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(54) Method and device to air a building

(57) The invention concerns a ventilation system for ventilating an accommodation in a building, with an air supply and an air exhaust and with resources for controlling the quantity allowed fresh air and/or the removed quantity used air and a control unit for controlling the control appliances, where the system includes preferably one or more sensors that perform measurements to air in the building and provide an indication concerning the nature of the air supply and/or air exhaust and of which the measurement data are used by the control unit for controlling the control appliances.

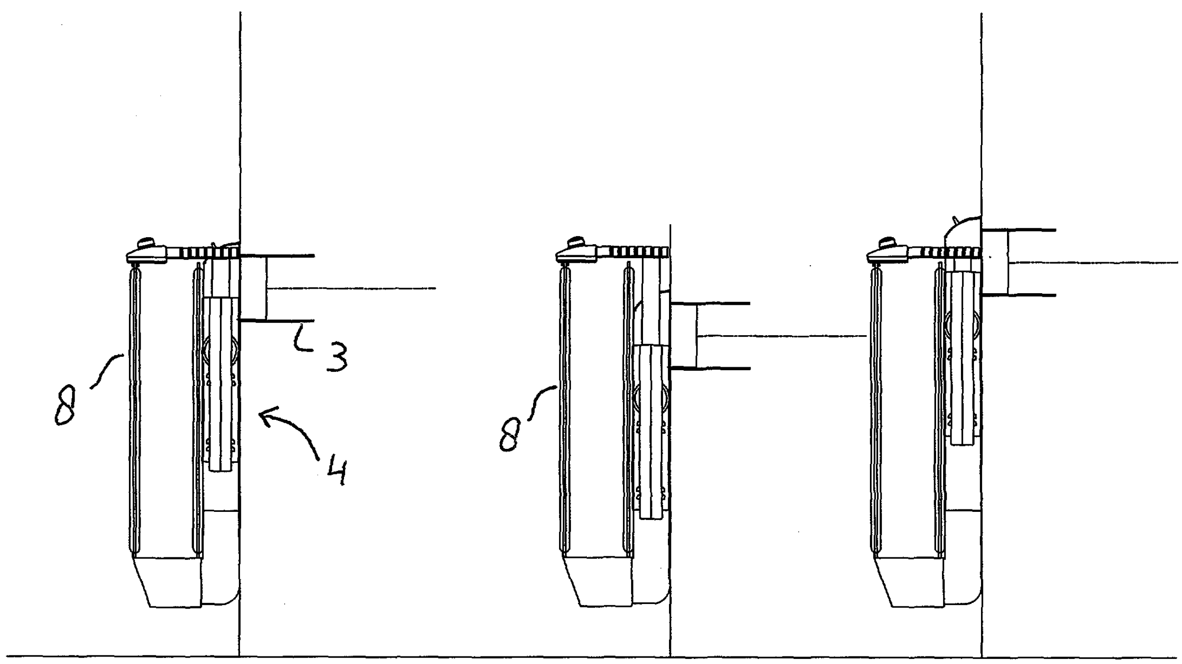

Fig. 6

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Description

[0001] The invention is related to (mechanical) ventilation of accommodations of a building, in particular a house, intended to maintain a liveable and pleasant environment. In particular the invention is related to the ventilation control. The invention is applicable for both high-rise and low-rise buildings (e.g. single-family dwellings).

[0002] From practice (see NEN1081) different ventilation systems are known. The, at present, highest developed systems (see e.g. EP-A-1026452) contain a tuned air inlet and exhaust by means of a central, intelligent control unit (computer) that performs flow measurements in the immediacy of both inlet and exhaust and establishes on that basis both the air inlet and exhaust. One of the shortcomings of this renowned system is the necessity of a wired or wireless data communication network between the three (mutually remote) main components (computer, air inlet and air exhaust). Also the control protocol is complex and as a result, sensitive. As a result this known system is relatively expensive and in fact unsuitable to build in afterwards.

[0003] With the invention an improvement of the current state of technology is intended. The inventor's objective is multipurpose and concerns, as example, making the (advanced controlled) ventilation system more robust, more simply, cheaper or more user-friendly or making it suitable for application in an existing building. Preferably a quality of the ventilation is thereby pursued (for example in connection with in-house climate, energy consumption) which corresponds at least to those of existing systems.

[0004] To this end is presented, that in a ventilation system and a ventilation method of a building the control is such, that the air exhaust is controlled by means of data, from one or more to the control unit connected sensors, that are obtained from measurements of air in the building and provide an indication concerning the nature of the air supply. Such data can be collected e.g. in the direct immediacy of the air exhaust, e.g. within an air exhaust canal (that can contain the exhaust fan), so that short data communication lines between measurement sensor and exhaust fan (or other appliance for natural or forced air exhaust) can suffice. That appliance can be brought to the market with an incorporated measurement sensor. E.g. measurement is at such a place that e.g. an exhaust fan does not disturb measurement at least mainly. It must be clear, that a control unit, such as a computer, receives and processes the measurement data and gives corresponding commands to the exhaust fan for more/less flow to provide.

[0005] The invention has been based on the insight, that on some distance of the air supply, one or more certain properties of air, in particular in the immediacy of the air exhaust, give an indication of the air supply. Thus the setting can be stipulated without contact on a large distance of the air supply. Surprisingly it has now proven to be, that one can ventilate in an advanced way by controlling the air exhaust in dependence of, on distance of the air inlet, measured air propert(y)/(ies) in the accommodation/house. In that way the control necessitates none from the air supply originating data and can lack a relevant (physical or not physical) data transmission line between the air inlet and the control unit. As it were the invention uses "master-slave" control, where the air exhaust follows the air inlet. Two or more of the components air exhaust, measurement sensor and control can be incorporated, which simplifies installation, among other things.

[0006] It deserves the preference, to control the exhaust in such a way on the basis of the measurement data, that at too low respectively too high measurement value the exhaust flow is reduced respectively increased. With that the inhabitant is given the opportunity to influence the ventilation (possibly even complete decisively) by regulating the supply. Because of this a more optimum transport of the ventilation airflow arises through the house. For example, the opening of a window or ventilation grid (air supply) can lead to an increase measurement value, whereby the exhaust consequently automatically increasing the outflow of air, which is desirable since the window is opened to ventilate. It must be clear, that the invention reaches its best right if in the house a lower air pressure dominates, with regard to the open-air pressure.

[0007] Preferably for the desired measurement value the air pressure is used. In an alternative the air temperature could be used, or the airflow speed. Also combinations of aforementioned or other air parameters are conceivable.

