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COOLING DEVICE, IN PARTICULAR FREEZER

Description

[0001] The invention relates to a cooling apparatus according to the preamble of patent claim 1.

[0002] A cooling apparatus is known from AU 61026 80 A, in which for defrosting purposes a hot cooling fluid is conducted from a compressor to an evaporator and heated in addition.

[0003] A cooling apparatus for frozen goods is known from WO 2006/130886. The known cooling apparatus has a control device provided for defrosting, which interacts with a refrigerant circuit such that during defrosting both the evaporator and a drainage channel provided for receiving the defrosting water are heated up. The drainage channel is arranged beneath the evaporator.

[0004] The invention addresses the problem of designing a cooling apparatus of the type initially mentioned such that the defrosting is improved.

[0005] The invention solves the problem on the basis of the fact that the cooling apparatus has the evaporator pipes arranged vertically in respect of one another and that a drainage channel for capturing defrosting and/or condensed water is provided, wherein the lowest evaporator pipe is arranged substantially at the same height as the channel. An electric heating device in the drainage channel is connected to a control device, wherein the control device is assigned to a control program which defines a defrost cycle.

[0006] According to the invention, the efficiency of the defrosting process is increased and a comparatively low energy consumption is achieved.

[0007] Further advantageous embodiments of the invention are defined in the dependent claims.

[0008] In the figures the subject matter of the invention is described on the basis of two exemplary embodiments.

[0009] The figures show the following

Fig. 1 shows an open lateral view of a part of a first chest freezer,

Fig. 2 shows an enlarged partial view of the channel according to Fig. 1,

Fig. 3 shows a lateral view of the pan part of the inner casing of the chest freezer,

Fig. 4 shows a detached top view of the drain of the pan part according to Fig. 3,

Fig. 5 shows an open lateral view according to V-V of Fig. 4 and

Fig. 6 shows an open lateral view of a part of a second chest freezer.

[0010] The partially shown first chest freezer 1 by way of example according to Fig. 1 has a casing 2. The casing 2 consists substantially of a multiple part inner casing 3 and an outer casing 4, between which foam 5 is inserted.
The inner casing 3 consists of a deep drawn pan including a drainage channel 12, several metal sheets, which connect to the channel 12, which are designed to be plug-in and overlap. The inner casing is designed to be trough-shaped and forms a cooling chamber 6 for products that are to be cooled, not shown in greater detail. For the purpose of access to the cooling chamber 6, the casing 2 forms a casing opening 7 that is accessible from above, which is sealed with a cap not shown in greater detail.

[0011] A device 8 is provided for applying cold to the cooling chamber 6, which by means of a part of the side wall 3' of the inner casing 3 applies temperature to the cooling chamber 6.

[0012] To this purpose the device 8 has an evaporator 9, which is integrated in a refrigerant circuit not shown in greater detail with a condenser 10 and a compressor 11.

The drainage channel 12 is provided in the area of the side walls 3' of the inner casing 3, said drainage channel which drains defrosting water in the thawing of ice formations on the inner casing 3. This channel 12 proceeds along the cooled side walls 3' of the inner casing 3, wherein by means of the device 8 all side walls 3' of the inner casing 3 are partially cooled, so that the channel 12 circumferential in design. The inclination of the channel 12 is selected such that the captured water is conducted to a drain 14, as shown in Figure 3.

[0013] In order to ensure a special stability of the chest freezer 1, provision is made that the multiple part inner casing 3 has a one-piece pan part 15, wherein the pan part 15 also forms the channel 12. The channel 12 is therefore a part of the one-piece pan part 15, as a result of which protruding edges and with them, any leaks, even in the event of comparatively great temperature differences, are avoided. For this reason, in accordance with the invention, even in the case of a chest freezer 1 for deep freezing, a rapid thawing is carried out, because comparatively high heat outputs (in the range of about 75 watts and a maximum compressor capacity in the defrost cycle of up to about 750 watts) can be applied to the side walls 3, which, for example, consist of aluminum sheets with patterned finish. Moreover, such a structural assembly of a pan is comparatively easy to manufacture by means of a deep drawing or injection molding, so that the chest freezer can be manufactured comparatively cost-effectively.

