before it is added to the drink for cooling also forms a critical process. Too small a quantity of the cooling medium would result in an unsatisfactory cooling of the drink.

Too large a quantity of the cooling medium would result in freezing of at least a substantial part of the drink, this also being undesirable. The dosing of the cooling medium is made more difficult in that the (cryogenic) cooling medium that is kept liquid has a boiling point below room temperature (20°C). This means that the cooling medium will tend to evaporate in the device before the cooling medium is dispensed by the device. Since the dosing generally takes place in time-controlled manner, wherein a dispensing opening is opened for a predetermined period of time, formation of gas in the device will considerably impede a precise dosing of the cooling medium.

10 The invention has for its object to provide a device enabling relatively precise dosing of cooling medium for the purpose of cooling drinks.

The invention provides for this purpose a device of the type stated in the preamble, comprising: at least one cooling medium supply container for holding at least one liquid cooling medium with a boiling point lower than room temperature, at least one dosing element connected to the cooling medium supply container via at least one supply conduit for the purpose of dosing a quantity of liquid cooling medium for cooling a drink by being mixed with the drink, and at least one cooling conduit connected to the cooling medium supply container for cooling with cooling medium the supply conduit provided with cooling medium. The cooling medium guided through the cooling conduit will generally be substantially liquid in nature, although it can also form a mixture of at least liquid cooling medium and gaseous cooling medium. Particularly during a start-up phase of the device a gas fraction will generally be present in the cooling conduit, and in the operative situation, in which cooling medium is actually dosed via the at least one dosing element, the cooling medium guided through the cooling conduit will generally be substantially or even wholly liquid to enable the cooling medium guided through the supply conduit to be held at temperature in relatively efficient manner. Not only a gaseous cooling medium will be guided through the cooling conduit in the operative situation, since the cooling capacity of a gaseous cooling medium is substantially lower, and usually too low, than in the case that an at least partially and preferably substantially liquid cooling medium is guided through the cooling conduit. By cooling the cooling medium present in the supply conduit using the cooling conduit likewise provided with cooling medium, formation of gas in the supply conduit can be prevented in relatively efficient and effective manner, which

considerably facilitates precise, in particular time-controlled, dosing of cooling medium manner for the purpose of cooling drinks and moreover makes it reproducible and therefore more reliable. The cooling of cooling medium present in the supply conduit using cooling medium present in the cooling conduit is particularly efficient because

5 only one cooling medium is required. The physical properties of the cooling medium present in the supply conduit and the cooling medium present in the cooling conduit are moreover identical, whereby sufficient cooling of the cooling medium present in the supply conduit can be realized in relatively simple manner. The cooling medium moreover comes from a single cooling medium supply container, whereby it is not

10 necessary to apply a separate supply container, whereby the device as such can be embodied with a relatively simple construction. The use of a separate cooling conduit to insulate the supply conduit relative to the atmosphere in order to prevent warming of the cooling conduit as far as possible is substantially cheaper, and therefore more efficient, than if for instance vacuum-insulated conduits were to be used. The device is

15 particularly suitable for dosing relatively cold (cryogenic) liquid cooling media with a boiling point (substantially) lower than room temperature (at atmospheric pressure), since the supply conduit is at least partly insulated by the cooling conduit, whereby evaporation of cooling medium in the supply conduit is prevented. A significant advantage of such typical cryogenic cooling media compared to non-cryogenic cooling

20 media, such as for instance cold water, is that the cryogenic cooling media have a great cooling capacity, whereby only a limited quantity of cooling medium is required to enable a rapid and effective cooling of the drink to be realized. Liquid nitrogen is preferably applied as cooling medium, since liquid nitrogen is relatively inexpensive and non-toxic. Furthermore, nitrogen need not necessarily be preserved in a pressure

25 vessel. It is possible to envisage preserving nitrogen under atmospheric pressure in the cooling medium supply container. In addition to nitrogen, it is also possible to envisage applying for instance liquified air, liquified carbon dioxide and liquid helium. It is also possible to envisage applying other types of cooling medium, generally provided however that the cooling medium is suitable for consumption by a consumer. Various

30 beverages can be cooled using the device according to the invention, including milkshakes, alcoholic (mixed) drinks, iced drinks, in particular slush puppies, fruit drinks, in particular smoothies, soft drinks, yoghurt, quark cheese, soups and water. It is however also possible to cool soft ice-cream using the device according to the invention. Soft ice-cream is therefore also deemed to be a drink within the context of

this patent publication. During the cooling of the drink the heat required for heating and evaporating the liquid cooling medium will be extracted from the drink for cooling, whereby the cooling of the drink will be realized. It is also possible here to envisage ice crystals forming in the drink, which can contribute toward the taste sensation of the cooled drink. The drink will moreover be aerated by the evaporation of the cooling medium. Depending on the nature of the drink, and particularly the viscosity of the drink, the gas bubbles will remain enclosed in the drink in relatively stable and sustained manner or be able to escape relatively quickly and easily from the drink. In addition to the use for cooling drinks, it is also possible to envisage the device according to the invention being applied in other types of application, in which dosing of particular cooling media is desired.

