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(54) METHOD AND ARRANGEMENT IN PNEUMATIC MATERIAL CONVEYING SYSTEM

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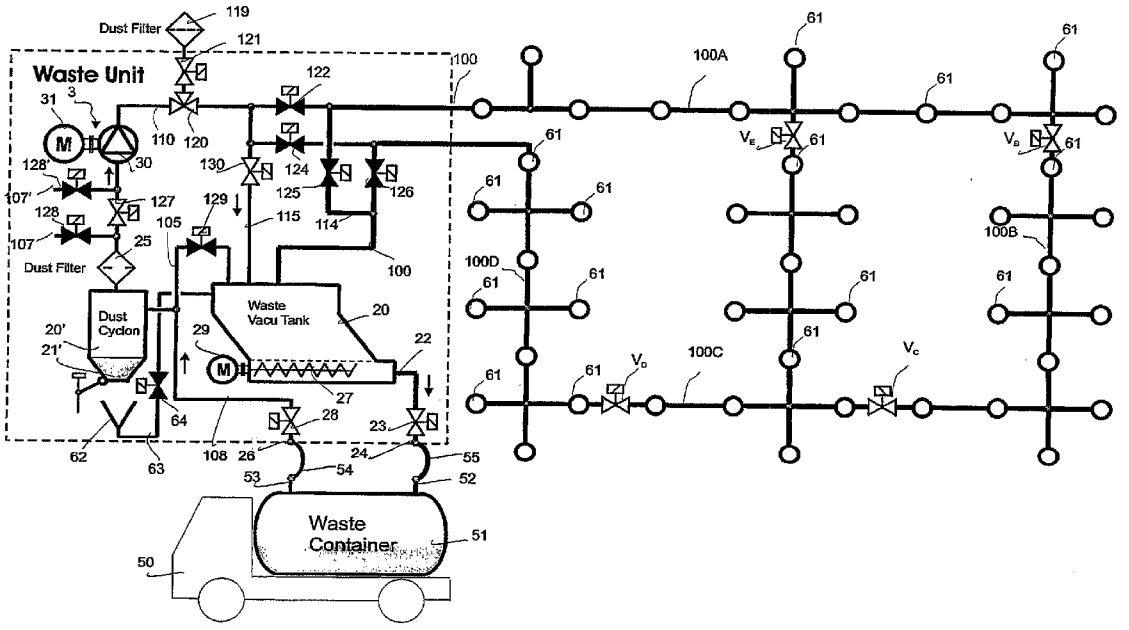
(57) **ABSTRACT**

A method in a pneumatic material conveying system, such as in a waste conveying system, said conveying system comprising at least one feed point (**61**) of material, particularly waste material; a material conveyor pipe (**100**) that is connectable to the feed point (**61**); and a separator device (**20**), where the material to be conveyed is separated from the conveyor air; as well as means (**3**) for creating a pressure difference in the conveyor pipe (**100**), at least for the duration of the process of conveying the material. In the method, material is conveyed further from the separator device (**20**) to the transport container (**51**), particularly a waste container, by employing in the conveying of material from the separator device to the transport container means (**3**) of the material conveying system for creating a pressure difference.



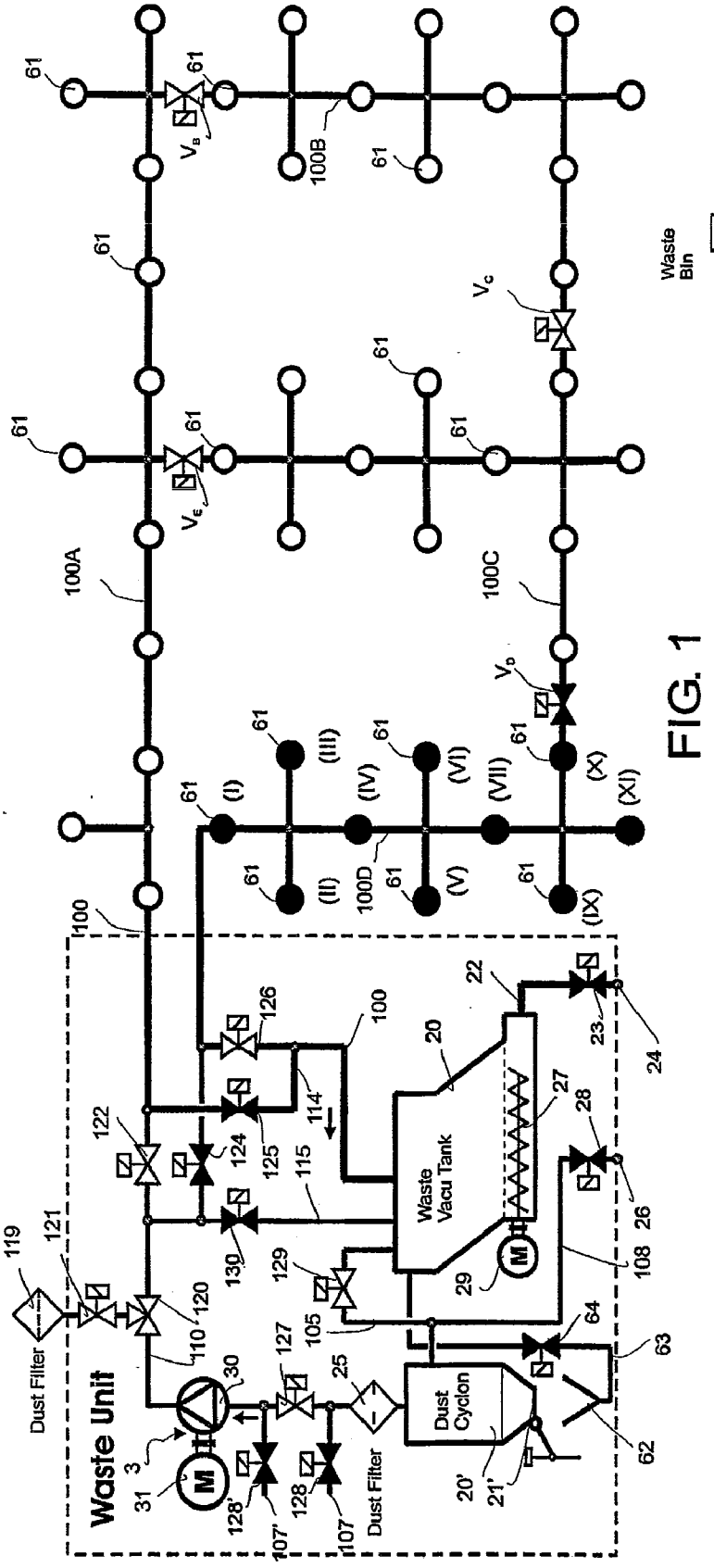

Waste Unit
Dust Filter
Waste Vacu Tank
Dust Cyclon
Dust Filter
100A
100B
100C
100D
100
61
(I)
(II)
(III)
(IV)
(V)
(VI)
(VII)
(IX)
(X)
(XI)
V_A
V_B
V_C
V_D
V_E
3
20
20'
21'
22
23
24
25
26
27
28
29
30
31
62
63
64
105
107
107'
108
110
114
115
119
120
121
122
124
125
126
127
128
128'
129
130

