

Cooling device and method for cooling a medium

The present invention relates to a cooling apparatus for cooling a medium.

5 Such cooling apparatuses are used, in particular, in production plants in order to efficiently remove heat arising in production processes to the surroundings. For example, it can be provided for a cooling apparatus to use river water from a river adjoining the production plant to effect cooling. Particularly in summer, when there is a great need for cooling, it is usually possible to transfer only a small quantity of heat to
10 the river water because of legal requirements. This can result in production engineering and economic difficulties.

It is an object of the present invention to provide a cooling apparatus by means of which a large quantity of heat can be removed efficiently.

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This object is achieved according to the invention by a cooling apparatus for cooling a medium, which comprises the following:

an evaporation apparatus for evaporating water;

a vacuum apparatus for generating a subatmospheric pressure in an evaporation space
20 of the evaporation apparatus;

a loading apparatus which comprises a loading space which is fluidically connected to the evaporation space of the evaporation apparatus and is at least partly filled with an absorption medium for absorbing the evaporated water;

an unloading apparatus by means of which the water absorbed by the absorption
25 medium can be removed from the absorption medium and released into surroundings of the cooling apparatus.

For the purposes of the present invention, absorption of water by means of the absorption medium is, in particular, a physical and/or chemical reaction of the water with
30 the absorption medium. The reaction is, in particular, reversible. For example, it can be

provided for the water to be absorbed, taken up, adsorbed by the absorption medium and/or be incorporated into the absorption medium.

5 The absorption medium is preferably a constituent of a thermochemical store by means of which surplus heat can be utilized not only for providing heat but also for covering and/or buffering a cooling requirement.

10 The cooling apparatus preferably comprises an open cooling circuit in which cooling water is not only utilized perceptibly by effecting a temperature increase but also by evaporation. In this way, at the same refrigeration requirement, the amount of cooling water necessary can preferably be reduced significantly, for example by up to a factor of 60.

15 During the absorption and/or release of water by the absorption medium, preference is given to heat being released or heat being absorbed. The absorption of water is thus preferably exothermic or endothermic. Correspondingly, the release of water is preferably endothermic or exothermic.

20 It can be advantageous for the unloading apparatus to comprise an unloading space in which the water absorbed by the absorption medium can be removed from the absorption medium, with the unloading space preferably being spatially separated from the loading space of the loading apparatus.

25 It can be advantageous for the unloading space to have a higher pressure than the loading space during cooling operation of the cooling apparatus.

The unloading space is preferably fluidically connected to surroundings of the cooling apparatus. The unloading space preferably has, at least approximately, the pressure of the surroundings, in particular atmospheric pressure.

The absorption medium preferably comes into direct contact with unloaded hot air in the unloading space in order to remove the water from the absorption medium. The unloaded hot air then preferably carries the water removed from the absorption medium into the surroundings of the cooling apparatus.

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Instead of direct contact between the unloaded hot air and the absorption medium, it is also possible for indirect heat transfer to be provided. Here, the water removed from the absorption medium preferably collects in vapor form in a space which can be opened, for example, by means of a valve, to release the water into the surroundings.

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It can be advantageous for the cooling apparatus to comprise a transport apparatus for transporting the absorption medium from the loading space to the unloading space.

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As an alternative or in addition, the cooling apparatus can comprise a transport apparatus for transporting the absorption medium from the unloading space to the loading space.

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In particular, it can be provided for the cooling apparatus to comprise a transport apparatus by means of which the absorption medium can be transported both from the loading space to the unloading space and from the unloading space to the loading space.

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It can be provided for the cooling apparatus to comprise at least one lock device through which the absorption medium can be transported from a subatmospheric pressure side of the cooling apparatus, to which the evaporation space and/or the loading space is assigned, to a high-pressure side of the cooling apparatus, to which the unloading space is assigned.

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In the present description and the accompanying claims, a subatmospheric pressure is, in particular, a pressure below ambient pressure/atmospheric pressure, for example not

more than about 500 mbar, in particular not more than about 100 mbar, preferably not more than about 50 mbar.

In the present description and the accompanying claims, the term “high pressure” refers
5 to, in particular, a pressure which corresponds essentially to or is above ambient pressure and/or atmospheric pressure.

In one embodiment of the invention, the cooling apparatus can comprise at least one
lock device through which the absorption medium can be transported from a high-
10 pressure side of the cooling apparatus, to which the unloading space is assigned, to a subatmospheric pressure side of the cooling apparatus, to which the evaporation space and/or the loading space is assigned.