In a preferred embodiment the cooling conduit, or at least the cooling medium received therein, connects directly to an outer wall of the supply conduit, whereby heat absorption by the supply conduit can be prevented as far as possible, which helps to maintain the temperature of the supply conduit. The cooling conduit preferably encloses the supply conduit at least partially. The at least one cooling conduit more preferably encloses an outer wall of the supply conduit substantially all the way round. In the case that a plurality of cooling conduits are applied it is possible to envisage one cooling conduit covering a part of a peripheral wall of the supply conduit while one or more other cooling conduits cover a remaining part of the peripheral wall of the supply conduit. In this way heating of the supply conduit and the cooling medium present therein, and thereby formation of gas in the supply conduit, can be prevented as far as possible. In a particular preferred embodiment at least a part of the cooling conduit and at least a part of the supply conduit are oriented coaxially with each other, wherein an inner conduit is formed by the supply conduit and an outer conduit is formed by a cooling conduit.

The supply conduit and the cooling conduit can respectively form part of separate cooling medium circuits. In general however, it is particularly advantageous if the cooling conduit is formed by a return conduit connected to the supply conduit for the purpose of returning via the cooling conduit cooling medium guided through the supply conduit. In this way a single cooling medium circuit is used, which is applied on the one hand to enable dosage of a quantity of cooling medium for the purpose of cooling a

drink and which is applied on the other hand to cool the supply conduit so as to be able to prevent formation of gas in the supply conduit and to be able to ensure a reliable dosing of the cooling medium. The return conduit is preferably connected to the supply conduit via the dosing element. In this way a maximum length of the supply conduit can be cooled by the return conduit, which enhances the insulating action of the return conduit. The dosing element can moreover be applied here as control valve for causing return of cooling medium via the return conduit or for causing dispensing of a dosed quantity of cooling medium via a dispensing opening of the dosing element for the purpose of cooling a drink. In a particular preferred embodiment the supply conduit and the return conduit connect to a dosing compartment forming part of the dosing element. The dosing compartment is in fact formed by a collection chamber for cooling medium to which the at least one supply conduit, the at least one return conduit and the at least one dispensing opening are connected. The dosing element more preferably comprises here at least one controllable closing element for closing the dispensing opening of the supply conduit. The closing element can optionally also be adapted to be able to close the return conduit. The closing element thus functions as said control valve in the dosing element. Since a cryogenic cooling medium with a boiling point (substantially) lower than room temperature is applied, the temperature of the liquid cooling medium will generally be low. Liquid nitrogen thus has a temperature of -196°C . These relatively low temperatures are generally unsuitable for the application of an electromechanical operating element to enable operation of the closing element. It is therefore recommended that the closing element is connected to an operating element via at least one spacer for the purpose of enabling operation of the closing element at a distance from the closing element. In this way the operating element can be positioned outside the relatively cold zone of the dosing element, which will in general significantly enhance the reliability of the operation of the closing element. The spacer is here generally formed by a rod. The operating element can for instance be formed by a magnet, which magnet is adapted to co-act with a controllable electromagnet forming part of the dosing element. The parts of the dosing element situated in the cold zone, i.e. the zone which is in direct contact with the relatively cold cooling medium, are preferably manufactured at least partially from plastic, since plastic can withstand relatively low temperatures relatively well, which will enhance the reliability and the durability of the dosing element. If the relatively cold cooling medium comes into contact with moisture (water) in uncontrolled manner, instantaneous freezing of the

moisture will then generally occur, whereby ice (clump) formation will occur. Since the dispensing opening of the dosing element is generally in direct contact with the (moist) atmosphere, said effect will also occur here. The moisture condensed in the dispensing opening will freeze instantaneously if cooling medium is dispensed by the dosing
5 element via the dispensing opening. The ice formation which will hereby occur will generally result in relatively rapid blockage of the dispensing opening. It is therefore recommended that the device comprises heating means for heating the dispensing opening. In this way condensation, and therefore freezing and possible blockage of the dispensing opening, can be prevented.

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Particularly in the case that the device is temporarily not in use the supply conduit and the return conduit will warm up, whereby the cooling medium present in the supply conduit and the return conduit will at least partially evaporate. Before the device can be applied for the dispensing of a dosed quantity of cooling medium via the dosing element
15 the supply conduit will first have to be degassed by flushing the supply conduit with liquid cooling medium. The gas will herein be displaced into the dosing compartment. Since the gaseous cooling medium has a lower density than the liquid cooling medium, the gas in the dosing compartment will displace as far as possible in upward direction. It is therefore advantageous when the supply conduit connects to the dosing compartment,
20 preferably via at least one feed opening, and the return conduit connects to the dosing compartment, preferably via at least one return opening, wherein at least one return opening is located higher than the at least one feed opening. By positioning the return opening higher than the (uppermost) feed opening the gas collected in the dosing compartment can be discharged relatively efficiently via the return conduit. It is
25 otherwise possible to envisage removing the gas generated in the supply conduit from the device by means of other degassing means. The supply conduit itself and/or the dosing element can for instance be provided for this purpose with a degassing mechanism.