FIG. 1

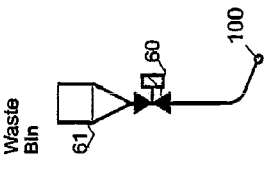

Waste Bin
60
61
100

FIG. 1a

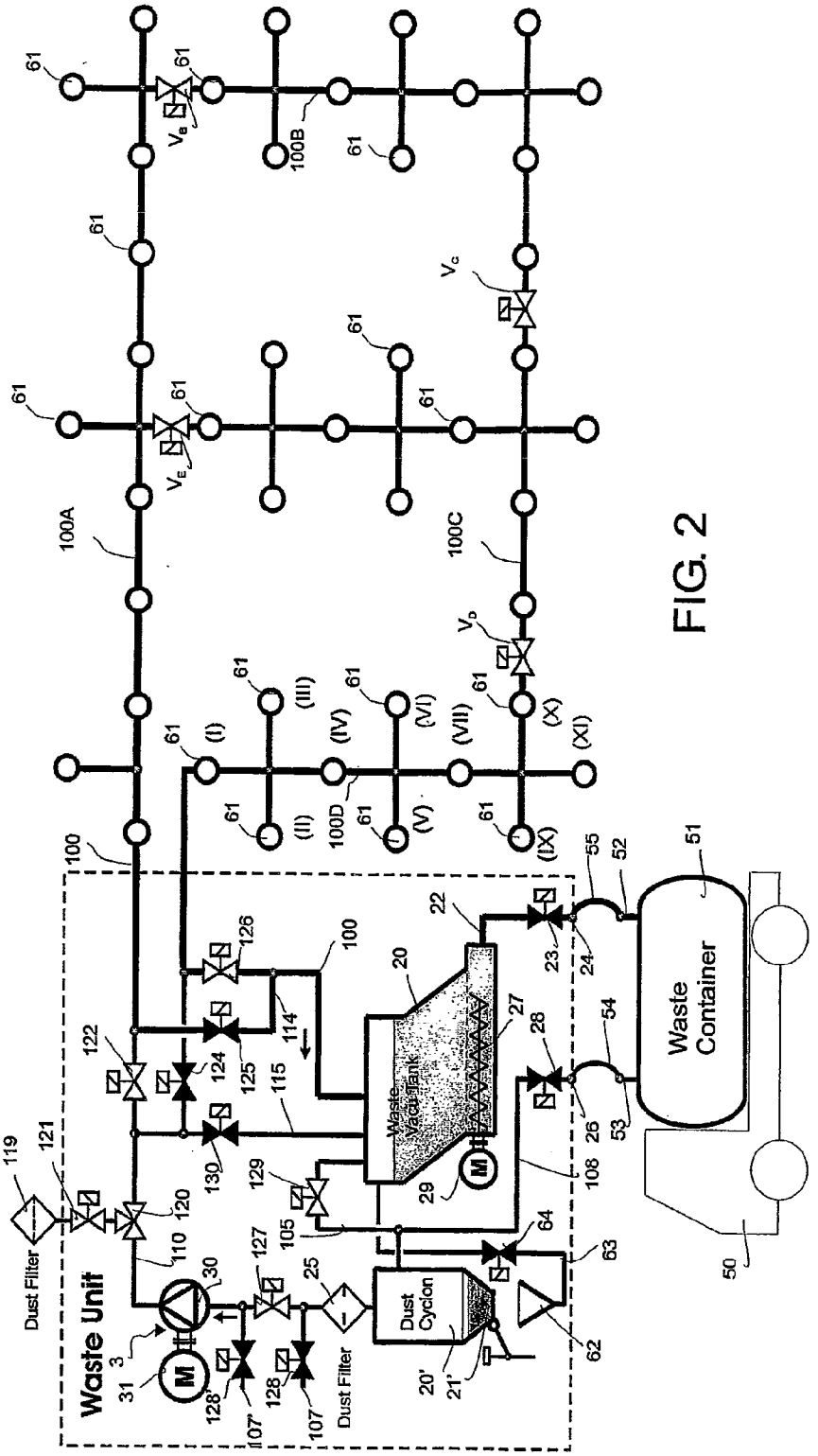

Waste Unit
Dust Filter
Waste Container
Waste Vacuum Tank
Dust Cyclon
Dust Filter
100
100A
100B
100C
100D
(I)
(II)
(III)
(IV)
(V)
(VI)
(VII)
(IX)
(X)
(XI)