[0008] In a further development of the invention an automatically controlled supply is used. Herewith the principle of the invention is exploited particularly effectively. A "stand alone" air supply system suffices, where a preprogrammed control unit (for example by giving a commando to a connected element for the adjustment of the air-supply opening dimension) regulates the air-supply flow, e.g. on the basis of the time of day, outside temperature, air humidity in the house, flow measurement, information from other installation systems, such as a thermostat, radiator temperature, temperature inflowing air, presence of a person, season, degree of use of present heating elements, C02-measurement, or combinations of it. It is thereby not necessary that this control unit takes into account the air exhaust situation, so that relevant data exchange may lack.

[0009] In a preference implementation of the invention it is taken care of, that air flow back through the air supply is limited and is preferably at least mainly prevented, e.g. by providing the air supply with an one-way valve or an intelligent control (meaning an automate which closes the concerning air supply if flow back is observed, where that automat can be a component of the control unit of the automatically controlled supply, if applied). An entirely univocal airflow from the outside in is than guaranteed with proper air tightness of the building/house. This way it has proven to be that the ventilation can be optimised, e.g. because it is now possible to supply fresh air also from the leeside of the house.

[0010] It must be clear that the air exhaust is preferably forced, e.g. using a fan. The flow of the air exhaust can be regulated in several manners, like by adjustment of the fan (for example by running more rapidly/slowly) or by choking of the exhaust canal. From the viewpoint of minimising the energy usage, varying the energy supply to the fan is preferable. Moreover also a hybrid system is aimed at, where at sufficiently natural draught the power unit is switched off, so that extra energy is saved.

[0011] In the following the invention is commented by means of a not-restrictive implementation example. The air exhaust canal ending above the roof of a house is equipped with a ventilator. The exhaust canal contains upstream of the ventilator (i.e. in front of the ventilator inlet) an electronic pressure gauge. The terminals of this gauge have been connected (wired of wireless) to an input of a control system, of which the output has been connected to the ventilator with the purpose to control the flow of it. The control system compares the pressure measurement with a predetermined setpoint and will issue at a larger than predetermined pressure-deviation a command, to modify the flow. If the pressure is too high, respectively too lower with respect to the norm pressure, the exhaust flow must be increased respectively reduced.

[0012] The ventilation grids above the windows in the house serve as supply for fresh (outside) air. They have been equipped with a construction and/or intelligent control to prevent air flow back through the grid from the house, to that end resources are present to measure the airflow direction through the grid and in dependence of it to block the airflow through that grid.

[0013] Also it has been connected to a pre-programmed control unit with adjustment entities, with which the grids automatically (for example in infinitely many positions) are opened/closed.

[0014] The invention covers all implementations that are based on this publication.

[0015] For example an implementation is possible where the user or a control, e.g. in reaction on certain with the domestic climate related indicators, temporarily switches off/overrules the control of supply and/or exhaust.

[0016] Conceivable is a manual setting in the kitchen, e.g. to adapt the ventilation to specific circumstances, such as cooking, or moisture detection in the bathroom indicating showering/bathing, a timer on e.g. the light switch in the toilet indicating toilet usage, C02-measurement in a room, such as a living/sleeping room indicating human presence. With that extra energy saving is possible. The exhaust reacts if it has been notified with the supply that less ventilation is necessary temporarily. At need for peak ventilation however the exhaust will dominate the control. For base ventilation the supply dominates, for peak ventilation the exhaust dominates.

[0017] Also the invention covers versions, where the air supply is controlled instead of the air exhaust (therefore the counterpart of the above publication). Implementations of this can for example be inferred from the above by reading "air supply" instead of "air exhaust", and the other way round.

[0018] The following reveals of the invention more aspects that separately or as a combination of one or more of it, can be applied to a ventilation unit or system (hereafter mutually indicated with system) for ventilating the inner room, such as a chamber or domestic room of a building. In particular one or more of these aspects are applied on a ventilation unit where the, from outside supplied fresh air, preferably unforced, is guided through a canal and/or along a heating element, in particular a plate shaped or panel shaped hot water radiator mounted in the concerning room to ventilate, thus to arrive warmed up in the room to ventilate, e.g. as published NL-A-1005429, of which publication herein needs to be considered as integral. For example one or more of the aspects are applied to a ventilation unit that is covered by the main conclusion or one of the subsequent conclusions of this NL-A-1005429.

[0019] One, also to this invention appertaining system can be based on a in NL-A-1005429 revealed system, which the therein published means of adjustment are implemented as valve/stop or ventilator or may lack; and/or the therein published control unit for controlling the means of adjustment lacks or controls the means of adjustment on basis of other parameters than the pressure difference between inside and outside of the facade (e.g. based on a difference in temperature or a setting of a switch). The means of control according to NL-A-1005429 can, for this invention, be positioned possibly at other places than in the canal, like in the canal of the facade.

[0020] Also belongs to the invention an implementation, obtained by combination of one or more of the revealed measures and one or more of the in NL-A-1005429 revealed measures. The system can be intended for the supply and/or exhaust of ventilation air.

Heating behaviour/climate cycles

[0021] It is presented to apply, at least two, mutually distance keeping temperature sensors which both have been connected on the control unit of the system. Preferably those sensors are intended to measure a temperature difference. For example these sensors are positioned such with respect to the heating element, that from the temperature difference measured by these sensors the system can infer for example that the heating element is heating the room at that moment. Consequently it is possible for example that the control strategy of the system is further optimised. E.g. the heating energy usage can be reduced because during the heating season one can ventilated more economically and more optimally. Also it is possible this way for the control unit e.g. to infer how frequent the heating element is switched on to e.g. on that basis decide to establishing another ventilation capacity. E.g. this way it is possible for the control unit to determine the heating season or other season or weather impression to decide e.g. on that basis to e.g. ventilate stronger, which wastes no heating energy in the summer and rather produces often desired cooling. Or e.g. the control unit can infer the day - night rhythm to e.g. carry out night cooling in the summer, or during the heating season reduce the ventilation in the living room at night.

[0022] With two temperature sensors connected to the control unit flow back during warmth issuing by the heating element can be detected. At such flow back warmed up air will be transported by means of the system to outside, which is undesirable. To this end the sensors are preferably established such, that it can be determined that the temperature of the ventilation air upstream of the heating element is higher than downstream of it. Preferably to this end one sensor is placed close the inlet ventilation manifold for the outside air and the other sensor is placed close the exhaust opening from which the air is conducted after passage of the heating element into the space to ventilate. Also, with this aspect a better control becomes possible, which extends the life span.