30

The device according to the invention preferably comprises displacing means for displacing the cooling medium from the cooling medium supply container to the dosing means. These displacing means and the driving force behind the displacement can be of very diverse nature here, this being elucidated hereinbelow. In a particular preferred embodiment the device comprises at least one pump for pumping cooling medium

through the cooling conduit. The pump, preferably a centrifugal pump, more preferably a tail pump, is adapted to pump cooling medium through the supply conduit at a predefined flow rate, this enhancing the eventual dosing of cooling medium by the dosing element. The flow rate of the pump can optionally be adjustable here. In another preferred embodiment the device comprises at least one pump for pumping cooling medium through the cooling conduit. The pump can also be formed here by a tail pump. It is otherwise possible here to envisage only a single pump being applied for the purpose of pumping cooling medium through both the supply conduit and the cooling conduit, this being particularly advantageous in the case the supply conduit and the cooling conduit connect to each other and therefore in fact form a single cooling medium circuit. It would also be possible to envisage positioning the cooling medium supply container higher than the dosing element, whereby feed of cooling medium to the dosing element could take place on the basis of gravity, which could render the use of a pump unnecessary. Feed of cooling medium to the dosing element solely on the basis of gravity will however generally make the dosing process more difficult because the flow rate through the supply conduit will generally not be (sufficiently) constant. Applying a pump and/or gravitational forces for the purpose of displacing cooling medium through the supply conduit and the cooling conduit has the further advantage that a so-called pressureless supply container can be applied, i.e. a cooling medium supply container is applied which is in open connection with an atmosphere surrounding the cooling medium supply container. The pressure in the cooling medium supply container is therefore substantially equal to the pressure of the atmosphere surrounding the cooling medium supply container. Such a cooling medium supply container is generally substantially cheaper than a pressure vessel and is moreover relatively safe because no substantial pressure can and will build up in the cooling medium supply container, whereby it will be possible to eliminate the danger of the cooling medium supply container exploding. Because cooling medium present in the cooling medium supply container will evaporate permanently, a permanent minimal overpressure will prevail in the cooling medium supply container, whereby the open cooling medium supply container has a self-cleaning capability. It has moreover been found that cooling medium can be displaced from the cooling medium supply container to the at least one dosing element in more rapid and therefore more effective manner by applying such a pressureless cooling medium supply container than if a pressure vessel were used. In addition, it has been found that filling of a pressureless vessel can take place

(significantly) more quickly than filling of a pressurized cooling medium supply container (pressure vessel).

5 In an alternative preferred embodiment the cooling medium supply container is formed by a pressure vessel, whereby flushing of the supply conduit and the cooling conduit can take place by applying one or more riser pipes arranged in the cooling medium supply container. Under the influence of the gas pressure built up in the cooling medium supply container the cooling medium will then be forced through the supply conduit and the cooling conduit via the at least one riser pipe. As stated above however, a pressure
10 vessel is relatively expensive and moreover not wholly without risk, whereby a pressureless vessel will generally be preferred to a pressure vessel.

The invention also relates to a dosing element for use in a device according to the invention, wherein the dosing element comprises a dosing compartment, which dosing
15 compartment is provided with at least one feed opening for feeding cooling medium to the dosing compartment, at least one return opening for discharging cooling medium from the dosing compartment, wherein at least one return opening is located higher than the at least one feed opening. Advantages of the dosing element and embodiment variants of the dosing element have already been described at length in the foregoing.

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In addition, the invention relates to an assembly of at least one supply conduit and at least one cooling conduit at least partially enclosing the at least one supply conduit for use in a device according to the invention. The cooling conduit is preferably formed by a return conduit for cooling medium coming from the supply conduit, whereby no
25 additional (separate) cooling circuit is required for the purpose of cooling the supply conduit by means of the cooling conduit. The supply conduit and the cooling conduit are more preferably positioned substantially coaxially with each other. In a preferred embodiment the supply conduit and the cooling conduit are mutually connected via at least one dosing element. The dosing element is preferably adapted here to at least
30 partially or optionally completely block the passage from the supply conduit to the cooling conduit. The dosing element will generally take a manipulable form here, wherein the dosing element is also adapted to leave clear the passage formed between the supply conduit and the cooling conduit in order to enable return of cooling medium. In a particular preferred embodiment the supply conduit and the cooling conduit are

manufactured at least partially from a substantially flexible material, preferably plastic, in particular Teflon®. The use of flexible materials facilitates the freedom of application of the assembly. The use of plastic is moreover advantageous because plastic is relatively inexpensive and allows great freedom in design, and in addition generally has a relatively low intrinsic heat capacity, whereby losses of cold can be prevented as far as possible. Other advantages of the assembly and embodiment variants of the assembly have already been described at length in the foregoing.