FIG. 2

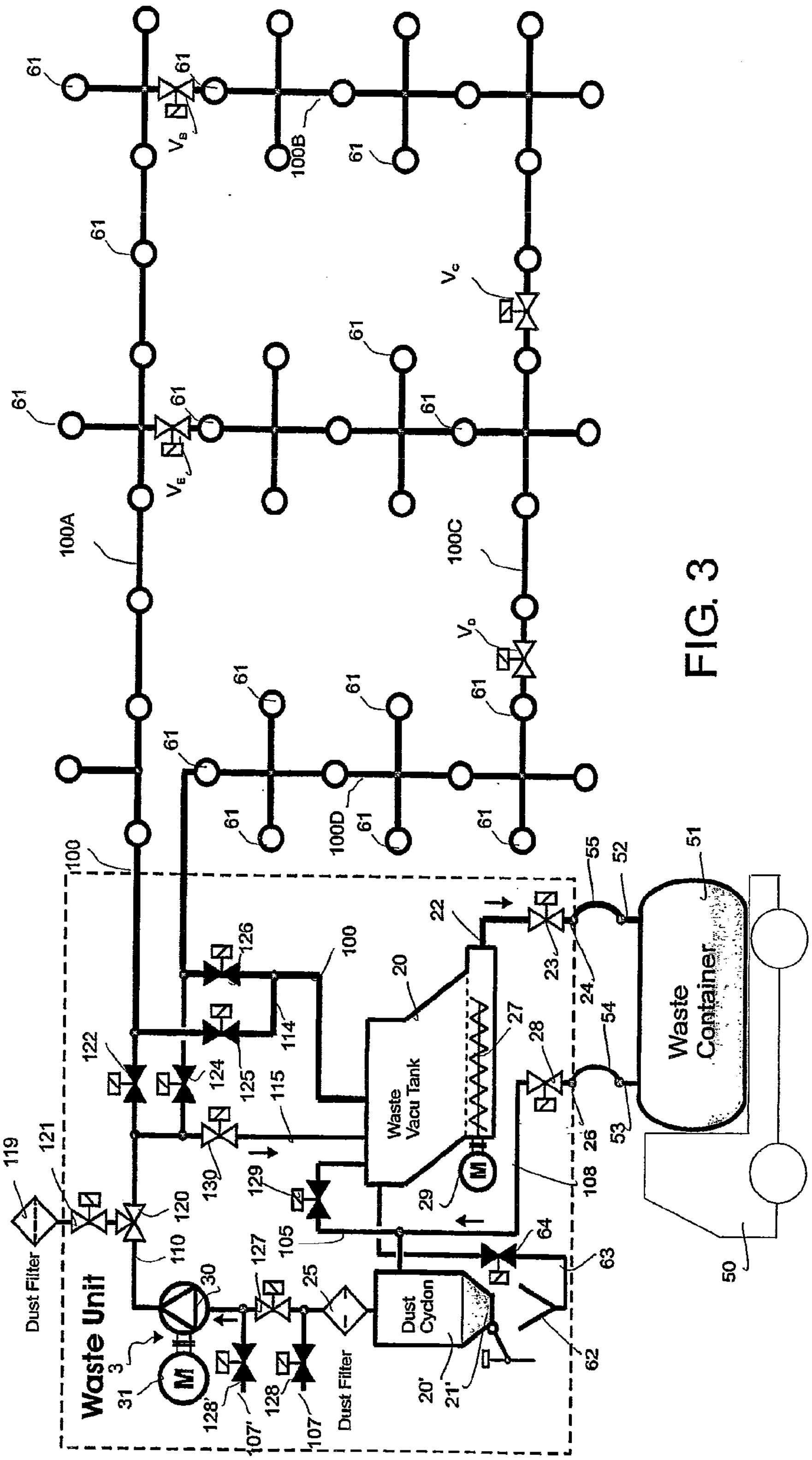

Waste Unit
Dust Filter
Dust Filter
Dust Cyclon
Waste Vacu Tank
Waste Container
100A
100B
100C
100D
61
100
110
114
115
119
120
121
122
124
125
126
127
128
128'
129
130
105
107
107'
108
20
20'
21'
22
23
24
25
26
27
28
29
3
30
31
50
51
52
53
54
55
62
63
64

FIG. 3

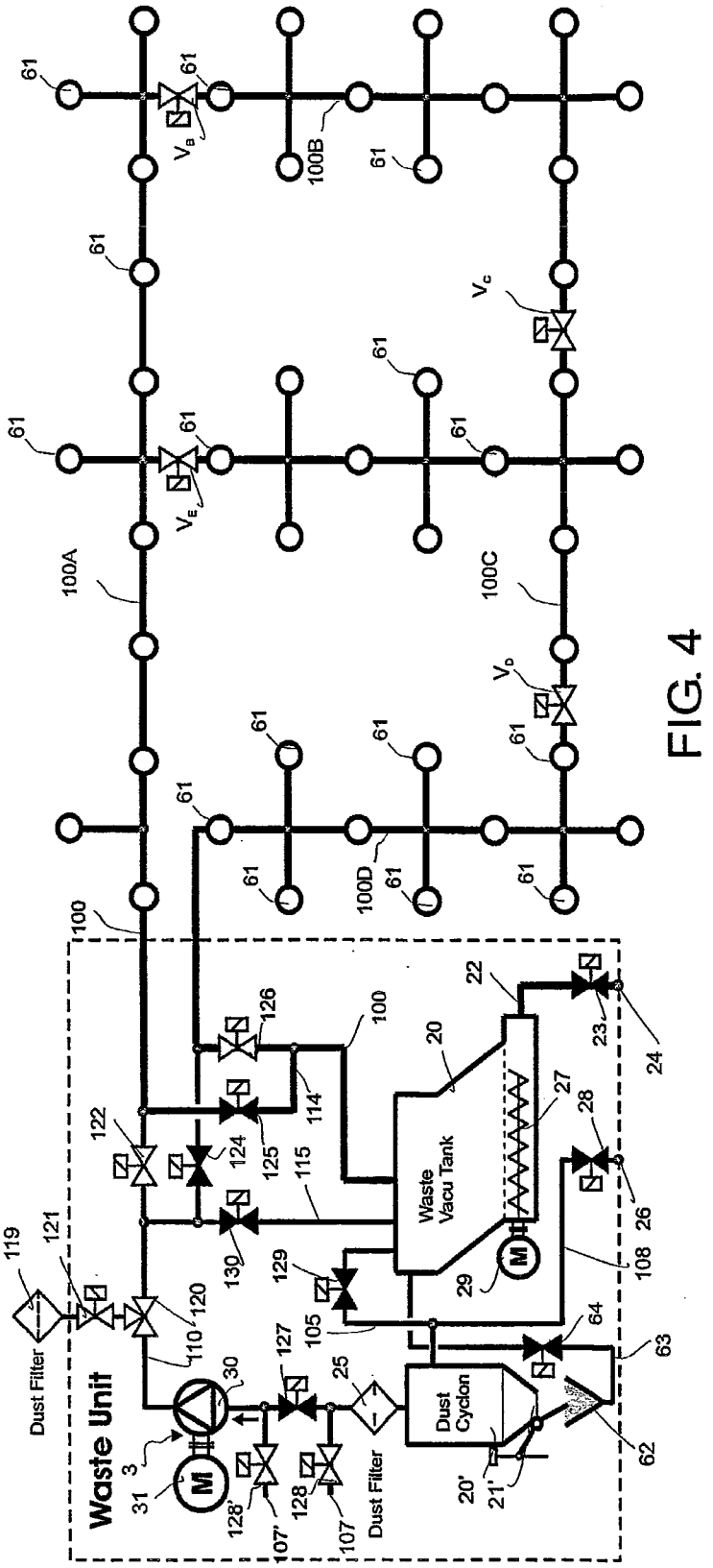

Waste Unit
Dust Filter
Waste Vacu Tank
Dust Cyclon
Dust Filter
100
100A
100B
100C
100D
61
V_B
V_C
V_E
V_D
M