[0014] The drain 14 extends at least partially vis-à-vis the flow diameter S1 of the channel 12. The flow diameter S2 of the drain 14 is therefore greater than the flow diameter S1 of

the channel 12. Moreover, the drain 14 is formed by the one-piece pan part 15. A hose 16 is inserted into the drain 14 in order to further drain the defrosting water 13.

[0015] The device 8 is designed on the one hand, to cool the cooling chamber 6 and on the other hand, to thaw the side wall of the inner casing, in which the refrigerant circuit is reversed in its direction. Thus, from a design standpoint, the evaporator 9 can be used to easily cool the cooling chamber 6 on the one hand, and also to thaw the side walls of the inner casing 3 on the other hand.

[0016] The parts of the side walls of the inner casing 3 to which temperature is applied by the device 8 are substantially arranged above the channel 12, in order to essentially be able to receive the defrosting water 13 in its entirety, as illustrated in Figure 2.
However, one of several evaporator pipes 9, in particular the lowest evaporator pipe, is substantially arranged at the same height as the channel 12.

[0017] In simplified construction, the previously described inner casing parts 17 of the inner casing 3 connect to the channel 12 of the pan part 14. This is made possible in simple manner by attaching a u-shaped bracket 19 of the inner casing part 17 on the outbound channel end 18.

[0018] With the aid of evaporator pipes 9 circling the cooling chamber, the device 8 applies a predefined temperature to the cooling chamber 6. These evaporator pipes 9 are arranged vertically in respect of one another and arranged contiguously on the side walls of the inner casing 3; condenser hoses 10 of the device 8 are provided on the outer casing 4.

[0019] Simple design relationships arise when, for positioning the first (here: lowest) evaporator pipe 9, at least one lateral metal sheet 17 adjoining the pan part 15 has an

attachment 20, into which the lowest evaporator pipe 9 is inserted.

[0020] Furthermore, the channel 12 has an electric (auxiliary) heating device 21, with which for thawing purposes the channel 12 or any captured water 13 is drained in a heated state, as a result of which a potential ice formation is also prevented. The lowest evaporator pipe 9 is arranged substantially at the same height as the channel 12, in which in turn, the electric heating device 21 is arranged.
Hence, the lowest evaporator pipe 9, the channel 12 and the electric heating device 21 are located substantially at the same (height) as the cooling apparatus. Advantageously, in addition to the heat, which is generated from the evaporator (here: lowest evaporator pipe 9), heat is also generated from the heating device 21.

[0021] The electric heating device 21 can be activated and deactivated manually or automatically.

[0022] For the purpose of this automatic activation and deactivation of the heating device 21 (hereinafter: "RH"), the cooling apparatus has an electric control device not shown in the figures, which is connected to the compressor 11 and the heating device 21.

[0023] This electric control device can also be connected to a magnetic closing valve. The closing valve, which is described for example in the Austrian utility model AT 008 789 U1, lies in a bypass pipe, parallel to the condenser and throttle. After opening the closing valve, hot refrigerant gas compressed by the compressor is used immediately to heat the evaporator.

[0024] The electric control device is assigned to a control program, which defines a defrost cycle, which is for example equipped as follows and comprises the following work phases:

1. Normal operation (cooling operation)
Speed of the compressor (11, hereinafter: "K"): speed as required or by control behavior, e.g. between 2000 and 4000 rpm
2. Pre-heating period (0 to 99 minutes)
magnetic valve (hereinafter: "MV"): off
RH: on
K: off
3. Defrost safety period (0 to 99 minutes)
MV: on
RH: on
K: on (e.g. 90 % of the maximum speed)
4. Standstill period: (fixed period)
MV: off
RH: on
K: off (speed: 0 rpm)
5. Post-heating period (time: 0 to 99 minutes, beginning of the cooling operation)
MV: off
RH: on
K: on (speed: e.g. maximum speed)

[0025] Subsequently, the compressor 11 is first kept at maximum speed and then switched back to normal operation (work phase 1).