In particular, the cooling apparatus can comprise a transport apparatus for transporting
15 the absorption medium in a closed circuit. The absorption medium can in this case preferably be transported from the loading space to the unloading space and, in particular along a separate route, back to the loading space, etc.

It can be advantageous for the cooling apparatus to comprise a water feed apparatus
20 for feeding liquid water to the evaporation apparatus.

The cooling apparatus preferably comprises at least one heat exchanger by means of which heat can be transferred from a medium to be cooled to the evaporation
apparatus, in particular to the water to be evaporated in the evaporation apparatus.

25 The absorption medium is preferably a liquid or a solid. In particular, it can be provided for the absorption medium to be free-flowing. The absorption medium can, for example, be a bulk material and/or a powder.

In one embodiment of the invention, the absorption medium can comprise salt, aqueous salt solution, silica gel, minerals, hydroxide, ionic liquid and/or zeolite or be formed by salt, aqueous salt solution, silica gel, minerals, hydroxide, ionic liquid and/or zeolite.

- 5 It can be advantageous for the cooling apparatus to comprise at least one degassing apparatus for degassing the water to be fed to the evaporation apparatus and/or at least one degassing apparatus for degassing the absorption medium to be loaded with water.

10 The vacuum apparatus for generating the subatmospheric pressure in the evaporation space of the evaporation apparatus can, for example, be formed by a transport apparatus for transporting the absorption medium.

15 The cooling apparatus preferably comprises at least one heat exchanger by means of which heat can be transferred from an external heat source to the absorption medium arranged in an unloading space.

The cooling apparatus, in particular the unloading apparatus, comprises, in particular, at least one flushing apparatus for flushing the unloading space with a flushing medium. The flushing medium is, for example, dry hot air which can be passed through the
20 unloading space of the unloading apparatus.

The absorption medium is preferably heated in the unloading space by means of the flushing medium and/or by means of an external heat source, as a result of which the water is preferably removed from the absorption medium. The water is, in particular,
25 released in gaseous or vapor form and removed by means of the flushing medium from the unloading space.

The cooling apparatus of the invention is particularly suitable for carrying out a method for cooling a medium.

The present invention therefore also provides a method for cooling a medium by means of a cooling apparatus.

In this respect, the present invention has the object of providing a method by means of which a medium can be cooled efficiently and using a very small amount of cooling medium, in particular water.

This object is achieved according to the invention by a method for cooling a medium by means of a cooling apparatus, wherein the method comprises the following:

application of subatmospheric pressure to an evaporation space of an evaporation apparatus;

introduction of liquid water into the evaporation space;

evaporation of the water in the evaporation space;

introduction of the evaporated water from the evaporation space into a loading space of a loading apparatus which is fluidically connected to the evaporation space and is at least partly filled with an absorption medium for absorbing the evaporated water;

absorption of the evaporated water by means of the absorption medium;

removal of the water absorbed by the absorption medium from the absorption medium and release of the water into surroundings of the cooling apparatus.

The method according to the invention preferably has one or more of the features and/or advantages described in connection with the cooling apparatus of the invention.

Furthermore, the cooling apparatus of the invention preferably has individual features and/or advantages or a plurality of features and/or advantages of the method according to the invention.

The release of the water into the surroundings is preferably effected in gaseous or vapor form.

It can be advantageous for the absorption medium to be taken from the loading space after absorption of the water and introduced into an unloading space of an unloading apparatus of the cooling apparatus.

5 In order to remove the water absorbed by the absorption medium from the absorption medium, the absorption medium is preferably heated to a temperature which exceeds the temperature of the medium to be cooled by means of the cooling apparatus before cooling of the medium.

10 The water introduced into the evaporation apparatus preferably has a temperature of not more than about 25°C, in particular not more than about 20°C, for example not more than about 15°C.

To remove the water from the absorption medium, the absorption medium is preferably
15 heated to a temperature of at least about 80°C, for example at least about 90°C, preferably at least about 100°C.

It can be advantageous for the absorption medium to be cooled after removal of the water absorbed by the absorption medium from the absorption medium and/or before
20 introduction of the absorption medium into the loading space.

