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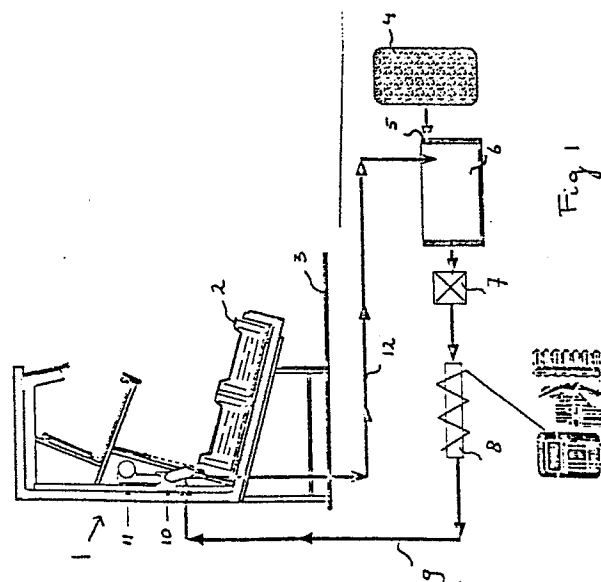
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54 **Apparatus and process for preserving a fresh product.**

57 An apparatus for the conditioning of a fresh product (2), provided with means of liquid passage communicating with a heat exchanger (8) which is connected to a liquid discharge pipe (9), in such a fashion that the liquid supplied through the means of liquid passage, the heat exchanger (8) and the discharge pipe (9) can, at least partly, be precipitated onto the fresh product (2), whilst the apparatus also comprises means of liquid discharge (12) which can pass off at least a part of the non-precipitated liquid to the means of liquid passage.



APPARATUS AND PROCESS FOR THE CONDITIONING OF A FRESH PRODUCT

The invention relates to an apparatus for the conditioning of a fresh product, such as vegetables, fruit, meat and flowers. The invention also relates to a process for the conditioning of such fresh products.

An apparatus of this type is known from the Netherlands patent application NL 79.00875. This known apparatus, which has been designed as a refrigerated display case, presents a solution for the problem that the fresh products arranged in the display case are desiccated very fast, because the air contained within the display case is extremely dry through cooling. Desiccation of the affected fresh products has subsequent negative effects on their freshness. The aforesaid patent application proposes to provide the refrigerating cabinet described therein with a steam generator which moistens the air present in the cabinet. This steam generator brings the water required for moistening into the gaseous phase, so that the water can readily be introduced into the circulating air or inside the cabinet. There the steam can be mixed with and thus moisten the air inside the cabinet. If required, fans or similar means may be present to facilitate transport of the steam.

A disadvantage of the known apparatus is that in actual practice the reduction of the desiccation effect of cooling on fresh products, which reduction results from moistening so as to enhance the relative humidity of air cooled by a refrigerating unit, is insufficient with this apparatus. A further drawback appears to be that, inasmuch as the water in the gaseous phase has a lower specific gravity than the ambient air, the water in this known apparatus does not adequately precipitate on fresh products, which results in unsatisfactory conditioning of fresh products.

An object of the present invention is to provide an apparatus for effective conditioning of a fresh product, which permits a far greater reduction of the desiccation effect of cooling on fresh products.

With this object in view, an apparatus according to the invention is characterized in that it is provided with means of liquid passage communicating with a heat exchanger which is connected to a liquid discharge pipe and that the liquid supplied through the means of passage, the heat exchanger and the discharge pipe can, at least partly, be precipitated onto the fresh product, whilst the apparatus also comprises means of liquid discharge which can pass off at least a part of the non-precipitated liquid to the means of liquid passage. The liquid cooled by the heat exchanger, for instance water, having a temperature below ambient, is preferably precipitated in the form of a

vapour through the liquid outlet disposed above the fresh product. This cold vapour will subsequently deposit on the fresh product by virtue of its high specific gravity. Evaporation of the cold vapour will cause heat to be abstracted from the fresh product which is thereby cooled. In the apparatus according to the invention, therefore, the water vapour is employed not for mixing with cooled air, but for moistening of the fresh product and, in consequence, for its conditioning. The said means of liquid passage may, for instance, comprise a liquid filter and/or pump. Since at least a part of the non-precipitated liquid is passed off to the means of liquid passage, such liquid can be re-used for cooling and moistening the fresh product after having passed through the heat exchanger and the liquid outlet. An advantage accruing from the use of non-precipitated liquid is that the apparatus according to the invention does not require a continuous supply of liquid from an outside source. In consequence, the apparatus according to the invention consumes little energy, because liquid that is passed through again does not need to be thoroughly cooled afresh. An additional advantage is gained when the apparatus according to the invention includes a filter, in that liquid that is passed through again does not need renewed complete filtration. A further advantage is also that conditioned fresh products have a highly attractive appearance when precipitated moisture is present on them, for instance in the form of dew.