The invention further relates to a method for dosing cooling medium for the purpose of cooling drinks by making use of a device according to the invention, comprising the steps of: A) flushing the supply conduit during a first period by causing liquid cooling medium to flow through the supply conduit, and B) causing a dosed quantity of cooling medium to be dispensed by a dispensing opening forming part of the dosing element during a second period after the first period according to step A). Flushing of the supply conduit before causing a dosed quantity of cooling medium to be dispensed is relevant in order to remove a possible gas fraction from the supply conduit, whereby the subsequent dosing can take place accurately and reliably. It is recommended here to at least partially discharge, via a return conduit, cooling medium guided into the dosing element during step A), whereby the cooling medium removed from the supply conduit during flushing of the supply conduit can be efficiently reused. It is however also possible to envisage the cooling medium guided into the dosing element during step A) being at least partially discharged via the dispensing opening of the dosing element in order to enable degassing of the supply conduit. A quantity of liquid cooling medium possibly dispensed via the dispensing opening during step A) can then be received in an empty drinking cup for the purpose of brief and effective pre-cooling of this drinking cup before drink is added to the drinking cup. After filling of the drinking cup with drink a dosed quantity of cooling medium can then be supplied to the drinking cup in controlled manner via the dispensing opening. It is advantageous here that the dispensing opening is heated during step B), and more preferably also during step A), to be able to counter ice formation in the dispensing opening. The cooling medium is preferably pumped through the supply conduit during step A) and step B). Cooling medium can be supplied to the dosing element at a relatively constant flow rate (quantity per unit of time) by means of a pump, which considerably facilitates a time-controlled, precise dosing during step B).

The first period preferably amounts to between 2 and 15 seconds. This will generally be sufficient for full degassing of the supply conduit, if necessary. The second period preferably amounts to between 1 and 10 seconds. This will generally be sufficient to
5 achieve an effective and satisfactory cooling of a quantity of consumable beverage. The method, and thereby the device, are preferably controlled by a control unit, which control unit will generally be provided with one or more timers enabling at least steps A) and B) to be performed. The control unit will generally also be adapted to control the remaining part of the preparation process, such as for instance the positioning of a
10 drinking cup below the dispensing opening and arranging of a dosed quantity of drink in the drinking cup. For a further specification hereof reference is made to the international patent application PCT/NL2008/050068, the content of which is deemed included in this patent specification.

15 The invention will be elucidated on the basis of non-limitative exemplary embodiments shown in the following figures. Herein:

figure 1 shows a schematic view of a vending machine provided with a device according to the invention,

figure 2 shows a detailed cross-section of a dosing element for use in the device
20 according to figure 1, and

figures 3a-3f show views of different embodiment variants of a supply conduit and a cooling conduit for use in a device according to the invention.

Figure 1 shows a schematic view of a vending machine 1 for serving cooled milkshakes,
25 which vending machine 1 is provided with a device 2 for dosing liquid nitrogen 3 for the purpose of cooling a milkshake. Device 2 comprises for this purpose a pressureless supply container 4 partially filled with nitrogen 3. Pressureless is understood to mean that supply container 4 is in open connection with an atmosphere surrounding supply container 4. Received in supply container 4 is a tail pump 5 which is connected to a first
30 dosing element 7 via a supply conduit 6. Supply conduit 6 is coaxially enclosed by a return conduit 8 for nitrogen 3, this return conduit 8 being connected on one side to first dosing element 7 and debouching on the other side in supply container 4. Device 2 thus comprises one nitrogen circuit: liquid nitrogen 3 is pumped from supply container 4 into supply conduit 6 via tail pump 5 and subsequently guided into return conduit 8 via first

dosing element 7, after which the nitrogen 3 is fed back again into supply container 4. The purpose of applying return conduit 8 is to create a cooling insulating sheath round supply conduit 6 in order to prevent evaporation of liquid nitrogen 3 in supply conduit 6. Evaporation of liquid nitrogen 3 in supply conduit 6 would result in formation of gas in supply conduit 6, which makes dosing of a predetermined quantity of liquid nitrogen 3 by first dosing element 7 considerably more difficult. Before nitrogen 3 is dosed using first dosing element 7 the supply conduit 6 is therefore first flushed with liquid nitrogen 3 in order to enable degassing of supply conduit 6. Gas possibly flushed out of supply conduit 6 will be guided back into supply container 4 via return conduit 8. After flushing of supply conduit 6 for a period of time the first dosing element 7 will be operated to enable dispensing of a dosed quantity of nitrogen 3 to a drinking cup 10 via a dispensing opening 9. Before nitrogen 3 is added to drinking cup 10, drinking cup 10 is first partially filled with milkshake. For this purpose vending machine 1 comprises a supply container 11 for milkshakes and a supply container 12 for an additive to be added to the milkshake. Each of these supply containers 11, 12 is coupled to a pump 13, 14 for supplying respectively milkshake and additive to a second dosing element 15. Dosing element 15 is adapted to add a dosed quantity of respectively milkshake and additive to drinking cup 10. After adding of the milkshake enriched with the additive to drinking cup 10 a stirring element 16 will mix the milkshake and the additive intensively with each other, wherein the dosed quantity of nitrogen 3 will also be added to drinking cup 10 during the stirring. After cooling of the milkshake, it will be possible to remove drinking cup 10 via a delivery compartment 17. Vending machine 2 comprises a control unit 18 for, among other purposes, time-controlled operation of pumps 5, 13, 14, the two dosing elements 7, 15 and stirring element 16. Vending machine 2 further comprises a control panel 19 and a supply container 20 for drinking cups 10.