Sensor type

[0023] In accordance with this aspect it is presented, to perform flow measurements, such as direction and/or range/speed, by the system with an on thermal measurement principles based, preferably electronic sensor, e.g. equipped with at least one thermocouple and preferably an element for heating the thermocouple. It has proven to be that the flow is influenced as little as possible (e.g. minimum flow resistance), which is in particular important for a good operation of a natural, i.e. unforced, ventilation system. Measuring can be carried out near at the heating element. Preferably the applied sensor is a so called thermopile, which is built from a large number of (in serial) connected thermocouples. Moreover this sensor contains a so-called heating coil, which takes care of heating the thermocouples. Preferably the thermopile is positioned on plate shaped carriers made of galvanic isolating material, e.g. a polymeric plastic, such as Kapton. The thermocouple can be made from two galvanic of each other separated, galvanic conductive materials, the conductibility of at least one of which is preferably strongly dependent of temperature variation, e.g. Constantan or Copper. A current source has been connected to the heating coil. The thermopile has been incorporated in an electronic circuit, to measure its potential difference. It has proven to be that this sensor is insensitive for pollutes, so that maintenance can be limited to a minimum. Preferably this sensor is placed in the ventilation airflow through the system.

To diminish energy consumption

[0024] In according to this aspect the control appliances for controlling e.g. the allowed quantity ventilation air or fresh air adjusted by means of a power unit, which is carried out with a self-braking property. In other words, the power unit preserves its setting and/or of its operated appliances without the necessity of electric drive energy. Thereby the valve remains, as an example of the control appliance, e.g. closed even is the wind outside blows hard, as a result of which then a torque operates on the valve that tries to open it. An example of self-braking power unit is a wormwheel transfer or spindle or (servo)motor (possible with (large) gear/reduction). In combination with favourably balanced control appliances (e.g. symmetrical butterfly valve) it is moreover conceivable, that the hold torque of a usual (non-powered) direct current or alternating current motor and/or the friction in the transmission of e.g. a servo-motor with restricted reduction, is sufficient.

Modularity

[0025] It is presented, on the basis of a limited number of standard width and/or height dimensions by mutually coupling to create the desired width and/or height of the system. In this way it is possible by keeping a limited number of stock components to equip each radiator panel on the market with the system of the invention.

[0026] Preferably a module has one, two or more, preferably mainly horizontally openings beside each other to connect itself on relevant through let for transit of fresh air through the segment against which the system is placed. Preferably those openings are themselves upstream of the control appliances for controlling the allowed quantity of fresh air. An example has been shown in the enclosed drawing fig. 1, which shows five system widths, based on two differing width modules 1, 2. With 3 are the through lets declared; with the 4 control appliances. The proportion flow through area of the flow through let(s): width module is preferably mainly constant, which e.g. is favourably for making the settings of the control unit.

[0027] It is noticed that the control appliances and/or control unit are preferably common for two or more to one entity geared up modules. If e.g. the control appliances have an open and close swerving valve, that valve (shared or not) stretches itself in length direction along both modules. Preferably, the modules connect as such to each other that there exists a lateral obstacle for airflow between modules being besides each other. On each other the connecting modules form a, preferably vertical, mainly integrated through let. E.g. this is established by connecting the edges of the modules to each other in such a way, that a segment, e.g. the back wall of the modules, vertical passes between the modules mainly fluently. In this way it deserves the preference, that the modules lack side, top or back wall (section) at the position of the connection with an adjacent module, or have such a continuing wall section.

[0028] Enclosed drawings fig. 2 + 3 show modularity in height. According to fig. 2 this is established with basic part 5 (provided with through lets 3 and/or control appliances 4) that is elongated downward using a short lengthening piece 6 and/or long lengthening piece 7. With 8 the heating panels are indicated. According to fiq. 3 this is obtained by two different, long basic parts 9 respectively 10 (equipped with through lets 3 and/or control appliances 4), elongated downward with a short lengthening piece 6 and/or long lengthening piece 7. Also telescopic lengthening in height and/or width is conceivable. Fig. 6 shows a solution for a through let with variable level of through let 3 with regard to the top of heating panel 8.

Slider

[0029] Also it deserves the preference, to make the system adaptable to several cross-sections of the heating element. To this end the system contains preferably a preferably telescopic extending canal section, preferably extending mainly in horizontal direction. Fig. 4 shows an example of this, with in the drawing on the left the extended position of the canal section 11 with which the, behind the hindmost radiator panel 8 as from through let 3 downward flowing air, is bent over 180° to flow between the two panels 8 upward and on top of the panels 8 to flow into the room. Also a separate intermediate section is conceivable, with i.e. a variable overlap.

Openings tun unit

[0030] In accordance with this aspect the system has resources for mixing air from the inner space with the fresh air. Preferably these appliances are downstream of the control appliances and/or through lets. Preferably those appliances contain one or more fixed, preferably without valve, openings in e.g. a partition of the canal through which the fresh air is conducted by the system into the room to be ventilated. Preferably those mix appliances have been carried out with flow resistance appliances which e.g. work in such a way that air flows in one through let direction more easily than in the other direction, preferably more difficult from the inside the canal to the outside. These mix appliances are situated preferably below the heating panels, e.g. in the bottom section of the canal section 11 shown in fig. 4. Preferably the mix appliances have been carried out as a large number of openings, e.g. in rows and/or columns (possibly with mutually moved rows and/or columns).

[0031] Fig. 5 shows an example of the flow resistance appliance cross-section in a side view. A section 12 of the flow canal, e.g. the bottom section of canal section 11 of fig. 4, possesses mix appliances, formed by a continuing opening 13. On the canal inside this opening has been covered partially by cover part 14, so that the opening 13 in, the in flow direction A of the, in through canal section 11 flowing fresh air turned direction, in the canal section 11 ends. Inside air can flow as a result by means of opening 13 into canal section 11 (arrow B), however fresh air will not pass section 13 by means of opening 13, since it must flow for that in a substantially deflective direction of the preference direction A.

[0032] The cover 14 can form a flow obstruction for in flow direction A flowing air in the canal section 11 in the direction parallel to direction A and/or in one or both directions perpendicular. In fig. 5 the cover 14 provides flow obstruction in all three mentioned directions. The main flow (arrow A) generates a draught, whereby the side flow (arrow B) arises.

Seal With Brushes

[0033] It is presented to equip the control appliances with a flexible edge meant to co-operate with a (considerable) less flexible counter edge. So a good seal can be realised at a little critical manufacturing tolerance, avoiding the creation of air vortices and, at nearly flow blocking control appliances, a whistling sound. E.g. that flexible edge is realised by a brush or a flexible profile of e.g. elastomer(like) material.