[0026] The chest freezer 1' represented according to Fig. 6 differs from the chest freezer 1 according to Fig. 1 in that, in comparison to this, the pan part 15 is further hoisted to be able to connect to a frame 22. The frame 22 likewise is sometimes used as a side wall 3' of the inner casing 3, wherein the frame 22 additionally has ducts 23 for a cap 24 of the chest freezer 1' and is attached to the pan part 15. For the latter purpose, the frame 22 forms an insert groove 25, into which the pan part 15 protrudes.

List of References

[0027]

1, 1'	Chest freezer
2	Casing
3	Inner casing
3'	Side wall
4	Outer casing
5	Foam
6	Cooling chamber
7	Casing opening
8	Device
9	Evaporator
10	Condenser
11	Compressor
12	Channel
13	Defrosting water
14	Drain
15	Pan part
16	Hose
17	Inner casing parts
18	Channel end
19	Bracket
20	Attachment
21	Electric heating device
22	Frame
23	Ducts
24	Cap
25	Insert groove

Patentkrav

1. Køleapparat, specielt en fryseboks med et indvendigt hus (3) og et kølekammer (6) til produkter, der skal køles, med mindst en anordning (8) til påføring af temperatur i kølekammeret (6), hvori, mindst delvist ved hjælp af mindst én sidevæg (3') af det indvendige hus (3), anordningen (8) påfører en temperatur i kølekammeret (6) ved hjælp af fordamperrør (9) fra et kølekredsløb, der omkranser kølekammeret (6), hvori fordamperrørene (9) er arrangeret lodret i forhold til hinanden, med en kanal (12) til opfangning af afrimnings- og/eller kondensationsvand (13), hvori det nederste fordamperrør (9) er arrangeret hovedsageligt i samme højde som kanalen (12), og hvori en elektrisk varmeanordning (21) er arrangeret i kanalen (12), **kendetegnet ved, at** den elektriske varmeanordning (21) er forbundet med en kontrolanordning, og **at** nævnte kontrolanordning er tildelt et kontrolprogram, der definerer en afrimningscyklus, der omfatter arbejdsfaser i forhold til en kølefunktion af køleapparatet, en forvarmningsperiode, en afrimningssikkerhedsperiode, en stilstandsperiode og en efteropvarmningsperiode.

2. Køleapparatet i henhold til krav 1, **kendetegnet ved, at** kontrolprogrammet er designet, så en kompressor (11) kontrolleres.

3. Køleapparatet i henhold til krav 2, **kendetegnet ved, at** kontrolprogrammet er designet, så der kontrolleres en ventil, der er arrangeret i et omløbsrør, parallelt med en kondensator (10) og en drosselventil i køleapparatet.