Figure 2 shows a detailed cross-section of first dosing element 7 for use in the device according to figure 1. As shown, dosing element 7 comprises a dosing compartment 21 to which supply conduit 6, return conduit 8 and dispensing opening 9 connect. A plastic valve 22 is applied to enable closure of dispensing opening 9 if desired. Valve 22 is here connected via a spacer 23 to an operating element 24, which is formed in this exemplary embodiment by a magnet. The operating element, and thereby valve 22, can be displaced by means of an electromagnet 25, whereby dispensing opening 9 can be

closed or opened. The dispensing opening is provided with a heating element 26 to prevent condensation and consequent freezing in dispensing opening 9. As shown, the inlet to return conduit 8 is situated at a higher position than the outlet of supply conduit 6. In this way gas formed by evaporated nitrogen 3 and coming from supply conduit 6 can be discharged relatively efficiently via return conduit 8.

Figures 3a-3f show views of different embodiment variants of a supply conduit and a cooling conduit for use in a device according to the invention. Figure 3a shows more particularly that a supply conduit 27 and a cooling conduit 28 can be oriented coaxially. Figure 3b shows that a cooling conduit 29 only partly covers a periphery of an outer wall 30 of a supply conduit 31. Figure 3c shows that a supply conduit 32 is enclosed by two cooling conduits 33a, 33b. Figure 3d shows that a curved supply conduit 34 is received in a cooling conduit 35, which is in fact formed in this exemplary embodiment by a cooling reservoir through which flow occurs. Figure 3e shows that a supply conduit 36 is fully enclosed by a cooling conduit 37 in longitudinal direction. Figure 3f shows that a supply conduit 38 is partially enclosed by a cooling conduit 39 in longitudinal direction. Supply conduit 38 and cooling conduit 39, more preferably formed by a return conduit connected to supply conduit 38, are preferably manufactured from a substantially flexible material, in particular plastic. A suitable plastic herein is Teflon (polytetrafluoroethylene (PTFE)). The advantage of applying a flexible assembly of supply conduit 38 and cooling conduit 39 is that this considerably facilitates the applicability of the assembly in general. At least the cooling conduit is preferably manufactured from a flexible corrugated pipe. The advantage of applying a corrugated pipe is generally that bending, and thereby blocking, of the cooling conduit can in this way be prevented.

It will be apparent that the invention is not limited to the exemplary embodiments shown and described here but that numerous variants, which will be self evident to the skilled person in this field, are possible within the scope of the appended claims.

Claims

1. Device for dosing a cooling medium, in particular for the purpose of cooling drinks, comprising:
 - 5 - at least one cooling medium supply container for holding at least one liquid cooling medium with a boiling point lower than room temperature,
 - at least one dosing element connected to the cooling medium supply container via at least one supply conduit for the purpose of dosing a quantity of liquid cooling medium, in particular for cooling a drink by being mixed with the drink,
10 and
 - at least one cooling conduit connected to the cooling medium supply container for cooling with substantially liquid cooling medium the supply conduit provided with cooling medium.
- 15 2. Device as claimed in claim 1, characterized in that the cooling conduit connects to the supply conduit.
3. Device as claimed in claim 1 or 2, characterized in that the cooling conduit at least partially encloses the supply conduit.
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4. Device as claimed in claim 3, characterized in that the cooling conduit substantially wholly encloses the supply conduit.
5. Device as claimed in claim 3 or 4, characterized in that at least a part of the
25 cooling conduit and at least a part of the supply conduit are oriented coaxially with each other.
6. Device as claimed in any of the foregoing claims, characterized in that the cooling conduit is formed by a return conduit connected to the supply conduit for the
30 purpose of returning via the cooling conduit cooling medium guided through the supply conduit.
7. Device as claimed in claim 6, characterized in that the return conduit is connected to the supply conduit via the dosing element.

8. Device as claimed in claim 7, characterized in that the supply conduit and the return conduit connect to a dosing compartment forming part of the dosing element.
- 5 9. Device as claimed in claim 8, characterized in that the supply conduit connects to the dosing compartment via at least one feed opening, and that the return conduit connects to the dosing compartment via at least one return opening, wherein at least one return opening is located higher than the at least one feed opening.
- 10 10. Device as claimed in any of the claims 7-9, characterized in that the dosing element comprises at least one dispensing opening for cooling medium connecting to the supply conduit, and that the dosing element comprises at least one controllable closing element for closing the dispensing opening of the supply conduit.
- 15 11. Device as claimed in claim 10, characterized in that the device comprises heating means for heating the dispensing opening.
12. Device as claimed in claim 10 or 11, characterized in that the closing element is connected to an operating element via at least one spacer for the purpose of enabling
20 operation of the closing element at a distance from the closing element.
13. Device as claimed in any of the foregoing claims, characterized in that the device comprises degassing means for degassing the supply conduit.
- 25 14. Device as claimed in any of the foregoing claims, characterized in that the device comprises at least one pump for pumping cooling medium through the cooling conduit.
15. Device as claimed in any of the foregoing claims, characterized in that the
30 device comprises at least one pump for pumping cooling medium through the supply conduit.
16. Device as claimed in any of the foregoing claims, characterized in that the cooling medium supply container is in open connection with the atmosphere.