[0034] This aspect will work best according to the expectations with an itself mainly horizontal with its length concerning mainly the whole length, width or height of the system extending, elongated seal element, e.g. flat strip, that in its closed position with its both edges sealing where meeting with canal inner sections and is open rotational around a, between those edges extending, axis (e.g. axis of symmetry).

Temperature Sensor

[0035] It is presented, to apply at least one temperature sensor, e.g. in order to avoid freezing of the system, or for other control characteristics. Preferably this sensor is connected to the control unit of a system with a forced airflow, e.g. generated using a fan and i.e. where the supplied fresh air passes a heating element before entering the inner space. An example of such a system possesses airflow generating capability with which airflow through the heating element can be generated sufficient to be able to measure in the room at appr. 1 m distance of it a flow speed of at least 0.2 m/s, preferable at least appr. 0.5 m/s. Such a system can be obtained by adding to a, on NL-A-1005429 based system, ventilator (e.g. directly flow downward of the through let) and i.e. to remove or replace the control appliances and/or control unit by an alternative. If the temperature sensor measures a too low of a temperature, the control unit will take care that the flow speed of the ventilation air through the system will be reduced to i.e. 0 m/s.

Self-Calibration

[0036] Preferably the system contains an appliance that guarantees that temporarily and/or on a random or predetermined moment the airflow through the system and/or along a sensor of it is (mainly) absent. In this way, self-calibration of the system and/or sensor is possible. This is particularly interesting for the used sensors, like for temperature, airflow direction, airflow speed. For example each time when the control unit of the system is activated, those appliances become effective whereupon the self-calibration is carried out, whereupon the appliances release the airflow blockade. For example such appliances are a valve or other airflow control appliance.

Presence Detection

[0037] Preferably the control unit of the system has been carried out such, that the system does not allow fresh air in a such degree that air, coming after passage of the heating element in the space, has a temperature below a pre-determined threshold temperature (= comfort control). Under circumstances consequently the system will allow less fresh air than wished for optimum ventilation. In an extreme case even no fresh air will be allowed at all, e.g. when the heating element is switched off and therefore does not heat (e.g. with a valve as a control appliance this valve is than entirely closed). In a further development it is preferable to equip the control unit with a heating sensor to detect if the heating element has been switched on or off. The control unit has preferably arranged thereby as such, that if this heating sensor notes that the heating element has been switched on, the control unit works according to comfort control, and differently ensures the desired ventilation independently of the air temperature. Preferably the control unit is equipped with a manual switch with which the communication with the comfort control and/or the communication of the comfort control with the heating sensor is switched off.

Space Behind Radiator

[0038] Preferably the flow canal has a depth of less than appr. 7 or 5 cm, so that it can be placed behind, onto existing systems hung hot-water radiators. Preferably the flow canal contains at least one partition of metal plate (steel), preferably thin walled with e.g. a cross-section of at most 1 or appr. 0.75 mm. Preferably at least the front and/or back wall section is turned to the radiator is of such metal plate.

[0039] Preferably the front and/or back wall section is equipped with one or more on distance of each other (possibly integrated) stiffeners/profiles, that possibly stick out in the internal of the through let.

[0040] Preferably the flow canal close to the control appliances is locally stiffened, e.g. provided with a mainly horizontally going vaulting, pressing or similar distortion of metal plate (integrated stiffener) and/or front and back wall bridging stiffener(s). In this way a reliable connection between wall section and control appliances is guaranteed. Preferably the through let is at least appr. 25 or 50 or 75 mm wide between two opposite side wall sections. Preferably the through let contains, mainly parallel to the flow direction, flow elements such as wall sections, partitions or ribbons, that influence the Reynolds number to favour the airflow (e.g. keeps the flow laminar). Preferably with those flow elements the flow canal is subdivided in a large number of mainly parallel canals with each a width that at most amounts 3 or 2 times the depth (or reversed). Those flow elements are preferably of lightweight material, such as aluminium, plastic or paper/paperboard. The flow elements preferably also take care for stiffening of one or more sidewalls of the through let, in particular the front and back wall. The flow elements form e.g. in transfers section seen triangular, mainly vertical canals, e.g. obtained by zigzag formed folded foil of which the pikes make (line) contact with the front and back wall.

[0041] The flow elements itself are preferable downstream of the control appliances.

[0042] Preferably one of the partitions, preferably the front partition, of the flow canal, runs less far or further. Because of this a simple adaptation to different height radiators is possible (the radiator extends the involved partition so to speak). Also the mutual attachment of modules is favoured. Possible flow-, stiffening- or other elements preferably pass beyond that less far passing partition, which further favours the effect of that partition.

[0043] Preferably partition sections connect face ward or in each other's extension lying on each other, in order to influence the flow cross-section as little as possible.

[0044] Preferably the back partition has an oversized opening on which a, through the wall of the building passing, canal stub can be connected, such that there is a wide tolerance for the position of the wall through let with respect to the through let canal and with respect to each other.

[0045] Preferably the through let canal behind the radiator is hung onto the, in the wall opening sticking, canal stub.

[0046] The canal stub sticks preferably through the through let opening in the back wall into the flow canal and mounted preferably onto a flange located on the inside of the flow canal which falls over the through let opening.

[0047] Preferably, the fresh air flowing through the system passes a barrier, such as a filter - or netting structure, to stop insects or particles. Preferably, that barrier plate is plate- or sheet formed and is positioned oblique with respect to the back wall to ensure an, as big as possible, through let area. The system is suitable to contain appliances for noise reduction (for example in through let canal or flow canal), for which the usually useless space behind the radiator can be used.

Presence Dependence

[0048] A system is presented to allow fresh air into the room or to convey air from there, where it is foreseen that system has control appliances (for example shut off valve) and a control unit to control the by the system allowed ventilation air and where to that control unit a temperature sensor has been connected so that in dependence of the temperature detection the control unit sets the control appliances, where this temperature sensor measures the air temperature in the room on a distance of maximum 25 cm from the system air outflow opening in the room. Preferably this temperature sensor measures that specific air temperature outside the direct influence of the air outflow opening, e.g. outside the ventilation flow coming from the air flow opening (preferable aside of that air outflow opening).

[0049] It has proven to be that with this system one can ventilate aimed and comfortably.

[0050] Preferably this system lacks a heating element so that the ventilation air at least mainly flows into or out of the room un-preheated. Preferably this system lacks a fan or alike, so that it works with a unforced air flow. An example of such a system is the so-called window grid with automatically regulated airflow opening.