FIG. 4

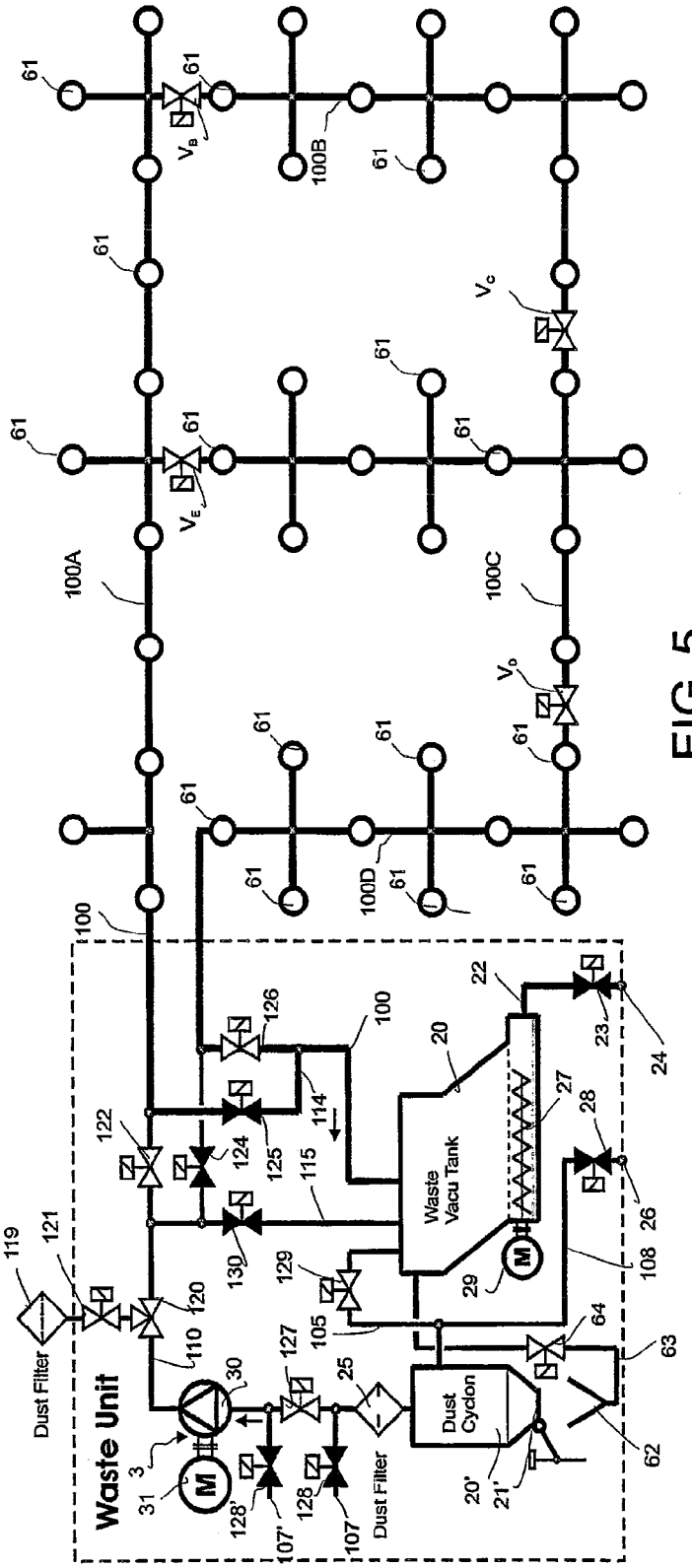

Waste Unit
Dust Filter
Waste Vacu Tank
Dust Cyclon
Dust Filter
100
100A
100B
100C
100D
61
V_B
V_C
V_D
V_E

FIG. 5

METHOD AND ARRANGEMENT IN PNEUMATIC MATERIAL CONVEYING SYSTEM

BACKGROUND OF INVENTION

[0001] The invention relates to a method according to the preamble of claim **1**.

[0002] The invention also relates to an arrangement according to claim **10**.

[0003] The invention relates generally to pneumatic conveying systems, such as vacuum conveying systems, particularly to collecting and conveying waste, for instance household waste.

[0004] There are known systems where waste is conveyed in a piping by means of suction. In these, waste is conveyed by suction for long distances in the piping. Apparatuses are utilized, for instance, for conveying waste in different institutions. Typical for them is that a vacuum apparatus is used for achieving a pressure difference, in which apparatus underpressure in the conveyor pipe is provided with vacuum generators, such as vacuum pumps or ejector equipment. In the conveyor pipe, there is typically arranged at least one valve element, and by opening and closing said valve element, make-up air coming in the conveyor pipe is regulated. The vacuum conveying systems typically have, among others, the following problems: high energy consumption, high air flow in the piping, problems with noise, dust and fine particles in the outlet pipe. In known systems, material has been conveyed from the system containers to a transport container, such as the container of a waste transport truck, by a suction pump device that is external to the system, for instance by a suction pump device of the transport truck or a corresponding device. This means that the vehicles used in the forward transportation of the material have been specific transport trucks provided with suction arrangement, which increases, among others, the amount of capital bound in the equipment.

[0005] An object of this invention is to achieve a totally novel arrangement in connection with material conveying systems by means of which the drawbacks of known arrangements are avoided. Another object of the invention is to provide an arrangement applicable to vacuum conveying systems by means of which the amount of capital bound in the transportation equipment can be decreased. A third object of the invention is to provide a solution by which the amount of specific transportation equipment can be reduced.

BRIEF DESCRIPTION OF INVENTION

[0006] The invention is based on an idea where the suction pump system of the vacuum conveying system itself is utilized in conveying material from said vacuum conveying system to an external transport container, for instance to a transport container located in a transport wagon or in a vehicle.

[0007] The method according to the invention is mainly characterized in that material is forwarded from the separator device to a transport container, particularly to a waste container, by using in the conveying of material from the separator device to the transport container, equipment of the conveying system for creating a pressure difference.

[0008] The method according to the invention is further characterized by what is set forth in claims **2-9**.

[0009] The arrangement according to the invention is mainly characterized in that the arrangement comprises means for connecting a transport container to the material conveying system, and means for conveying at least part of the material accumulated in the separator device from the separator device to the transport container, particularly a waste container, by using in the conveying of material from the separator device to the transport container equipment of the material conveying system for creating a pressure difference.

[0010] The arrangement according to the invention is further characterized by what is set forth in claims **11-16**.

[0011] The arrangement according to the invention has several remarkable advantages. By means of the arrangement according to the invention, pump elements of the system itself can be used for draining the material conveying system and for conveying material to a transport container. By utilizing the suction/pressure of the material conveying system, waste is conveyed for example to the tank of a transport vehicle. Now the transport vehicle can be any possible vehicle provided with a suitable container, such as a shipping container or the like. Consequently, a special truck provided with a suction pump, or a corresponding vehicle, is not needed in the arrangement according to the invention for draining the material conveying system. This results in remarkable savings both financially and with respect to energy consumption. When the system piping is arranged to comprise a circuit where at least part of the conveyor air circulates, the amount of outlet air can be reduced. At the same time, energy consumption in the system is reduced. By maintaining both underpressure and blowing, there can be achieved an efficient circulation of conveyor air in the circuit, and an efficient transport of material in the conveyor pipe. The amount of outlet air can be essentially reduced by an arrangement according to the invention, and at the same time possible problems with dust and fine particles in the outlet pipe can be eliminated. The arrangement according to the invention also essentially alleviates the problem with noise known in the prior art. As the amount of inlet air is reduced, energy consumption is likewise reduced. By opening and closing the system feed points according to the invention, there is achieved an efficient material transport to the conveyor pipe and forwarding in the conveyor pipe, and simultaneously the noise effect caused by the operation of the system can be maintained low. When the conveyor pipe of the material conveying system is arranged to be composed of several functional sections, i.e. sub-circuits, both the conveying of material in the conveyor piping and the draining of the feed points to the conveyor pipe can be efficiently arranged. Blockages can be efficiently cleared by making the conveyor air circulate in the opposite direction. In a loop piping, the direction of circulation of the conveyor air can be easily changed. The arrangement according to the invention is applicable both in conventional conveying systems including one or several conveyor pipes, and in conveying systems with a loop piping.