Furthermore, the cooling apparatus of the invention and/or the method according to the invention can have one or more of the features and/or advantages described below:

25 The water can preferably be evaporated under subatmospheric pressure, for example at about 10°C, by means of the cooling apparatus.

The main cooling effect of the cooling apparatus is preferably achieved by evaporation of the water under subatmospheric pressure.

The absorption medium (reaction medium), which is, in particular, circulated, is preferably partly conveyed under subatmospheric pressure and partly under ambient pressure (high pressure).

- 5 The cooling apparatus of the invention can, in particular, be utilized when cooling is actually not available in another way, for example when conventional heat pumps fail.

Particularly when the absorption medium is circulated and, for example, is cooled before being introduced into the loading space, continuous operation of the cooling apparatus
10 can be possible.

The cooling water used for cooling is preferably not merely heated perceptibly but evaporates. In conventional, customary heating by 10 K, the quantity of heat which can be taken up is about 41 kJ/kg. The quantity of heat which can be taken up by
15 evaporation is, on the other hand, about 2503 kJ/kg. According to the invention, the cooling potential of the water used can thus be increased by a factor of about 60. The cooling water requirement thus decreases drastically at a given cooling power.

It is preferably not necessary for the cooling water to be fed back into a river after heat
20 has been taken up since it has preferably been released in gaseous or vapor form into the surroundings.

The absorption medium preferably makes it possible for the time at which the waste heat is utilized, in particular for unloading the absorption medium, to be decoupled from
25 the time at which the cooling function takes place, in particular during loading of the absorption medium.

Particularly when the absorption medium can be transported, it is possible to use an inexpensive reactor (loading space) which is, in particular, optimized for the required
30 cooling power (evaporator power). A large storage apparatus for accommodating the absorption medium can then preferably be dispensed with.

Preference is given to using industrial waste heat, for example at a temperature level of about 100°C, for unloading the absorption medium.

- 5 The absorption medium preferably has a high affinity for water. In particular, the absorption medium is preferably strongly hygroscopic.

The water is preferably introduced in liquid form into the cooling apparatus and released in gaseous and/or vapor form from the cooling apparatus into the surroundings.

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The cooling apparatus of the invention is particularly suitable for cooling industrial processes, for providing a predetermined cooling power and/or to supplement existing cooling apparatuses to cover peak loads.

- 15 Further preferred features and/or advantages of the invention are indicated in the following description and the depiction of a working example.

The drawings show:

fig. 1 a schematic depiction of a cooling apparatus in which liquid water is evaporated under subatmospheric pressure and released in vapor and/or gaseous form into
5 surroundings of the cooling apparatus.

Identical or functionally equivalent elements are denoted by the same reference numerals in the figure.

10 A cooling apparatus which is shown in fig. 1 and is denoted as a whole by 100 serves, in particular, for cooling a medium which is, for example, fed into a heat exchanger 102.

The cooling apparatus 100 comprises an evaporation apparatus 104 for evaporating water and a water feed apparatus 106 by means of which liquid water can be introduced
15 into the evaporation apparatus 104.

Furthermore, the cooling apparatus 100 comprises a vacuum apparatus 108 by means of which a subatmospheric pressure can be applied to a subatmospheric pressure side
20 110 of the cooling apparatus 100.

In particular, a subatmospheric pressure, i.e. a pressure below ambient pressure or atmospheric pressure, for example about 100 mbar, can be generated in an evaporation space 112 of the evaporation apparatus 104 by means of the vacuum apparatus 108.

25 Owing to the subatmospheric pressure in the evaporation space 112, the liquid water fed to the evaporation apparatus 104, in particular the evaporation space 112, can be evaporated even at relatively low temperatures.

The cooling apparatus 100 further comprises a loading apparatus 114 which comprises
30 a loading space 116.

The loading space 116 is at least partly filled with an absorption medium. The evaporated water can, in particular, be absorbed by means of the absorption medium.

5 The loading space 116 and the evaporation space 112 are for this purpose fluidically connected to one another, so that the water evaporated in the evaporation space 112 can go into the loading space 116.

10 The absorption medium can, after the absorption of water, be discharged from the loading space 116 and introduced into an unloading space 120 of an unloading apparatus 122 by means of one or two transport apparatuses 118 of the cooling apparatus 100.