[0051] Such a system can for example possibly work such that only if warmth is available in the room sufficiently, there is ventilation. E.g. the control unit can decide to block the airflow opening entirely if the temperature sensor does not detect a preset threshold value. Thus with a suitable choice of that threshold value the ventilation can be restricted by nature in a simple manner up to moments that the room is in use and there is someone present.

Moisture-proof Fitting

[0052] Commonly, through let 3 is in an outside wall and can consequently lead to rain coming in. This will not only be the case if the through let is used to ventilate a building. For this reason the invention has not been restricted to the area of ventilation.

[0053] To avoid that rain coming in leads to problems the following is presented: Inward in the through let on distance of the outside end a passive element is placed that catches/stops penetrated rainfall from outside and transports it to the outside, preferably through the through let. Preferably that passive element has been formed such, that it gives a smallest possible resistance to the air flowing through the through let.

[0054] Preferably the passive element sticks deep into the through let, so mainly all rainfall is caught. Preferably the passive element is positioned at the bottom side of the through let. In a preference implementation, the passive element includes to this end a, on distance of the wall of the through let axial extending (first) partition (barrier) of which at least a part runs downward under a small angle of preferably between 2° and 10° or 20°, measured with respect to the horizontal, preferably the direction of outside end. The rainfall that is caught on this is then transported to outside end by gravity. Because the partition keeps a distance to the wall of the through let, the airflow through the through let experiences minimum resistance, so that a small flow resistance is guaranteed. Possibly the partition contains two, by reciprocally angles between 0° and 90° included parts, of which one runs preferably mainly horizontally.

[0055] In another preference implementation the passive element includes a radial extending (second) partition (barrier), that for examples sticks out of the wall of the through let and forms a barrier for an axial flow through the through let. Possibly the partition contains two, by reciprocally angles between 0° and 90° included parts, of which one runs preferably mainly horizontally. More preferable this partition contains three parts of which a first mainly axial, a second mainly radial and a third runs under an angle.

[0056] At combination of both partitions, preferably the second partition lies further within with respect to the first partition. The enclosed fig. 7 shows a front view respectively a side view of a cross section of through let 3 with the passive element. The through let 3 sticks horizontally through the vertical outside wall 15 and sticks out with outer end 16 outside the wall 15. The cross section of through let 3 can have every possible desired form, such as rectangular, polygonal, round or elliptic. Inward, on distance of end 16 the through let contains a first partition 17 and a second partition 18. Fresh air can flow between the partitions 17, 18 (see arrow C). Rainfall which penetrates through let 3 from the outside deeply (for example heavy showers at gale), falls on partition 17 and flows along the first oblique part of it back as from the free front edge 20 to fall on the bottom of the through let 3 and forms there a water pond. The partition 18 prevents that the water pond is blown deeper into the through let 3. If the water pond is sufficient deep, water flows along the bottom of through let 3 to the end 16 and escapes by means of e.g. a, outside the partition 15 ending, opening 19 at the bottom of through let 3. Partition 17 is flat and partition 18 has a straight edge.

[0057] It must be clear that the denotations "above", "below", "inside", "outside" being the terms indicating the orientation are related to the usual installed state. Furthermore it must be clear, that many implementation alternatives are part of the invention that are obtained with one separate measure, possibly in combination with one or more other separate measures which are revealed with this application. To such a measure belongs also the functional equivalent of it.

Claims

1. Ventilation system for ventilating a space in a building, with an air supply and an air exhaust and with resources for controlling the quantity of allowed

fresh air and/or the quantity of disposed, used air and a control unit for controlling the control appliances, where the system includes preferably one or more measurement sensors that perform measurements to air in the building and that provide an indication concerning the nature of the air supply and/or air exhaust and of which the measurement data are used by the control unit for controlling the control appliances.

2. System according to conclusion 1, where those measurement data, e.g. concerning the nature of the air supply in the direct immediacy of the air outlet, e.g. within an air exhaust canal, are collected, preferable such that a forced exhaust element does not disturb the measurement, at least mainly.

3. System according to conclusion 1 or 2, where two or more of the components air exhaust, measurement sensor and control can be incorporated, which among other things simplifies installation and where preferably a measurement value includes the air pressure, air temperature and/or airflow speed.

4. System according to conclusion 1, 2 or 3, where the air exhaust is controlled on basis of the measurement data such, that at a too low respectively too high measurement value the exhaust flow is reduced respectively increased, or vice versa.

5. System according to one of the previous conclusions, where it is taken care of that air flow back via the air supply is limited and is preferably prevented at least mainly.

6. System according to one of the previous conclusions, where it is arranged, e.g. equipped with a heater-sensor, to detect if a heating element for heating the accommodation or its (ventilation) air has been switched on.

7. System according to conclusion 6, where it is equipped with a manual switch with which the communication with the heater-sensor and/or temperature sensor is switched off.

8. System according to one of the previous conclusions, where it contains two, at a mutual distance of e.g. at least 1 cm, preferably between approximately 5 cm and approximately 1 m, sensors that measure the same property, such as temperature.

9. System according to conclusion 8, where the sensors have been placed such, that from the difference measurement of those sensors the operation activity of the system can be deducted, e.g. because one sensor measures the property within and the other sensor the property outside the accommodation.

10. System in particular according to one of the previous conclusions, where it contains one or more of the following:

- a sensor for airflow measurement, based on a thermal measurement principle;
- an adjustment element for the control appliances with a power unit with a self-blocking property;
- a modular construction made from modules placed beside and/or above each other;
- an in length adaptable canal section;
- resources for mixing of allowed fresh air with air from the accommodation, before entering the accommodation;
- control appliances with a flexible edge which is intended to cooperate with a less flexible counter edge, of which two edges are movable towards each other;
- a self-calibrating provision;
- suitable for assembly behind a heating element that is mounted with an existing suspension system;
- a sensor which measures a property, e.g. temperature, of the air in the accommodation outside the direct influence of the air supply or air exhaust;
- an element in the through let that catches/stops from outside penetrated rainfall and/or transports to the outside.