BRIEF DESCRIPTION OF DRAWINGS

[0012] In the description below, the invention is explained in more detail with reference to the appended drawings, wherein

[0013] FIG. **1** is a schematical illustration of a system according to a preferred embodiment of the invention,

[0014] FIG. **1***a* is a simplified illustration of part of the system according to the invention,

[0015] FIG. **2** is a schematical illustration of a system according to the invention, shown in a second mode of operation,

[0016] FIG. **3** is a schematical illustration of a system according to the invention, shown in a third mode of operation,

[0017] FIG. **4** is a schematical illustration of a system according to the invention, shown in a fourth mode of operation, and

[0018] FIG. **5** is a schematical illustration of a system according to the invention, shown in a fifth mode of operation.

DETAILED DESCRIPTION OF INVENTION

[0019] FIG. **1** is a simplified schematical illustration of a pneumatic material conveying system according to the invention, particularly a waste conveying system. The drawing shows a material conveyor pipe **100**, along which pipe there is arranged at least one, but typically several feed points **61**. A feed point **61** is the feed station of the material to be conveyed, particularly waste material, through which feed point the material to be conveyed, particularly waste material, such as household waste, is fed to the conveying system. The system may comprise several feed stations **61**, through which the material to be conveyed is fed to the conveyor piping **100**, **100**A, **100**B, **100**C, **100**D, **100**E. In the drawing, the feed station **61** is designated by a spot, and by opening and closing a locking element, such as a valve element **60**, provided in connection with the feed station, material can be conveyed from the feed point to the conveyor pipe. FIG. **1***a* illustrates in more detail a feed point **61** and its drain valve **60***a* used in the system according to the invention. On the valve side, the feed point is connected to a conveyor pipe **100**. Typically the conveyor piping comprises a main conveyor pipe **100**, to which there may be connected several branch conveyor pipes, to which in turn there may be connected several feed stations **61**. The fed material is conveyed along the conveyor piping **100**, **100**A, **100**B, **100**C, **100**D to a separator device **20**, where the material to be conveyed is separated from the conveyor air, for instance as the flow rate drops and owing to centrifugal force. The separated material is removed, for instance according to the needs of the situation, from the separator device **20** to a material container, such as a waste container **51**, or to further processing.

[0020] From the separator device **20**, a conveyor air duct **105** leads to means **3** for creating underpressure in the conveyor pipe. In the embodiment of FIG. **1**, the means for creating underpressure comprise a vacuum pump unit **3**. By the means for creating underpressure, there is generated the required underpressure in the conveyor piping **100** and/or part thereof for conveying the material. The vacuum pump unit **3** comprises an underpressure pump **30**, which is driven by an actuator **31**.

[0021] FIG. **1** illustrates a pneumatic material conveying system, particularly a waste conveying system, according to a preferred embodiment of the invention. The drawing depicts a material conveyor pipe **100**, along which there is arranged at least one, typically several feed points **61**. A feed point **61** serves as the feed station of the material to be conveyed, particularly waste material, through which the material to be conveyed, particularly waste material, such as household waste, is fed to the conveying system. The system may comprise several feed stations **61**, through which the material to be conveyed is fed to the conveyor piping **100**, **100**A, **100**B, **100**C, **100**D, **100**E. In the drawing, a feed station **61** is designated by a spot, and by opening and closing a locking element, such as valve element **60** provided in connection with the feed station, material can be conveyed from the zo feed point **61** to the conveyor pipe **100**. FIG. **1***a* illustrates in more detail a feed point **61** to be used in a system according to the invention, and its drain valve **60**. On the valve side, the feed point is connected to the conveyor pipe **100** or to a pipe provided in connection with it. Typically a conveyor piping comprises a main conveyor pipe **100**, to which there may be connected several branch conveyor pipes, to which in turn there may be connected several feed stations **61**. The supplied material is conveyed along the conveyor piping **100**, **100**A, **100**B, **100**C, **100**D to a separator device **20**, where the material to be conveyed is separated, for example as the flow rate drops, and owing to centrifugal force, from the conveyor air. The separated material is removed, for example according to the needs of the situation, from the separator device **20**, to a material container, such as a waste container **51**, or to further processing.

[0022] In the embodiment of FIG. **1**, the separator device **20** is provided with material stirring/conveying elements **27**, **29**. A conveyor air duct **105** leads from the separator device **20** to the means **3** for creating underpressure in the conveyor pipe. In the embodiment of the drawing, the means for creating underpressure comprise a pump device **3**, such as a vacuum pump unit. By the means for creating underpressure, there is achieved the underpressure required for conveying material in the conveyor piping **100** and/or a section thereof. The vacuum pump unit **3** comprises an underpressure pump **30**, which is driven by an actuator **31**. The system comprises means for circulating conveyor air in a circuit, and at least a section of the conveyor piping **100**, **100**A, **100**B, **100**C, **100**D, **100**D, **100**E forms part of said circuit. In the embodiment of FIG. **1**, the conveyor piping **100** can be divided into functional sections or sub-circuits **100**A, **100**B, **100**C, **100**D, **100**E, by valve elements V_B, V_C, V_D, i.e. sectional valves.

[0023] FIG. **1** illustrates a situation where the valve element V_D is closed, in which case conveyor air is prevented from flowing in the circuit. When the suction end of the vacuum generator **3** is connected directly or by intermediation of an air duct **105** to at least one separator device **20**, **20'**, to which in turn the outlet end of the conveyor pipe **100** is connected, there is achieved underpressure in the conveyor pipe, at least in that part of the circuit that is located, in the material conveying direction, between at least one valve, in FIG. **1** valve V_D, and the separator device **20**. The material conveying direction and the air flowing direction are designated by arrows in FIG. **1**. Underpressure also prevails in that part of the circuit that is left between the separator device **20** and the vacuum generator **3**, i.e. in the conveyor air duct **105**, and in the embodiment of the drawing also in a second separator device **20'**, i.e. a dust filter, and in that part of the conveyor air duct **105** that extends from said separator device **20'** to the vacuum generator **3**. In a case according to the drawing, when at the feed point **61** its valve element **60** is opened, the batch of material to be conveyed is transferred to the conveyor pipe **100**, in the drawing through the part **100**D of the conveyor pipe, to be further conveyed to the separator device **20**. Possible makeup air enters the conveyor pipe for example via the feed point **61** when opening the valve **60** to the conveyor pipe.