15 In particular, the water can be removed from the absorption medium by means of the unloading apparatus 122.

A transport apparatus 118 arranged downstream of the loading space 116 in a transport direction 124 preferably forms a lock device 126 by means of which the absorption medium initially present on the subatmospheric pressure side 110 of the cooling apparatus 100, i.e. in the subatmospheric pressure region, can be transported to a high-
20 pressure side 128 of the cooling apparatus 100, i.e. at least approximately ambient pressure.

25 The unloading apparatus 122 is arranged on this high-pressure side 128 of the cooling apparatus 100 so that, for example, the ambient pressure prevails in the unloading space 120 of the unloading apparatus 122 and the water which has been absorbed by the absorption medium can be removed at ambient pressure from the absorption medium.

30 The unloading space 120 of the unloading apparatus 122 is coupled to a heat exchanger 130 of the cooling apparatus 100.

By means of the heat exchanger 130, heat from an external heat source 132 can be transferred to the absorption medium located in the unloading space 120.

5 The absorption medium can, in particular, be heated to a high temperature, for example up to about 100°C.

The unloading space 120 is open to surroundings 134 of the cooling apparatus 100 so that water given off from the absorption medium can escape into the surroundings 134.

10 The cooling apparatus 100 further comprises a flushing apparatus 136 by means of which a flushing medium, for example dry hot air, can be introduced into the unloading space 120.

15 The unloading space 120 and the absorption medium present therein can thus be flushed particularly simply by means of the flushing apparatus 136, firstly in order to heat the absorption medium and secondly to discharge the water given off from the absorption medium from the unloading space 120 and finally release it into the surroundings 134.

20 To optimize the function of the cooling apparatus 100, one or more degassing apparatuses 138 of the cooling apparatus 100 are additionally provided. In particular, the liquid water to be fed to the evaporation apparatus 104 can be degassed by means of these degassing apparatuses 138. Furthermore, the absorption medium to be introduced into the loading space 116 can be degassed by means of a degassing
25 apparatus 138.

The transition from the high-pressure side 128 to the subatmospheric pressure side 110 of the cooling apparatus 100 can, in particular, be realized by means of throttle valves 140 of the cooling apparatus 100.

In particular, a desired subatmospheric pressure on the subatmospheric pressure side 110, in particular in the evaporation space 112 and/or in the loading space 116, can be achieved in a targeted manner by means of the throttle valves 140.

5 Finally, the loading apparatus 114 preferably additionally comprises an extraction apparatus 142. A gas, in particular inert gas, which during operation of the cooling apparatus 100 accumulates in the loading space 116 can preferably be discharged from the loading space 116 by means of the extraction apparatus 142.

10 In the cooling apparatus 100, a closed absorption medium circuit 144 is firstly formed. The absorption medium circuit 144 comprises the loading space 116, the transport apparatus 118, the unloading space 120, a degassing apparatus 138, a throttle valve 140 and a further transport apparatus 118.

15 In the absorption medium circuit 144, the absorption medium can thus be fed from the loading space 116 through the lock device 126 into the unloading space 120. The unloaded medium can subsequently be fed from the unloading space 120 through the degassing apparatus 138 and the throttle valve 140 and through the lock device 126 back into the loading space 116.

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The cooling apparatus 100 further comprises a water transport section 146.

The water transport section 146 comprises a throttle valve 140, the water feed apparatus 106, a degassing apparatus 138, the evaporation space 112, the loading
 25 space 116, a transport apparatus 118, the unloading space 120 and finally the surroundings 134.

By means of the water transport section 146, the initially liquid water can firstly be fed through the throttle valve 140 and via the water feed apparatus 106 into the evaporation
 30 space 112 and be evaporated therein. The evaporated water can be fed into the loading space 116 and absorbed there by means of the absorption medium.

The absorbed water can be fed together with the absorption medium via the transport apparatus 118 and thus through the lock device 126 into the unloading space 120, there be removed from the absorption medium and finally be released, in particular together
5 with a flushing medium, into the surroundings 134.

The water transport section 146 is thus not closed. Rather, the initially liquid water can be fed to the cooling apparatus 100 and be released in gaseous or vapor form into the surroundings 134.

10 The above-described cooling apparatus 100 functions as follows:

a medium to be cooled by means of the cooling apparatus 100 is fed into a heat exchanger 102 which is thermally coupled to the evaporation apparatus 104.

15 In order to withdraw heat from the medium to be cooled, water is evaporated in the evaporation apparatus 104.

The initially liquid water is for this purpose conveyed through the throttle valve 140 and
20 via the water feed apparatus 106 into the evaporation space 112.