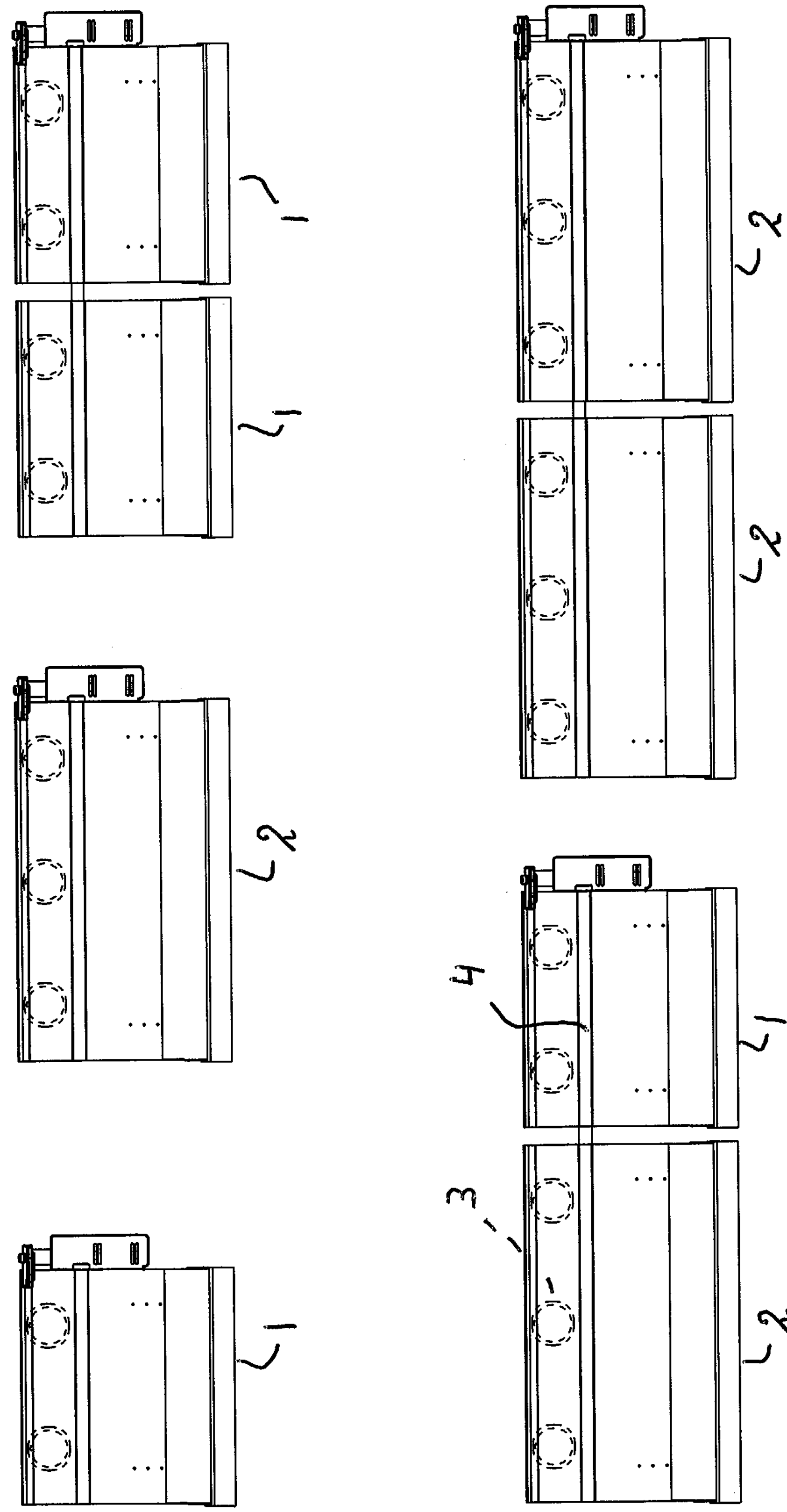

Fig. 1

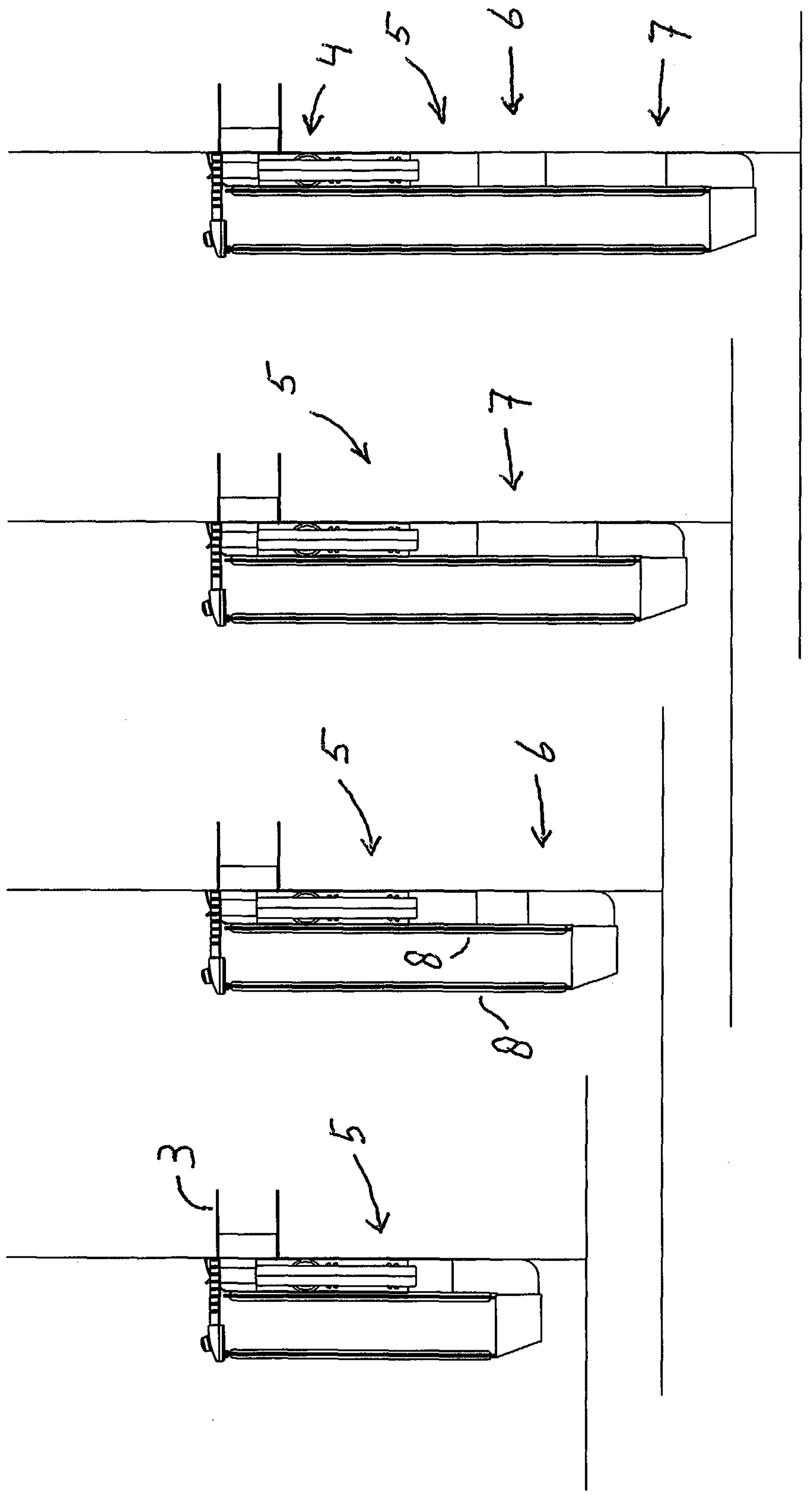

Fig. 2