[0024] In the embodiment according to FIG. **1**, the outlet end of the underpressure pump **30** of the pump device **3** is in said mode of operation arranged to blow into the channel **110**. There can efficiently be created overpressure at the pump

outlet end, and/or underpressure and/or a suction effect at the suction end of the pump device.

[0025] The operation of the system is controlled so that for draining feed points within a desired functional section, at least one valve is open in the material conveying direction, with respect to the functional section of the conveyor pipe **100**, said valve being located on the go-side of the conveyor air, i.e. on the suction side, in which case suction can affect the conveyor pipe within the functional section. Let us assume that in the arrangement according to the drawing, the aim is to realize the draining of the feed points **61** within the range **100**D of the conveyor pipe. Now all sectional valves located between the separator element **20** and the functional section in the conveyor pipe **100** (in the drawing part **100**D of the conveyor pipe) in the conveying direction are open (in Figure valve **126**). Now the suction created by at least one vacuum generator **3** is effective in the conveyor piping **100**D within the functional section. At least one valve V_D located on the outlet side of the conveyor pipe **100** is closed, and thus only suction is now effective within the functional section. The functional section feed points **61**, or at least part of them, are drained so that the first connection to the conveyor pipe **100**D to be opened is the connection of the feed point **61** (I) that is located in the conveyor pipe nearest to the outlet end in the conveying direction, i.e. in the embodiment according to the drawing, nearest to the separator device **20**, so that material can be conveyed from the first feed point to the conveyor pipe, and before the connection of the first feed point (I) to the connection conveyor pipe is closed, the connection of the next feed point **61** (II) to the conveyor pipe is opened. In the embodiment of the drawing, said next feed point is, when proceeding against the conveying direction, the next feed point **61** (II) to be drained. Thereafter the connection of the first feed point **61** (I) to the conveyor pipe is closed. Respectively, the connection to the conveyor pipe of a third feed point **61** (III) to be drained is opened before the connection of the second feed point **61** (II) to the conveyor pipe is closed. This step is repeated until all desired feed points are drained. In the embodiment of the drawing, it is assumed that all the feed points **61** within the conveyor pipe range **100**D should be drained, in which case their draining order to the conveyor pipe **100**, **100**D is in the drawing designated by ordinals in parentheses: (I), (II), (III), (IV), (V), (VI), (VII), (VIII), (IX), (X), (XI) and (XII). When the communication to the conveyor pipe **100** of the last feed point **61** (XII) to be drained within the functional section is opened, and when the material is transferred to the conveyor pipe **100**, **100**D, and the communication between the feed point and the conveyor pipe is closed, there is opened a connection to the conveyor pipe **100**D of the functional section on the outlet side by opening at least one valve element V_D, which is located between the functional section and the pump device **3**, blowing into the conveyor pipe **100**. Now there is achieved an enhanced conveying effect (suction and blow together) for the conveyed material that is transferred to the conveyor pipe **100**, **100**A, **100**B, **100**C, **100**D. In the drawing, the conveyor air circulates along a route designated by arrows, so that the batches of material transferred through the feed points to the conveyor pipe proceed in the conveyor piping further to the separator device **20**, where the material to be conveyed is separated from the conveyor air. In the drawing, the sectional valve V_E of the conveyor pipe WOE of the functional section is closed, in which case the conveyor air has no access to the conveyor pipe **100**E of the functional section, but it flows along the circulating route **100**A, **100**B, **100**C, **100**D of the conveyor pipe of the range. In connection with draining different functional sections, the material conveying route from the functional section to a draining station, such as a separator element **20**, can be optimized by keeping the sectional valves located along the desired transport route open.

[0026] FIG. **2** illustrates a mode of operation in a system according to the invention, where conveyor air is free to circulate along a circuit of which at least a section of the conveyor pipe **100** forms part, and which in the embodiment of the drawing includes a separator device **20**, a conveyor air duct **105**, a possible second separator device **20'**, and an air duct **110** from the outlet end of the vacuum generator to the go-side of the conveyor pipe **100**. The vacuum generator **3** is arranged to circulate air in the circuit and to create a suction effect in the conveyor pipe **100**, at least at its outlet end, i.e. at the end that is located on the side of the separator element **20** in the conveying direction. According to the embodiment of the drawing, the vacuum generator **3** also is arranged to create a blow effect in the conveyor pipe, in the drawing through the air duct **110**. Conveyor air has free access to circulate in the circuit, at least part of which is formed by at least a section of the feed pipe **100**, so that the batches of material fed into the conveyor pipe from one or more feed stations **61** are transferred towards the separator device **20**.

[0027] In the embodiment of the drawing, there also is formed a conduit **107** provided with a valve **128**, and by opening said valve, supplementary air can be fed to the suction end of the vacuum unit **3** from outside the circuit. When necessary, air pressure in the conveyor pipe can be increased by opening the valve **128**, so that there is achieved an enhanced conveying rate for the conveying of material.

[0028] In the case of FIG. **2**, a transport container **51** is brought to the system by a transport vehicle **50**, such as a transport wagon or a transport truck. The arrangement comprises means for connecting the transport container **51** to the material conveying system and means for transferring at least part of the material accumulated in the separator device **20** from the separator device **20** to the transport container **51**, particularly a waste container, by employing, in the conveying of material from the separator device **20** to the transport container **51**, means **3** of the material conveying system for creating a pressure difference. From the separator element **20**, particularly its lower part, there is arranged drain channel **22**. The drain channel is provided with a valve element **23**. The drain channel has a junction **24**, at which the channel **55**, **52** of a transport container can be connected to the drain channel **22** of the separator element. The arrangement comprises means for connecting the transport container **51** to the separator device **20** by at least one first conveyor channel **22**, **23**, **24**, **55**, **52**, and means for connecting the transport container to the suction end of the pump device **3** of the material conveying system at least by one second channel **108**, **28**, **26**, **53**, **54**, so that material can be transferred from the separator device **20** to the transport container **51** by means of the suction created by the pump device **3** of the material conveying system. The second channel includes a channel section **108**, which in the embodiment of FIG. **2** is connected to the conveyor air duct in between the separator element **20** and the second separator element **20'**. The second channel is provided with a valve element **28**. Furthermore, it is provided with a junction **26**, at which the second channel is connected to the second channel **53**, **54** of the transport container **51**. In the embodiment of the drawing, the valves **28** and **23** are in closed position, in which

case the system suction cannot affect the transport container **51**, and the material cannot proceed from the separator element **51** to the transport container **51**.