A subatmospheric pressure preferably prevails in the evaporation space 112 so that the water evaporates even at very low temperatures and thus takes up heat.

25 In particular, the evaporating water withdraws heat from the medium to be cooled.

The water which is now present in vapor or gaseous form next goes into the loading space 116 in which it comes into contact with a strongly hygroscopic absorption medium and is absorbed by the absorption medium.

30 The absorption medium is, in particular, a salt or an aqueous salt solution.

The absorption medium loaded with water is subsequently discharged from the loading space 116. In particular, the absorption medium loaded with water is taken by means of the transport apparatus 118 from the loading space 116 and fed into the unloading space 120 of the cooling apparatus 100.

The absorption medium here passes through the lock device 126 and is thus conveyed from the subatmospheric pressure side 110 of the cooling apparatus to the high-pressure side 128 of the cooling apparatus 100.

In particular, ambient pressure, for example atmospheric pressure, prevails on this high-pressure side 128.

In the unloading space 120, the absorption medium loaded with water is heated by introduction of heat in order to remove the water absorbed in the absorption medium from the absorption medium.

Owing to the relatively high pressure, namely ambient pressure, which now prevails, a relatively high temperature of, for example, about 100°C is required to remove the water in gaseous or vapor form from the absorption medium and finally release it into the surroundings 134 of the cooling apparatus 100.

This high temperature is achieved, in particular, by transfer of heat from an external heat source 132 to the absorption medium and/or by introduction of dry hot air into the unloading space 120 by means of the flushing apparatus 136.

After the water has been at least partly removed from the absorption medium, the absorption medium can be reused for the absorption of water.

The absorption medium is for this purpose fed, in particular, through a further throttle valve 140 and a further lock device 126 back into the loading space 116.

In order to reduce the temperature of the absorption medium which has been heated in the unloading space 120 and thus increase the efficiency of the cooling apparatus 100, the absorption medium can be cooled by means of a cooling device (not shown) before
5 being introduced into the loading space 116.

The absorption medium is then able, in particular, to be conveyed in a continuous circuit, namely the absorption medium circuit 144.

10 The cooling apparatus 100 can then be, in particular, operated continuously.

When the cooling apparatus 100 is looked at overall, it can thus be seen that liquid water is evaporated in order to cool a medium to be cooled.

15 Unlike the temperature level in conventional evaporation plants, the medium to be cooled can be cooled to very low temperatures of, for example, from about 10°C to about 15°C. The amount of water required for this is very small because of the evaporation of the water. In addition, recirculation of heated water to a water source can be avoided because of the evaporation of the water.

List of reference numerals

	100	Cooling apparatus
	102	Heat exchanger
5	104	Evaporation apparatus
	106	Water feed apparatus
	108	Vacuum apparatus
	110	Subatmospheric pressure side
	112	Evaporation space
10	114	Loading apparatus
	116	Loading space
	118	Transport apparatus
	120	Unloading space
	122	Unloading apparatus
15	124	Transport direction
	126	Lock device
	128	High-pressure side
	130	Heat exchanger
	132	External heat source
20	134	Surroundings
	136	Flushing apparatus
	138	Degassing apparatus
	140	Throttle valve
	142	Extraction apparatus
25	144	Absorption medium circuit
	146	Water transport section

Claims

1. A cooling apparatus (100) for cooling a medium, which comprises:

- an evaporation apparatus (104) for evaporating water;
- a vacuum apparatus (108) for generating a subatmospheric pressure in an evaporation space (112) of the evaporation apparatus (104);
- a loading apparatus (114) which comprises a loading space (116) which is fluidically connected to the evaporation space (112) of the evaporation apparatus (104) and is at least partly filled with an absorption medium for absorbing the evaporated water;
- an unloading apparatus (122) by means of which the water absorbed by the absorption medium can be removed from the absorption medium and released into surroundings (134) of the cooling apparatus (100).

2. The cooling apparatus (100) as claimed in claim 1, characterized in that the unloading apparatus (122) comprises an unloading space (120) in which the water absorbed by the absorption medium can be removed from the absorption medium, where the unloading space (120) is spatially separated from the loading space (116) of the loading apparatus (114).

3. The cooling apparatus (100) as claimed in claim 2, characterized in that the unloading space (120) has a higher pressure than the loading space (116) during cooling operation of the cooling apparatus (100).