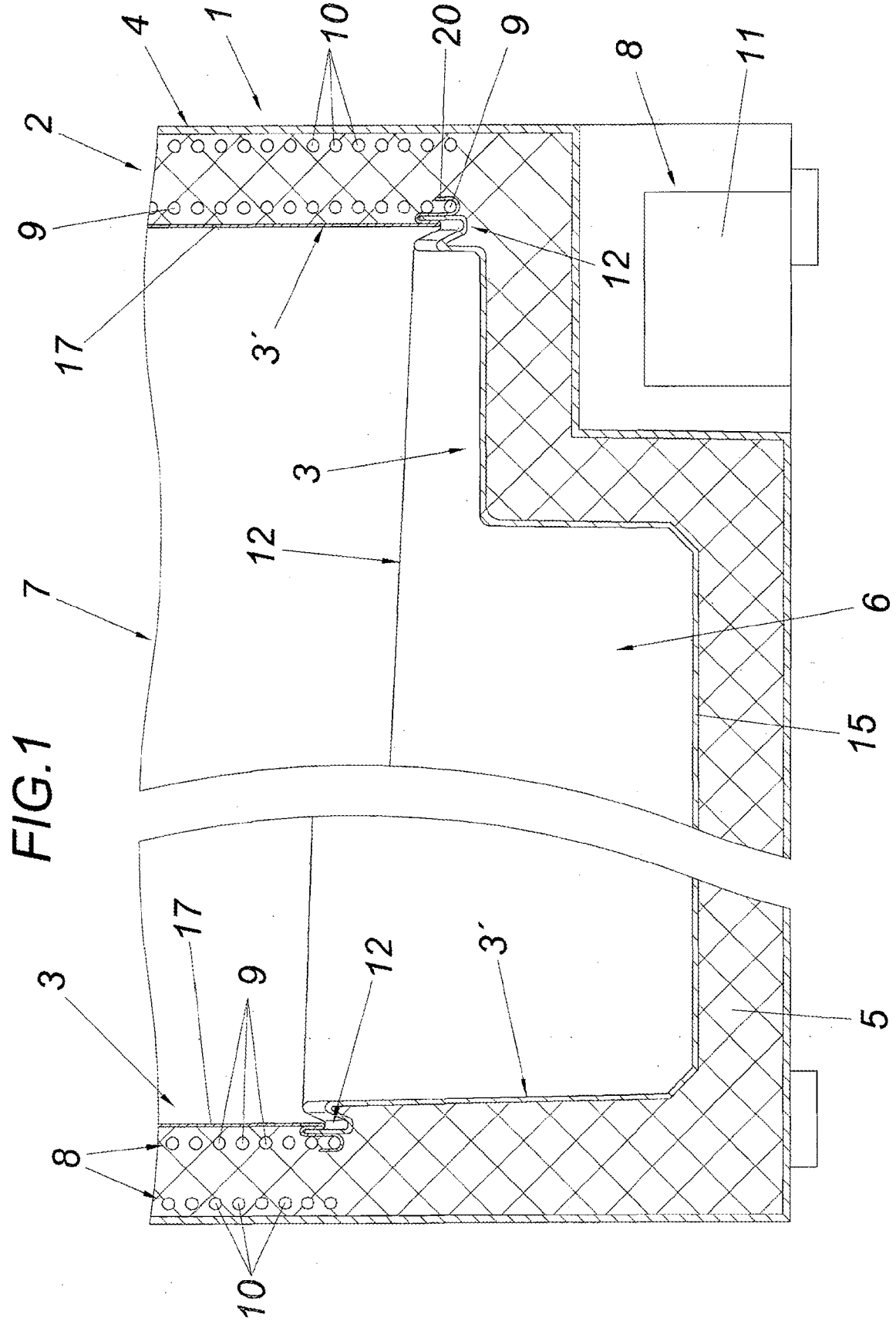

FIG.1

FIG.2

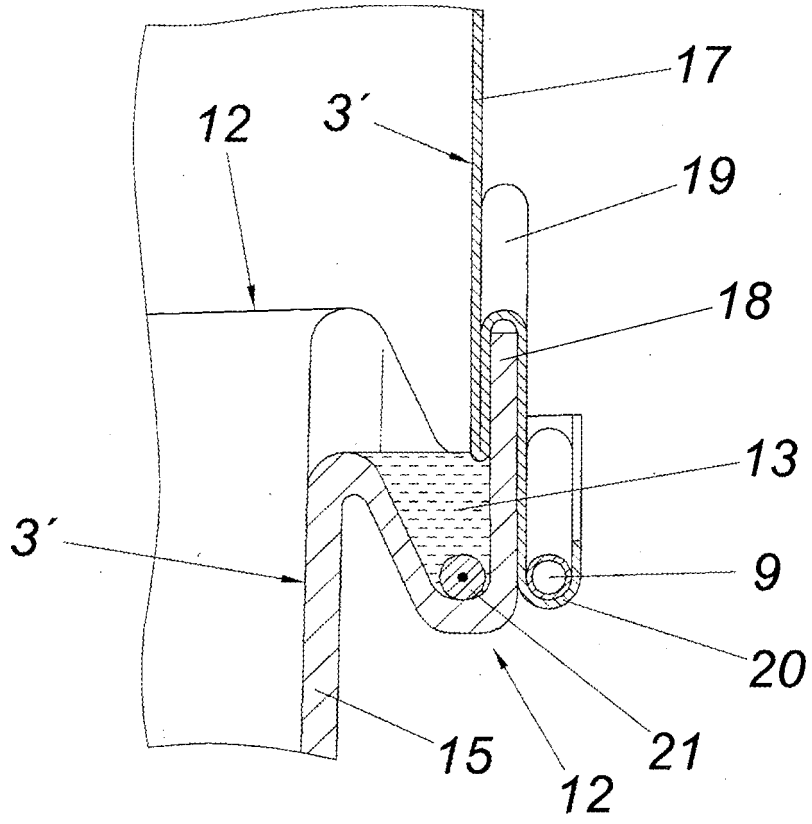