United States Patent No. 2 625 806 discloses a counter for the display and preservation of, for example, vegetables in which cooled water mixed with cold air is sprinkled over the vegetables. An apparatus according to the said U.S. patent has the drawback that it attempts in a very complex and hence expensive fashion to ensure that a sufficient quantity of cooled water is distributed over the vegetables. When too much cooled water is delivered to the liquid outlet, which in actual practice is by no means inconceivable having regard to the use of nozzles in particular, the apparatus according to the U.S. Patent offers no solution to the problem how to dispose of the excess cooled water in an energetically efficient manner. When such an excess of cooled water is distributed over the vegetables, their conditioning may be adversely affected. In addition, bacterial formation and growth of algae may thereby be induced in the counter of an apparatus according to the said U.S. Patent. Besides, such an apparatus is not provided with a filter, so that means of liquid passage tend to clog especially through mineral salts originating from, for instance, town water. Furthermore such an ap-

paratus is customer-unfriendly inasmuch as the nozzles produce a great deal of noise in operation and the excess of cold water distributed may be a nuisance to customers.

The invention will now be elucidated further with reference to the accompanying drawings, in which

Figure 1 is a simplified diagram of an apparatus according to the invention;

Figure 2 depicts part of the front elevation of the apparatus represented in Figure 1.

The drawing of Figure 1 shows a display case 1 in which vegetable and fruit boxes 2 have been arranged. The whole is set up on a floor 3. A filter 4 which has been connected to the normal town water supply system purges the mains water delivered of any undesirable matter contained therein such as minerals, scale and the like. This filter 4 is connected to a water vessel 6 comprising a liquid level controller, for instance a float 5, so that there is no need for a continuous supply of town water from the mains system. The water vessel 6 is in its turn connected through a pump 7 to a heat exchanger 8 which cools the water supplied down to a temperature of 2 or 3°C. The cold water can then be passed through a supply line 9 to an ultrasonic diaphragm 10 which atomizes at least a part of the cold water to ultrafine particles by means of sound waves converted into vibrations. The resultant cold vapour is ejected right over the boxes 2 and will, because of its high specific gravity, subsequently precipitate on the products disposed in the boxes 2. Owing to the evaporation process of the cold vapour, heat is abstracted from the products which are thereby cooled. Furthermore, the display case 1 comprised a centrifugal fan 11 intended to eject the vapour over the entire length of case 1. A discharge line 12 connected to the shell of the diaphragm 10 permits the cooling water which has not been ejected through the diaphragm to be recycled to the water vessel 6. It is to be noted that the filter 4 may be positioned either ahead of the heat exchanger 8, as represented in Figure 1, or after the heat exchanger. The filter 4 is intended especially to prevent clogging of the diaphragm 10 by mineral salts present in mains water. It will be clear that the apparatus according to the invention can be employed both as self-contained conditioning aggregate and in all types of refrigerating cabinets, display cases, refrigerating shelves and the like.

Figure 2 shows part of the front elevation of the display case 1 represented in Figure 1. Here, the ultrasonic diaphragm 10 is connected to lines 13 which are provided with discharge openings 14 and which extend over the entire length of the display case 1.

Claims

1. An apparatus for the conditioning of a fresh product, characterized in that this apparatus is provided with means of liquid passage communicating with a heat exchanger which is connected to a liquid discharge pipe and that the liquid supplied through the means of liquid passage, the heat exchanger and the discharge pipe can, at least partly, be precipitated onto the fresh product, whilst the apparatus also comprises means of liquid discharge which can pass off at least a part of the non-precipitated liquid to the means of liquid passage.

2. An apparatus according to claim 1, characterized in that the means of liquid passage comprise a liquid filter.

3. An apparatus according to claim 1 or 2, characterized in that the means of liquid passage comprise a liquid pump.

4. An apparatus according to claim 1 or 2, characterized in that a liquid vessel with a liquid level controller has been interposed between the liquid filter and the liquid pump.

5. An apparatus according to any one of claims 1-4, characterized in that the liquid discharge pipe comprises a liquid-vibration member.