[0029] The transport container **51** is arranged to be connected as part of a circuit where the conveyor air is circulated at least during the process of transferring the material by the pump device **3**, the suction end whereof is arranged to be connected to at least one transport container **51** and separator device **20**, preferably to its lower part, and so that at least part of the conveyor air on the pressure side of the pump is arranged to be conveyed to the separator device **20**, preferably to its upper part.

[0030] The transport container **51** is arranged in a transport vehicle **50**, such as a transport wagon or a transport truck.

[0031] An embodiment of the arrangement according to the invention comprises at least one second separator device **20'**, which is arranged on the suction side of the pump device **3**, in between the transport container **51** and/or the first separator device **20** and the pump device **3**.

[0032] The separator device **20** comprises material stirring and/or conveying means **27**. In the embodiment of the drawing, the stirring/conveying means **27** comprise a conveyor/blender screw arranged in the lower part of the separator element, which screw is driven by an actuator **29**. The stirring/conveying means are preferably arranged to convey material in the separator element towards the drain channel **22**.

[0033] FIG. **3** illustrates a mode of operation of the system, where the connection from the separator element **20** is opened to the transport container and respectively, the connection from the suction end of the pump is opened to the transport container, so that material is transferred from the separator element **20** via the drain channel **22** to the transport container **51**. From the outlet end of the pump element, there also is provided a connection **115** to the upper part of the separator element **20**, in which case the conveying process can be enhanced by means of a combined zo effect of suction and blowing. In this mode of operation, in the embodiment of the drawing, the connection from the conveyor piping **100** to the separator element is closed, and also the connection from the outlet end of the pump element to the conveyor piping **100** is closed. The connection from the pump suction end to the separator element **20** is now made via the transport container **51**.

[0034] FIG. **4** illustrates yet another embodiment of a system according to the invention, depicting a mode of operation where the material accumulated in the second separator device **20'** is drained into a collector element **62**, which in the drawing is a feeding funnel. From the collector element **62**, there is made a conveyor channel **63** to the separator element **20**. The conveyor channel **63** is provided with a valve element **64**, by which the connection from the collector element **62** to the separator device **20** can be opened and closed. The collector element can be drained, and the material can be conveyed therefrom to a separator device **20**, by connecting the suction of the pump device **3** to affect the separator device **20**, and by opening the valve element **64** of the conveyor channel, in which case material is transferred from the collector element to the separator device **20** (FIG. **5**).

[0035] Thus the invention relates to a method in a pneumatic material conveying system, such as a waste conveying system, said conveying system comprising at least one feed point **61** of material, particularly waste material; a material conveyor pipe **100**, which is connectable to the feed point **61**; and a separator device **20**, where the material to be conveyed is separated from the conveyor air; as well as means **3** for creating a pressure difference in the conveyor pipe **100**, at least for the duration of the process of conveying the material. In the method, material is further transferred from the separator device **20** to the transport container **51**, particularly a waste container, by employing in the conveying of material from the separator device to the transport container means **3** of the material conveying system for creating a pressure difference.

[0036] According to a preferred embodiment, in the method the transport container **51** is connected to the separator device by at least one first conveyor channel **22**, **55**, and the transport container is connected to the suction side of the pump device of the material conveying system by at least one second channel **108**, **54**, so that material is conveyed from the separator device **20** to the transport container **51** by means of the suction created by the pump device **3** of the material conveying system.

[0037] According to a preferred embodiment, in the method the transport container **51** is connected to form part of a circuit where conveyor air is circulated, at least during the process of conveying the material, by a pump device **3**, the suction end whereof is connected to at least one transport container **51** and separator device **20**, preferably to its lower part, and that at least part of the conveyor air on the pressure side of the pump is conducted to a separator device **20**, preferably to its upper part.

[0038] Typically the transport container **51** is a transport vehicle **50**, such as a transport wagon or a transport truck.

[0039] According to another preferred embodiment, in the method solid particles are separated from the conveyor air at least by one second separator element **20'**, which is arranged on the suction side of the pump device **3**, in between the transport container **51** and/or the first separator device **20** and the pump device **3**.

[0040] According to a typical embodiment, in the method the material contained in the separator device **20** is manipulated by the material stirring/conveying means **27**, for instance by stirring and/or conveying material towards the drain channel **22**.

[0041] According to a preferred embodiment, in the method underpressure is created in the circuit by at least one pump device **3**, such as a vacuum generator and/or a blower, the suction end whereof is connected to the separator device **20** and/or to the transport container **51**.

[0042] According to a preferred embodiment, in the method material is fed to the conveyor pipe **100** via material feed points **61**, which are waste feed points, such as waste bins or refuse chutes.

[0043] Typically in between the material feed point **61** and the conveyor pipe **100**, there is arranged at least one valve element **60**, and by opening and closing said valve element, it is possible to adjust the feeding of material and/or makeup air to the conveyor pipe.

[0044] The invention also relates to an arrangement in a pneumatic material conveying system, such as a waste conveying system, comprising at least one feed point **61** of material, particularly waste material; a material conveyor pipe **100**, which is connectable to the feed point **61** and to a separator device **20**, where the material to be conveyed is separated from the conveyor air; as well as means **3** for creating a pressure difference in the conveyor pipe **100**, at least for the duration of the process of conveying the material. The arrangement comprises means for connecting the trans-

port container **51** to the material conveying system and means for transferring at least part of the material accumulated in the separator device **20** from the separator device **20** to the transport container **51**, particularly a waste container, by employing in the conveying of material from the separator device **20** to the transport container **51** means **3** of the material conveying system for creating a pressure difference.

[0045] According to a preferred embodiment, the arrangement comprises means for connecting the transport container **51** to the separator device **20** by at least one first conveyor channel **22**, **23**, **24**, **55**, **52**; and means for connecting the transport container to the suction side of the pump device **3** of the material conveying system by at least one second channel **108**, **28**, **26**, **53**, **54**, so that material can be transferred from the separator device **20** to the transport container **51** by means of the suction created by the pump device **3** of the material conveying system.

[0046] According to a preferred embodiment, the transport container **51** is arranged to be connected as part of a circuit where conveyor air is circulated, at least during the process of conveying the material, by a pump device **3**, the suction end whereof is arranged to be connected at least to one transport container **51** and to a separator device **20**, preferably to its lower part, so that at least part of the conveyor air on the pressure side of the pump is arranged to be conveyed to the separator device **20**, preferably to its upper part.

[0047] Typically the transport container **51** is arranged in a transport vehicle **50**, such as a transport wagon or a transport truck.