FIG.3

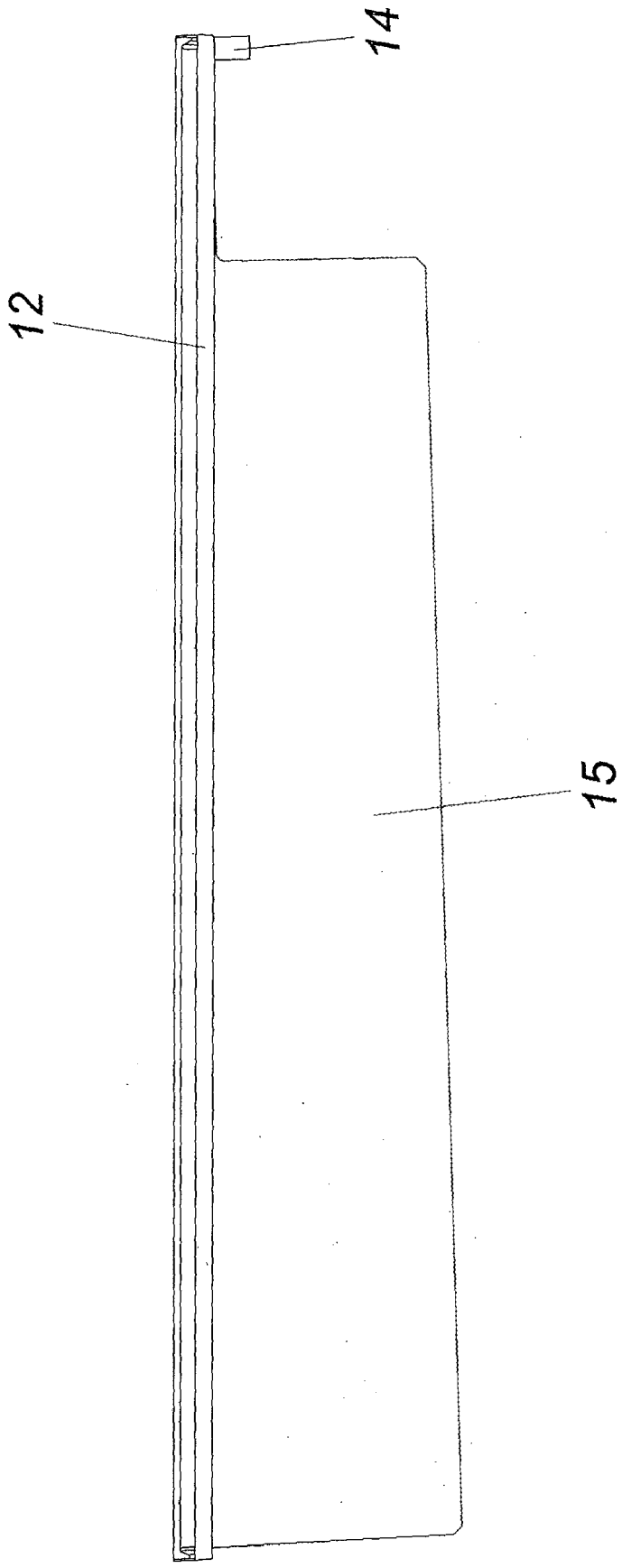

FIG.4