17. Device as claimed in any of the foregoing claims, characterized in that the cooling medium is formed by liquid nitrogen.

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18. Dosing element for use in a device as claimed in any of the claims 1-17, characterized in that the dosing element comprises a dosing compartment, which dosing compartment is provided with at least one feed opening for feeding cooling medium to the dosing compartment, at least one return opening for discharging cooling medium
10 from the dosing compartment, wherein at least one return opening is located higher than the at least one feed opening.

19. Assembly of at least one supply conduit and at least one cooling conduit at least partially enclosing the supply conduit for use in a device as claimed in any of the claims
15 1-17.

20. Assembly as claimed in claim 19, characterized in that the cooling conduit is formed by a return conduit for cooling medium coming from the supply conduit.

20 21. Assembly as claimed in claim 19 or 20, characterized in that the supply conduit and the cooling conduit are positioned substantially coaxially with each other.

22. Assembly as claimed in any of the claims 19-21, characterized in that the supply conduit and the cooling conduit are mutually connected via at least one dosing element.

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23. Assembly as claimed in claim 22, characterized in that the dosing element is adapted to at least partially block the passage from the supply conduit to the cooling conduit.

30 24. Assembly as claimed in any of the claims 19-23, characterized in that the supply conduit and the cooling conduit are manufactured at least partially from a substantially flexible material, preferably plastic, in particular Teflon.

25. Method for dosing a cooling medium, particularly for the purpose of cooling drinks, by making use of a device as claimed in any of the claims 1-17, comprising the steps of:

- 5 A) flushing the supply conduit during a first period by causing substantially liquid cooling medium with a boiling point lower than room temperature to flow through the supply conduit, and
- B) causing a dosed quantity of cooling medium to be dispensed by a dispensing opening forming part of the dosing element during a second period after the first period according to step A).

10

26. Method as claimed in claim 25, characterized in that the substantially liquid cooling medium guided into the dosing element during step A) is at least partially discharged via a return conduit.

15 27. Method as claimed in claim 25 or 26, characterized in that the cooling medium guided into the dosing element during step A) is at least partially discharged via the dispensing opening of the dosing element.

20 28. Method as claimed in any of the claims 25-27, characterized in that the cooling medium is pumped through the supply conduit during step A) and step B).

29. Method as claimed in any of the claims 25-28, characterized in that the dispensing opening is heated at least during step B).

25 30. Method as claimed in any of the claims 25-29, characterized in that the first period amounts to between 2 and 15 seconds.

31. Method as claimed in any of the claims 25-30, characterized in that the second period amounts to between 1 and 10 seconds.