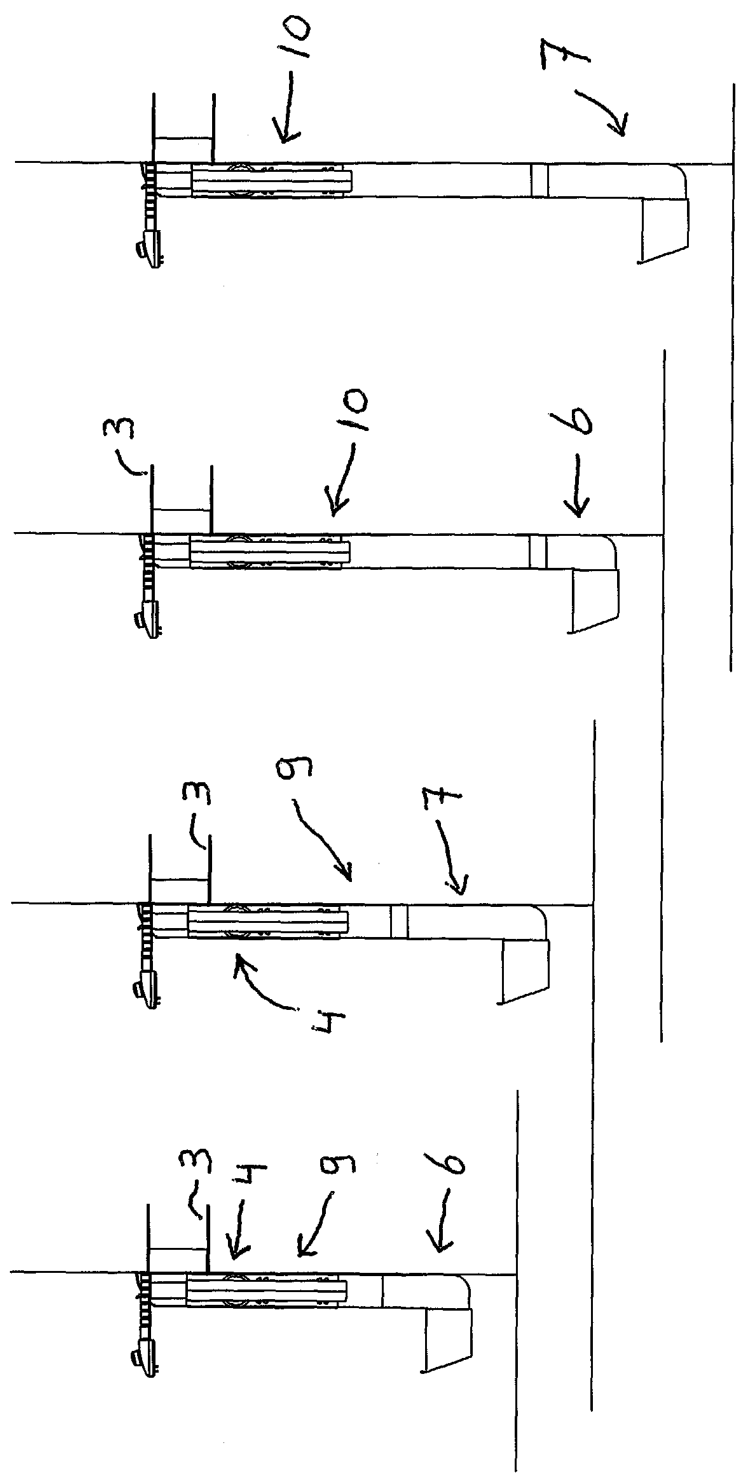

Fig. 3

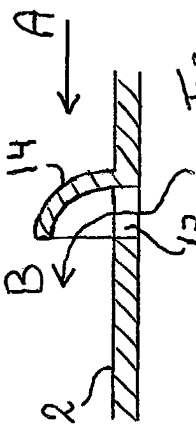

Fig. 5

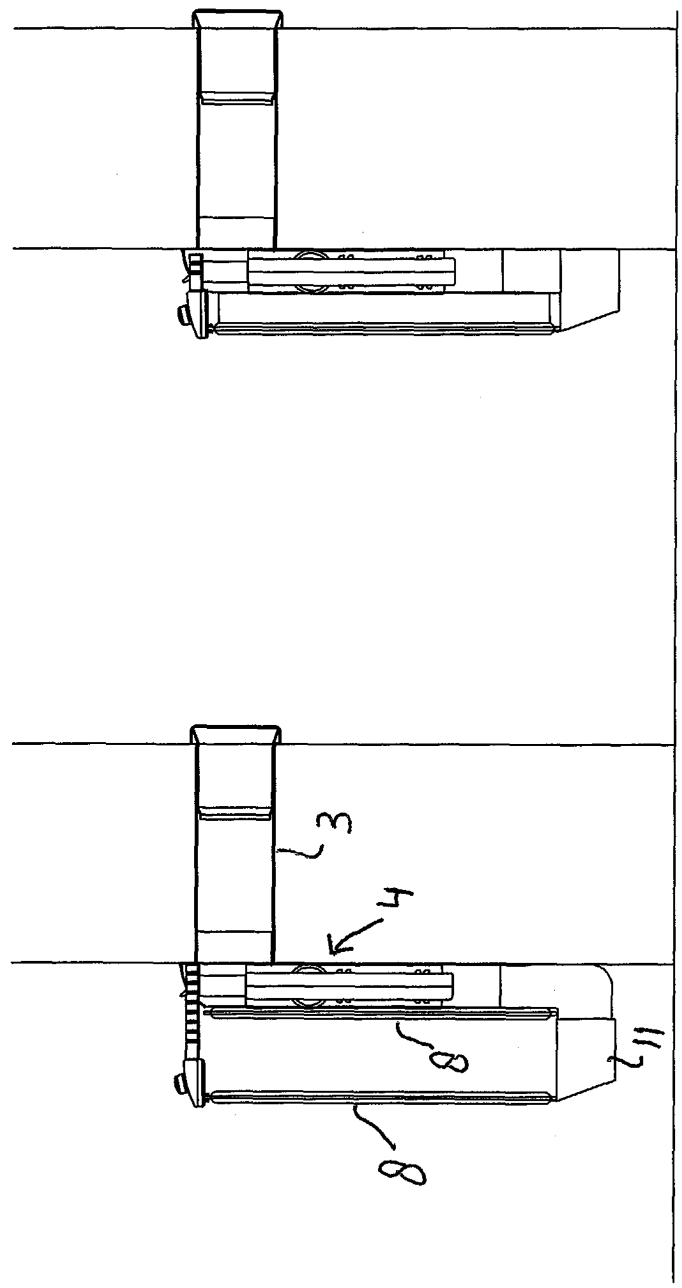