6. An apparatus according to claim 5, characterized in that the vibration member is connected to lines provided with liquid discharge openings which extend over a space intended to accommodate the fresh product.

7. A process for the conditioning of a fresh product, characterized in that a liquid is first pumped to a heat exchanger, where this liquid is cooled and then via a liquid discharge pipe precipitated at least partly over the fresh product, whilst at least a part of the non-precipitated liquid is recycled to the heat exchanger.

8. A process according to claim 7, characterized in that the liquid is filtered either before or after cooling in the heat exchanger.

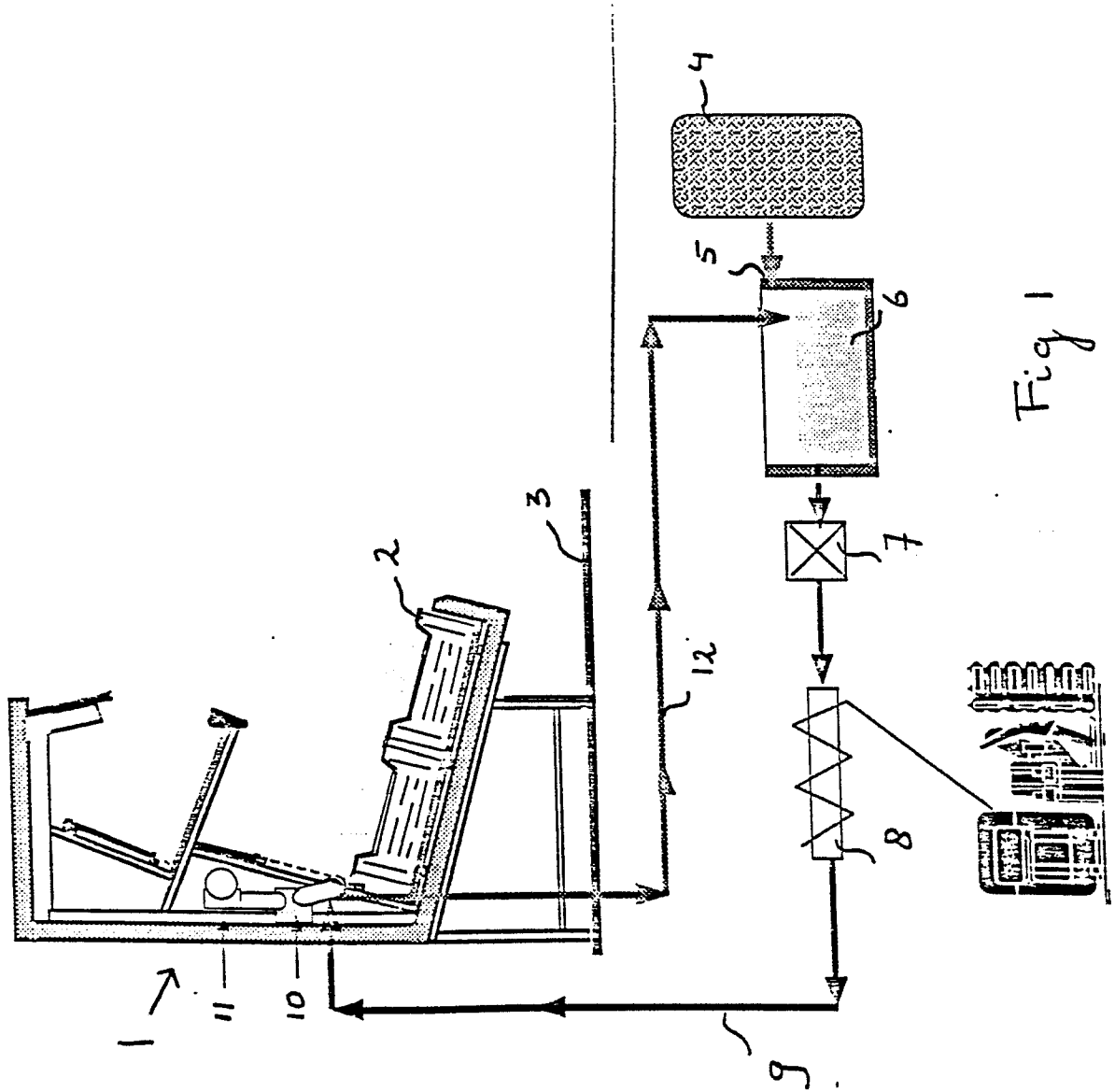


Fig 1

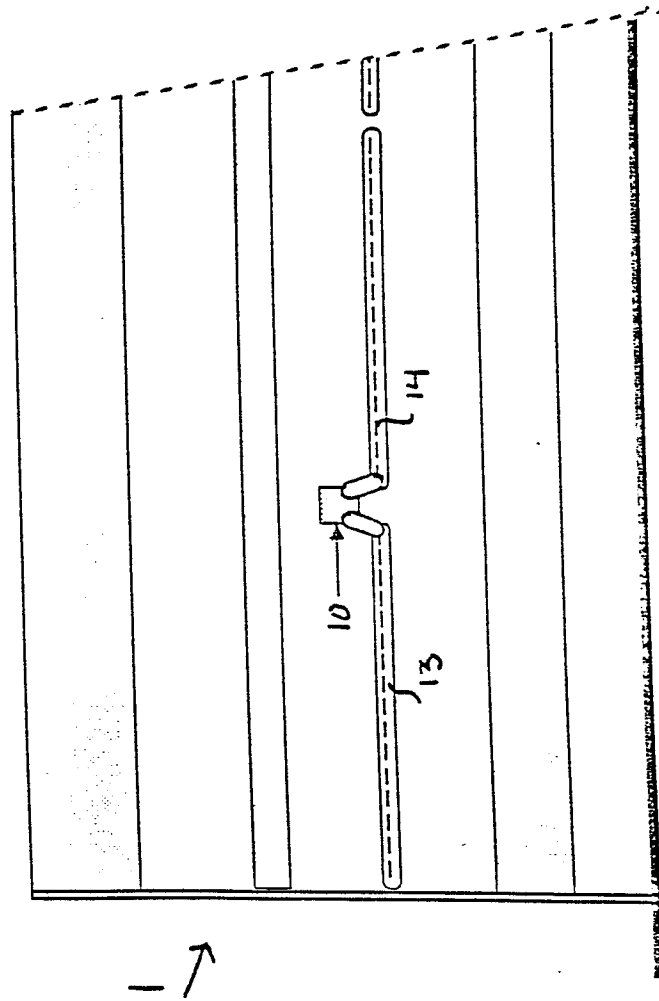


Fig 2



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 4)
A	FR-A-2 415 986 (ERWIN PEUKERT OHG) * Page 3, line 11 - page 6, line 12; figures 2-9 * & NL-A-7 900 139 ---	1-4,7,8	A 47 F 3/04
D,A	US-A-2 625 806 (G.C. KENNEDY) * Column 1, line 55 - column 3, line 27; figures 1-3 * ---	1,7	
A	FR-A-2 125 205 (SAREC) * Page 2, line 4 - page 3, line 40; figure * ---	1-3,7,8	
A	US-A-1 995 729 (M.T. ZAROTSCHEFFE) * Page 2, left-hand column, line 68 - page 3, left-hand column, line 30; figures 1,2 * ---	1-3,7,8	