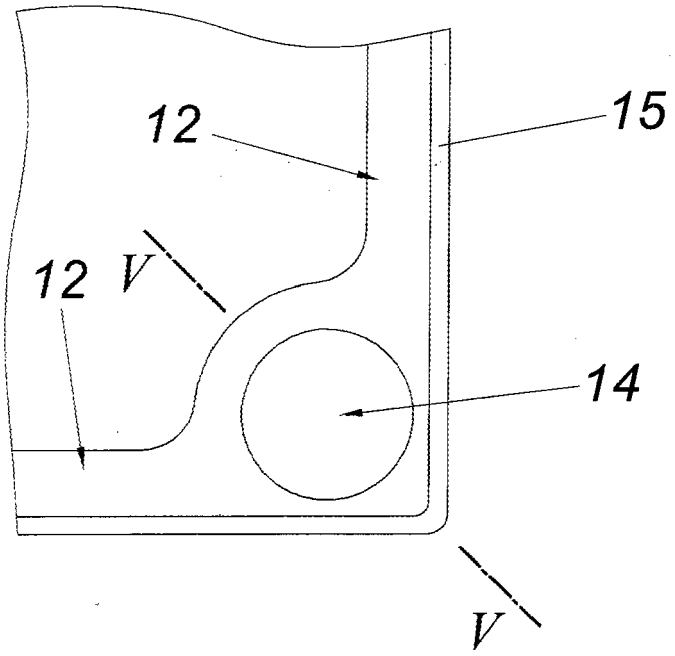

FIG.5

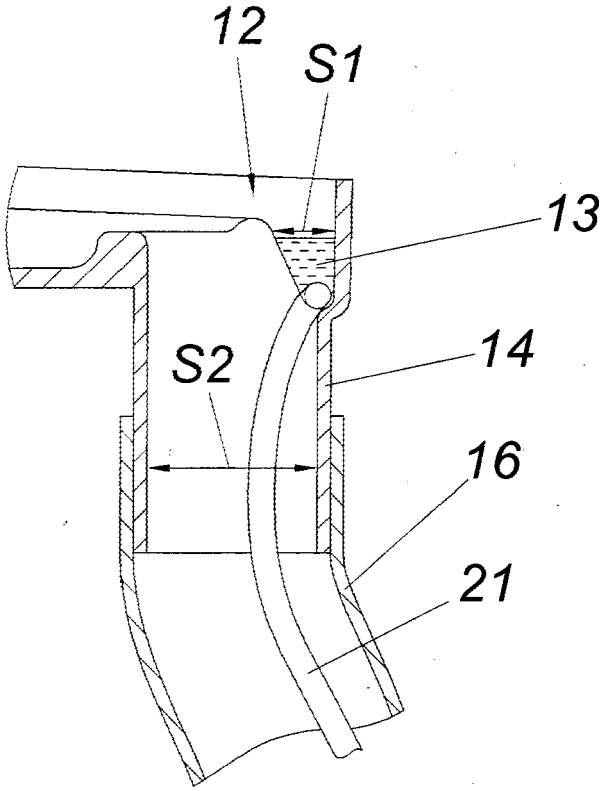

FIG.6