1/3

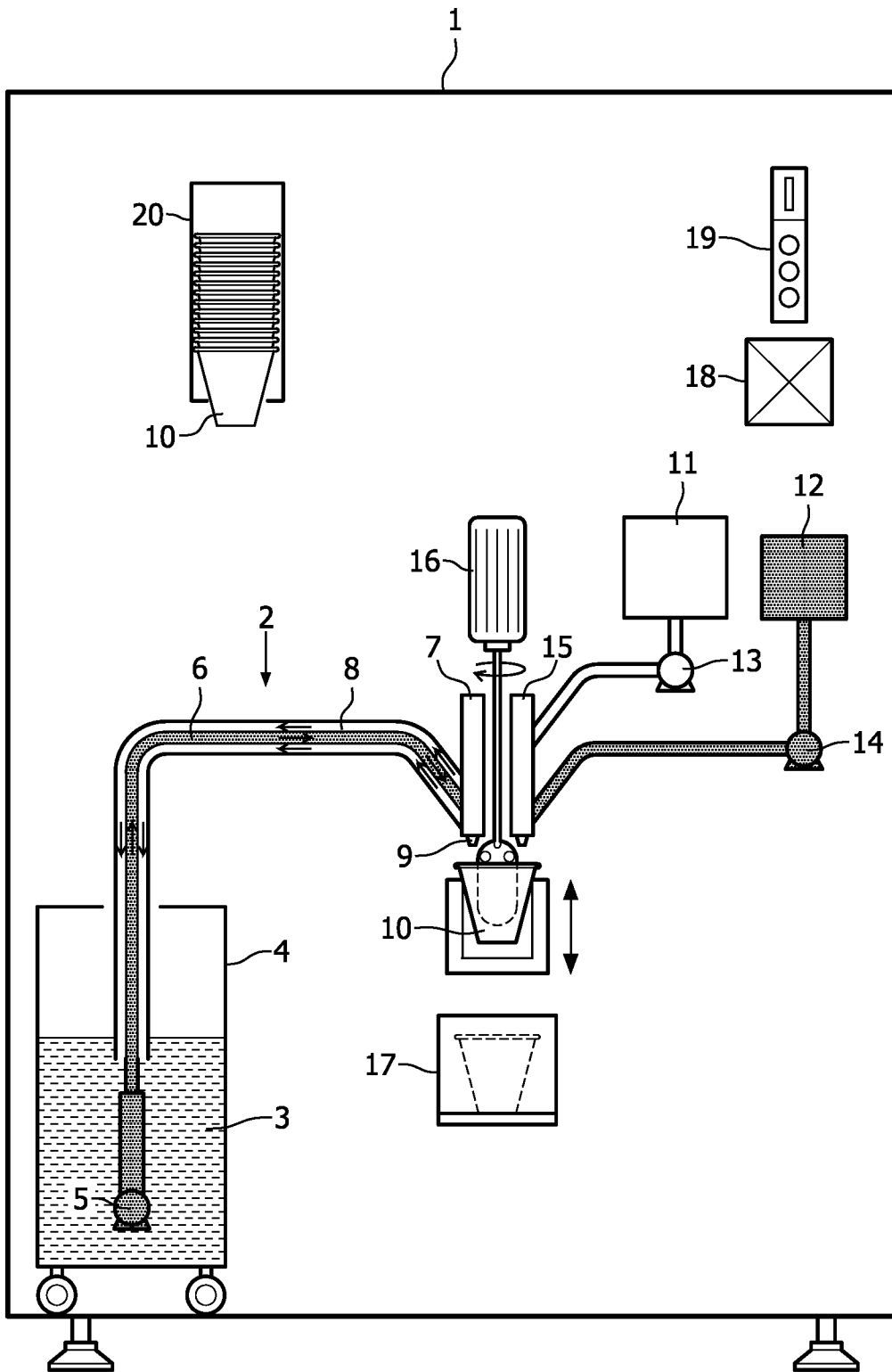


FIG. 1

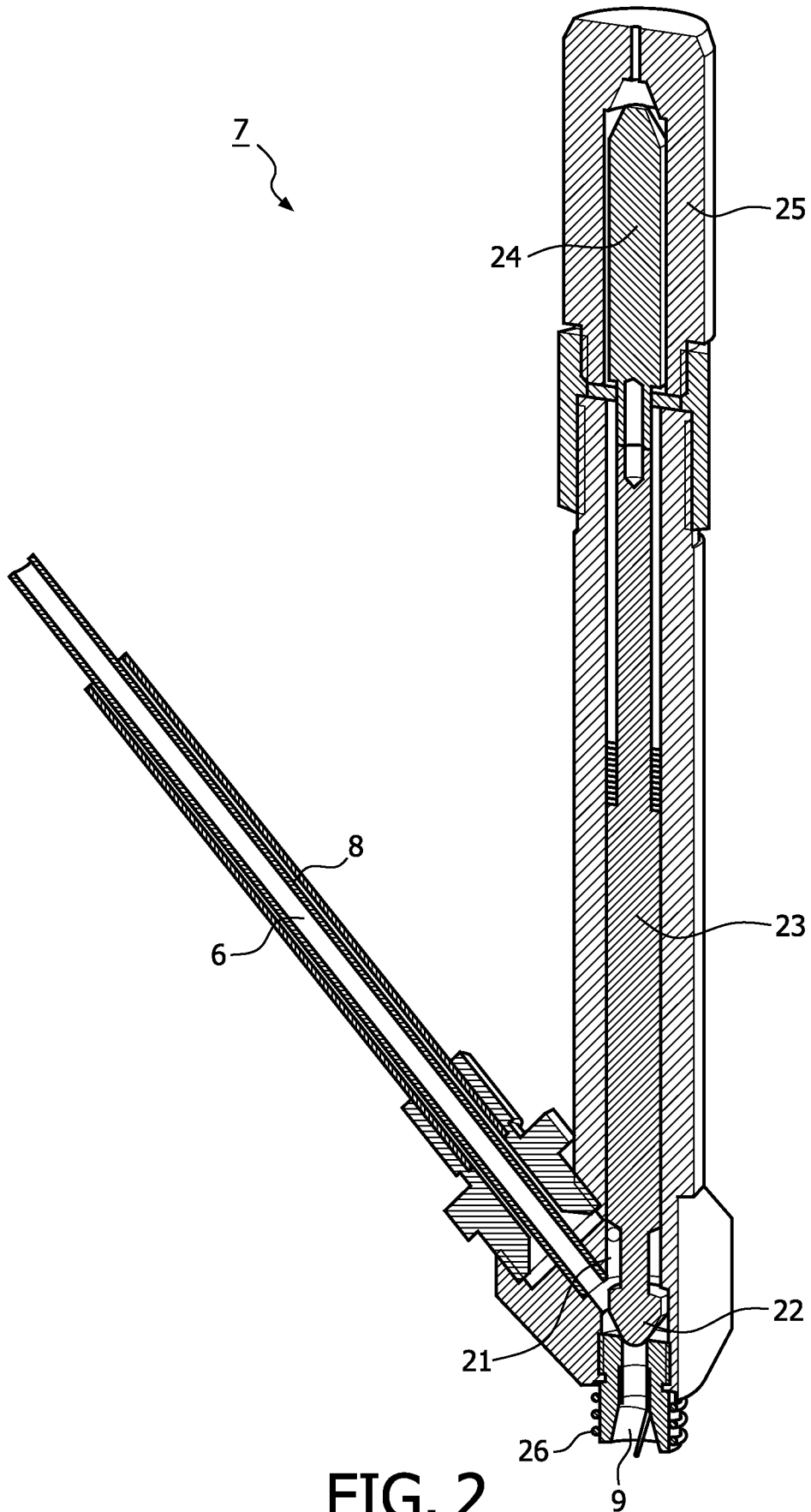


FIG. 2

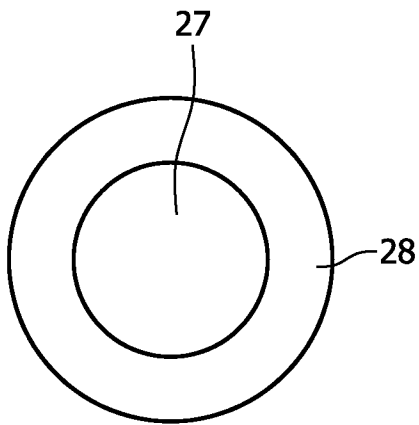


FIG. 3A

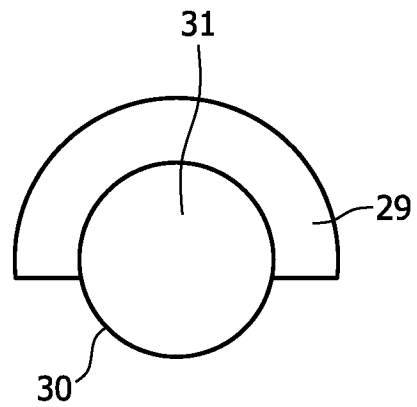


FIG. 3B

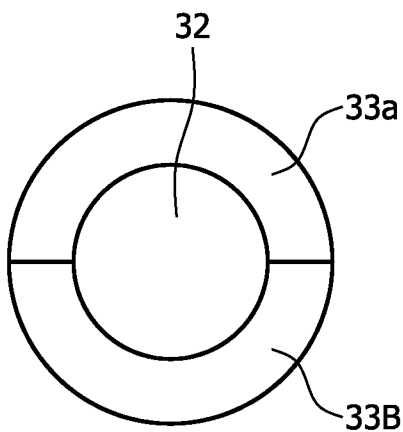


FIG. 3C

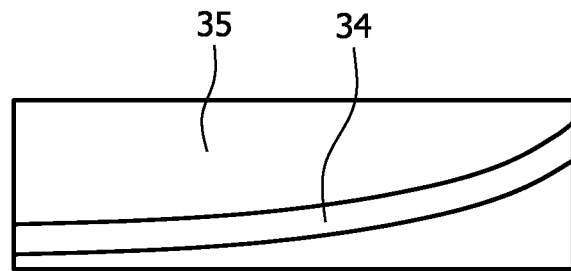


FIG. 3D

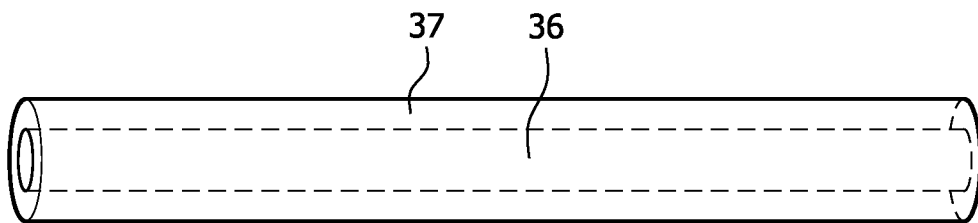


FIG. 3E

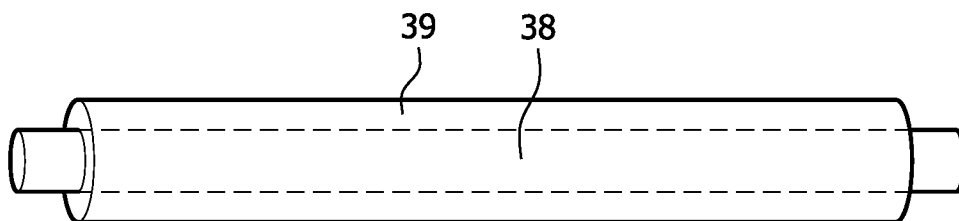


FIG. 3F

INTERNATIONAL SEARCH REPORT

International application No
PCT/NL2009/050472

A. CLASSIFICATION OF SUBJECT MATTER

INV. F25D3/10 F25D31/00 A23G9/06 F17C9/04 F16K21/00

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)
F25D F25C A23G F17C

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 practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 638 697 A (REZNIKOV LEV [US] ET AL) 17 June 1997 (1997-06-17) abstract; figures 1,2 column 2, line 28 - column 3, line 46	1-31
A	US 3 068 105 A (MORRISON WILLARD L) 11 December 1962 (1962-12-11) abstract; figures 1,2	1-31

Further documents are listed in the continuation of Box C.

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.

Z document member of the same patent family

Date of the actual completion of the international search

27 October 2009

Date of mailing of the international search report

05/11/2009

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Authorized officer

Yousufi, Stefanie

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/NL2009/050472

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5638697	A	17-06-1997	NONE
US 3068105	A	11-12-1962	NONE