4. The cooling apparatus (100) as claimed in either claim 2 or 3, characterized in that the cooling apparatus (100) comprises a transport apparatus (118) for transporting the absorption medium from the loading space (116) to the unloading space (120) and/or from the unloading space (120) to the loading space (116).

5. The cooling apparatus (100) as claimed in claim 4, characterized in that the cooling apparatus (100) comprises at least one lock device (126) through which the absorption medium can be transported from a subatmospheric pressure side (110) of the cooling apparatus (100), to which the evaporation space (112) and/or the loading space (116) is assigned, to a high-pressure side (128) of the cooling apparatus (100), to which the unloading space (120) is assigned.
6. The cooling apparatus (100) as claimed in either claim 4 or 5, characterized in that the cooling apparatus (100) comprises at least one lock device (126) through which the absorption medium can be transported from a high-pressure side (128) of the cooling apparatus (100), to which the unloading space (120) is assigned, to a subatmospheric pressure side (110) of the cooling apparatus (100), to which the evaporation space (112) and/or the loading space (116) is assigned.
7. The cooling apparatus (100) as claimed in any of claims 2 to 6, characterized in that the cooling apparatus (100) comprises a transport apparatus (118) for transporting the absorption medium in a closed circuit (144).
8. The cooling apparatus (100) as claimed in any of claims 1 to 7, characterized in that the cooling apparatus (100) comprises a water feed apparatus (106) for feeding liquid water to the evaporation apparatus (104).
9. The cooling apparatus (100) as claimed in any of claims 1 to 8, characterized in that the cooling apparatus (100) comprises at least one heat exchanger (102) by means of which heat can be transferred from a medium to be cooled to the evaporation apparatus (104), in particular to the water to be evaporated in the evaporation apparatus (104).
10. The cooling apparatus (100) as claimed in any of claims 1 to 9, characterized in that the absorption medium comprises salt, aqueous salt solution, silica gel,

minerals, hydroxide, ionic liquid and/or zeolite or is formed by salt, aqueous salt solution, silica gel, minerals, hydroxide, ionic liquid and/or zeolite.

- 5 11. The cooling apparatus (100) as claimed in any of claims 1 to 10, characterized in that the cooling apparatus (100) comprises at least one degassing apparatus (138) for degassing the water to be fed to the evaporation apparatus (104) and/or at least one degassing apparatus (138) for degassing the absorption medium to be loaded with water.
- 10 12. The cooling apparatus (100) as claimed in any of claims 1 to 11, characterized in that the vacuum apparatus (108) for generating the subatmospheric pressure in the evaporation space (112) of the evaporation apparatus (104) is formed by a transport device (118) for transporting the absorption medium.
- 15 13. The cooling apparatus (100) as claimed in any of claims 1 to 12, characterized in that the cooling apparatus (100) comprises at least one heat exchanger (130) by means of which heat can be transferred from an external heat source (132) to the absorption medium arranged in an unloading space (120).
- 20 14. A method for cooling a medium by means of a cooling apparatus (100), which comprises:
- application of subatmospheric pressure to an evaporation space (112) of an evaporation apparatus (104);
 - introduction of liquid water into the evaporation space (112);
 - 25 - evaporation of the water in the evaporation space (112);
 - introduction of the evaporated water from the evaporation space (112) into a loading space (116) of a loading apparatus (114) which is fluidically connected to the evaporation space (112) and is at least partly filled with an absorption medium for absorbing the evaporated water;
 - 30 - absorption of the evaporated water by means of the absorption medium;

- removal of the water absorbed by the absorption medium from the absorption medium and release of the water into surroundings (134) of the cooling apparatus (100).

- 5 15. The method as claimed in claim 14, characterized in that the absorption medium is, after absorption of the water, taken from the loading space (116) and introduced into an unloading space (120) of an unloading apparatus (122) of the cooling apparatus (100).
- 10 16. The method as claimed in either claim 14 or 15, characterized in that in order to remove the water absorbed by the absorption medium from the absorption medium, the absorption medium is heated to a temperature which exceeds the temperature of the medium to be cooled by means of the cooling apparatus (100) before the medium has been cooled.
- 15 17. The method as claimed in any of claims 14 to 16, characterized in that the absorption medium is cooled after removal of the water absorbed by the absorption medium from the absorption medium and/or before introduction of the absorption medium into the loading space (116).