[0048] According to another preferred embodiment, the arrangement comprises at least one second separator device **20'**, which is arranged on the suction side of the pump device **3**, in between the transport container **51** and/or the first separator device **20** and the pump device **3**.

[0049] According to yet a preferred embodiment, the separator element **20** comprises material stirring and/or conveying means **27**.

[0050] For a man skilled in the art, it is obvious that the invention is not restricted to the above described embodiments only, but many modifications are possible within the scope of the appended claims. Such characterizing features that in the specification are possibly described together with other characterizing features can, when necessary, also be used separately.

1-15. (canceled)

16. A method in a pneumatic material conveying system, such as a waste conveying system, said conveying system comprising at least one feed point (**61**) of material, particularly waste material; a material conveyor pipe (**100**) that is connectable to the feed point (**61**); and a separator device (**20**), where the material to be conveyed is separated from the conveyor air; as well as means (**3**) for creating a pressure difference in the conveyor pipe (**100**) at least for the duration of the process of conveying the material, characterized in that in the method, the transport container (**51**) is connected to the separator device by at least one first conveyor channel (**22**, **55**), and the transport container is connected to the suction side of the pump device of the material conveying system at least by one second channel (**108**, **54**), and in that in the method, material is conveyed further from the separator device (**20**) to a transport container (**51**), particularly a waste container, by employing in the conveying of material from the separator device to the transport container means (**3**) of the material conveying system for creating a pressure difference, in which case material moves from the separator device (**20**) to the transport container (**51**) by means of the suction created by the pump device (**3**) of the material conveying system.

17. A method according to claim **16**, characterized in that in the method, the transport container (**51**) is connected as part of a circuit where the conveyor air is circulated, at least during the process of conveying the material, by a pump device (**3**), the suction end whereof is connected to at least one transport container (**51**), and to a separator device (**20**), preferably to its lower part, and that at least part of the conveyor air on the suction side of the pump is conducted to the separator device (**20**), preferably to its upper part.

18. A method according to claim **16**, characterized in that the transport container (**51**) is provided in a transport vehicle (**50**), such as a transport wagon or a transport truck.

19. A method according to claim **16**, characterized in that in the method, solid particles are separated from the conveyor air by at least one second separator element (**20'**), which is arranged on the suction side of the pump device (**3**) in between the transport container (**51**) and/or the first separator device (**20**) and the pump device (**3**).

20. A method according to claim **16**, characterized in that in the method, the material contained in the separator device (**20**) is manipulated by stirring/conveying means (**27**), for instance by stirring and/or conveying material towards the drain channel (**22**).

21. A method according to claim **16**, characterized in that in the method, there is created underpressure in the circuit by at least one pump device (**3**), such as a vacuum generator and/or a blower, the suction end whereof is connected to a separator device (**20**) and/or to a transport container (**51**).

22. A method according to claim **16**, characterized in that in the method, material is fed to the conveyor pipe (**100**) through material feed points (**61**), which are waste feed points, such as waste bins or refuse chutes.

23. A method according to claim **16**, characterized in that in between a material feed point (**61**) and the conveyor pipe (**100**), there is provided at least one valve element (**60**), and by opening and closing said valve element, it is possible to adjust the feeding of material and/or makeup air to the conveyor pipe.

24. An arrangement in a pneumatic material conveying system, such as a waste conveying system, comprising at least one feed point (**61**) of material, particularly waste material; a material conveyor pipe (**100**) that is connectable to the feed point (**61**) and to the separator device (**20**), where the material to be conveyed is separated from the conveyor air; as well as means (**3**) for creating a pressure difference in the conveyor pipe (**100**), at least for the duration of the process of conveying the material, characterized in that the arrangement comprises means for connecting the transport container (**51**) to the material conveying system and means for transferring at least part of the material accumulated in the separator device (**20**) from the separator device (**20**) to the transport container (**51**), particularly a waste container, by employing in the conveying of material from the separator device (**20**) to the transport container (**51**) means (**3**) of the material conveying system for creating a pressure difference, and in that the arrangement comprises means for connecting the transport container (**51**) to the separator device (**20**) by at least one first conveyor channel (**22**, **23**, **24**, **55**, **52**); and means for connecting the transport container to the suction side of the pump device (**3**) of the material conveying system by at least one second channel (**108**, **28**, **26**, **53**, **54**), such that material can be con-

veyed from the separator device (**20**) to the transport container (**51**) by the suction created by the pump device (**3**) of the material conveying system.

25. An arrangement according to claim **24**, characterized in that the transport container is arranged to be connected as part of a circuit where conveyor air is circulated, at least during the process of conveying the material, by a pump device (**3**), the suction end whereof is arranged to be connected to at least one transport container (**51**) and separator device (**20**), preferably to its lower part, and that at least part of the conveyor air on the pressure side of the pump is arranged to be conveyed to a separator device (**20**), preferably to its upper part.

26. An arrangement according to claim **24**, characterized in that the transport container (**51**) is arranged in a transport vehicle (**50**), such as a transport wagon or a transport truck.

27. An arrangement according to claim **24**, characterized in that the arrangement comprises at least one second separator device (**20'**), which is arranged on the suction side of the pump device (**3**), in between the transport container (**51**) and/or the first separator device (**20**) and the pump device (**3**).

28. An arrangement according to claim **24**, characterized in that the separator element (**20**) comprises material stirring and/or conveying means (**27**).

29. A method according to claim **17**, characterized in that the transport container (**51**) is provided in a transport vehicle (**50**), such as a transport wagon or a transport truck.

30. A method according to claim **17**, characterized in that in the method, solid particles are separated from the conveyor air by at least one second separator element (**20'**), which is arranged on the suction side of the pump device (**3**) in between the transport container (**51**) and/or the first separator device (**20**) and the pump device (**3**).

31. A method according to claim **18**, characterized in that in the method, solid particles are separated from the conveyor air by at least one second separator element (**20'**), which is arranged on the suction side of the pump device (**3**) in between the transport container (**51**) and/or the first separator device (**20**) and the pump device (**3**).

32. A method according to claim **17**, characterized in that in the method, the material contained in the separator device (**20**) is manipulated by stirring/conveying means (**27**), for instance by stirring and/or conveying material towards the drain channel (**22**).

33. A method according to claim **18**, characterized in that in the method, the material contained in the separator device (**20**) is manipulated by stirring/conveying means (**27**), for instance by stirring and/or conveying material towards the drain channel (**22**).

34. A method according to claim **19**, characterized in that in the method, the material contained in the separator device (**20**) is manipulated by stifling/conveying means (**27**), for instance by stirring and/or conveying material towards the drain channel (**22**).

35. A method according to claim **17**, characterized in that in the method, there is created underpressure in the circuit by at least one pump device (**3**), such as a vacuum generator and/or a blower, the suction end whereof is connected to a separator device (**20**) and/or to a transport container (**51**).

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