A	US-E- 19 973 (H.L. FORMAN) * Page 1, right-hand column, line 18 - page 3, left-hand column, line 54; figures 1-4 * ---	1-3,7,8	
A	US-A-2 077 021 (R.L. SITES) * Page 1, right-hand column, line 7 - page 2, right-hand column, line 59; figure * ---	1,3,4,7	TECHNICAL FIELDS SEARCHED (Int. Cl.4) A 47 F F 25 D F 24 F
A	GB-A-2 119 501 (I. MASAHIKO) * Page 1, line 119 - page 4, line 43; figures 1-6 * ---	1,3,7	
A	US-A-3 606 159 (G.P. SUTTON) * Column 2, line 61 - column 5, line 3; figures 1-8 * ---	1,7	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 07-07-1988	Examiner BOETS A.F.J.
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			



DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	US-A-4 630 451 (D. KISHIMOTO) * Column 2, line 49 - column 6, line 17; figures 1-10 *	1,5-7	
A	DE-A-2 922 971 (ALLGEMEINE KÜHLMÖBELBAU GmbH) * Page 8, line 18 - page 10, line 23; figures 1-3 *	4-6	
A	DE-A-3 313 399 (K. LEUPRECHT) * Page 7, line 10 - page 9, line 21; figures 1-3 *	5,6	
A	US-A-2 263 194 (W.P. SHEPHERD)		
A	GB-A- 333 722 (J.A. BIRDSOING et al.)		
A	DE-C- 23 083 (TH. WINTER)		
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
Place of search THE HAGUE		Date of completion of the search 07-07-1988	Examiner BOETS A.F.J.
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			