Fig. 4

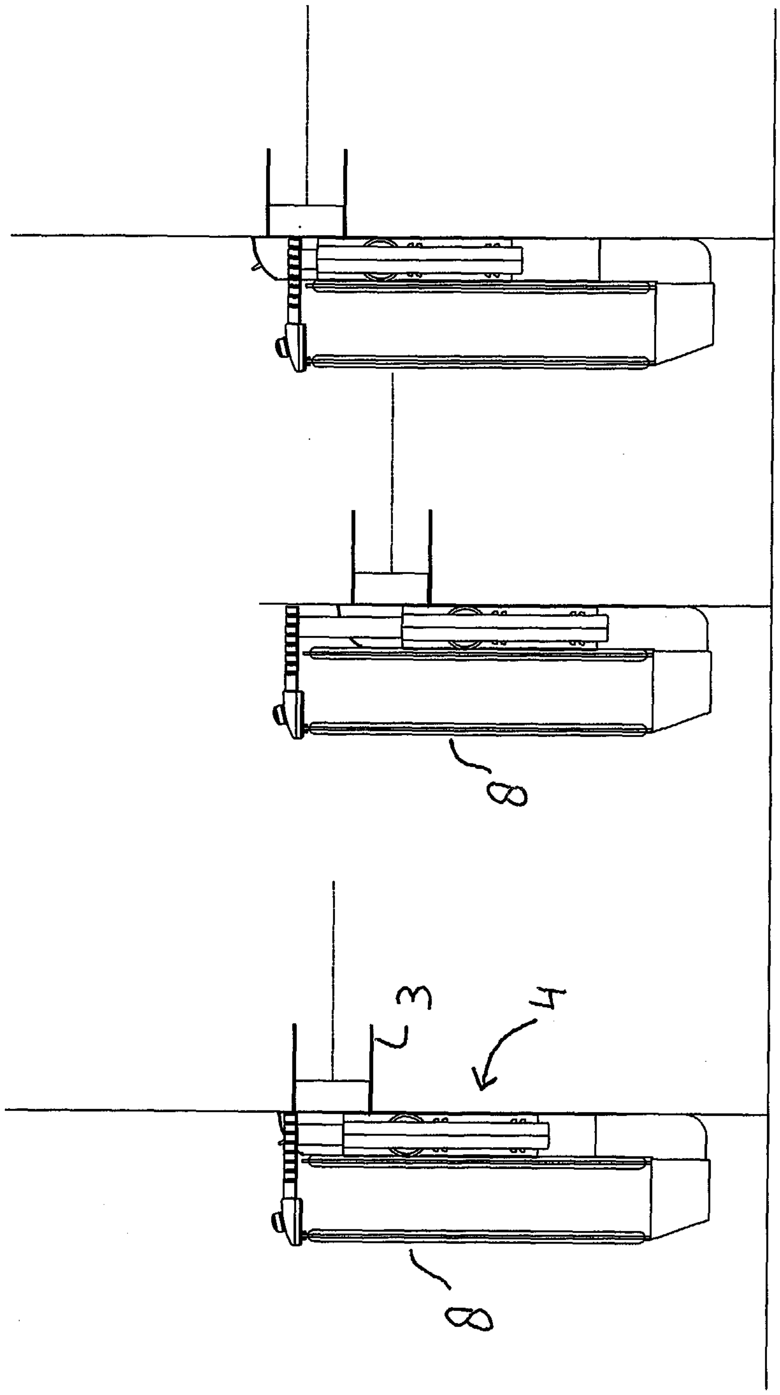

Fig. 6

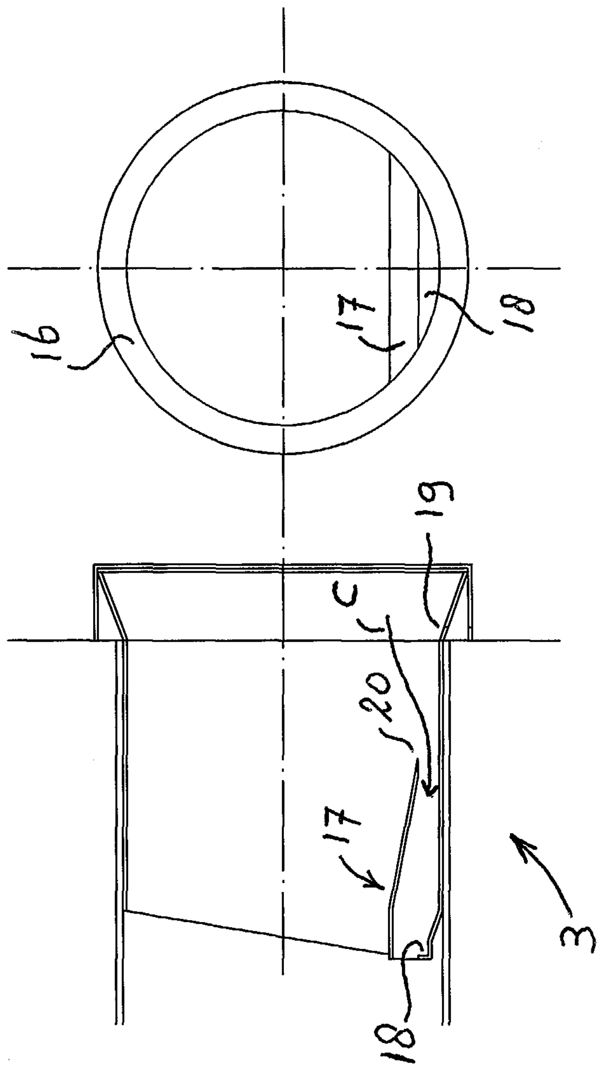

Fig. 7