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Building with a ventilation system and method for upgrading an existing building to such a building

Description

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[0001] The invention relates to a building with a ventilation system having several channels for the aeration and/or ventilation of rooms of a building. At least a first and a second air distribution point and at least one channel connecting these can be provided in a supply room for supplying and/or removing air in at least two rooms of a building, whilst at least a second channel is provided in a further room and is fluidically connected with the second air distribution point and where applicable with a further air distribution point. The invention further relates to a method for fitting a building with a ventilation system.

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[0002] Known distribution systems for fresh air in apartments and houses are differentiated in two different concepts: Either round tubes are used here which are laid in a suspended ceiling or in a wall cladding, or flat channels are used which can be laid underneath a prefabricated floor (screed floor). Occasionally air distribution systems are used which also enable an individual regulation of the individual air channel sections.

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[0003] For renovating old buildings, however, these known concepts are for various different reasons either unsuitable or connected with high expense. Thus, the visible arrangement of such air distribution systems in living rooms is regarded as visually distracting. Furthermore, technical reasons, such as the space required by such channels and/or claddings, go against the use of these known concepts when renovating old buildings. The concealed laying of such channels by slitting open walls and floors is also linked with high expense. The same applies for bringing in a suspended ceiling.

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[0004] From DE 43 43 759 A1 a ventilation arrangement is known which has a collecting channel arranged in the ceiling region of the respective room and

provided over its entire length with a channel opening in which separators, closing panels or the like can be detachably inserted.

5 [0005] In FR 2 361 511 A, in order to heat a room, it is proposed to form the walls of the room with layers spaced from one another so that an intermediate space is formed between these layers through which the spent air can be guided to an air outlet. The heat contained in the exhaust air is hereby to be discharged to the wall. However, as a result of the multi-layered wall structures this system is not suitable for retrofitting an existing building. Furthermore, the space required
10 by the multi-layered wall structure is regarded as disadvantageous.

[0006] From WO 95/10739 A1 a ventilation system is known which has intermediate spaces underneath the floor for ventilation and aeration. These intermediate spaces are each connected to several air outlets and/or exhaust air
15 inlets. As a result of the multi-layered floor structure this system is not suitable for retrofitting existing buildings. The space required by the multi-layered floor structure is furthermore regarded as disadvantageous.

[0007] The DE 38 02 583 A1 describes a window or door frame having hollow
20 chamber profiles which are configured as supply air or exhaust air channels surrounding the window or door in ring fashion. A ventilation and aeration of a room can be achieved through the heat exchange between the supply air and exhaust air with the frame as a convection recuperator.

25 [0008] The object of the present invention is to further develop a ventilation system of the type mentioned at the beginning so that it is suitable also for retrofitting in old buildings with the minimum space required and with a low fitting expense.

30 [0009] This is achieved through a building according to claim 1 as well as a method according to claim 11. According to the invention it is proposed that at least one of the channels, preferably several channels, of the ventilation system are (each) designed as a ring channel with two fluidically connected parallel

subchannels. Since the volume flow required for the aeration and ventilation can be divided up into the two parallel subchannels of the ring channel, each of these subchannels can be provided with a small cross-section so that these conduits (subchannels) can be laid in space-saving manner in the corner or edge by way of example between the wall and ceiling. The disadvantages described above of the known systems are consequently avoided with the ventilation system according to the invention. At the same time an optimum fresh air distribution is ensured to the various rooms of a home or a part of a large dwelling in a multi-storey building block. It is particularly advantageous here that the assembly can be also implemented in the occupied state owing to the low structural expense, since the comparatively small conduits or subchannels do not have to be laboriously laid in the wall. Furthermore, according to the invention, a ventilation device fluidically connected to the at least one ring channel is provided according to the invention in a supply room and is connected to at least one supply air source and/or exhaust air sink. A distributor ring channel which has at least three air distribution points is provided in a central room.

[0010] As opposed to the ventilation arrangement known from the aforementioned DE 43 43 759 A1, the (ring) channels according to the invention are however preferably constructed in modular fashion from closed pipelines and corresponding shaped pieces for plug-fit connection, that is without any channel opening extending over the entire length.

[0011] According to a particularly preferred embodiment of the invention at least one of the channels is designed as a ring channel so that an air stream to be conveyed between two air distribution points, that is by way of example between a ventilation device and a control distributor element or connecting element, can be separated into two sub-streams which can be passed through two parts of the ring channel arranged in parallel. In other words, the air stream which is to be conveyed through a channel is divided into two sub-streams, passed along in these two sub-streams, by way of example underneath the ceiling, and combined again in the second air distribution point.

[0012] It is preferred if several ring channels are provided which are each assigned to different rooms of a building. It is particularly preferred here if at least one ring channel is arranged in each of the rooms of the building which are to be aerated or ventilated, and is in fluidic connection with one or more of the
5 ring channels of the remaining rooms.

[0013] For this purpose, a central room, by way of example the hallway or corridor of a building, can be provided with a ring channel which is formed as a distributor ring channel and has at least three air distribution points. Thus, fresh
10 air can be conveyed by way of example from a supply room through a ring channel into the distributor ring channel in the hall or the like, from where ring channels are connected into the rooms adjoining the hall via further air distribution points. In order to supply a dwelling or building with fresh air and to draw off spent air, a supply room is provided in which a ventilation device is
15 arranged which is connected to at least one supply airline and/or exhaust airline and/or is connected to the surroundings as fresh air source and exhaust air sink. This ventilation device then forms a first air distribution point. A connecting element, by way of example a T-shaped control distribution element, can be provided as a second air distribution point for connecting two ring channels. The
20 supply room in which the first ring channel is laid, is more expediently a damp room, such as by way of example the bathroom, kitchen or WC.

[0014] Further air distribution points in the sense of the present invention can also be air inlets or outlets which can be integrated into the ring channels in order
25 to draw off spent air from the rooms and supply fresh air into same. For this, the ventilation system according to the invention preferably has a modular construction and consists of a plurality of interfitting elements or shaped pieces, such as adapters, curved, distributor or T-members. These elements and shaped pieces can be integrated at a suitable place into the conduits of the ring channels
30 so that aeration or ventilation can be performed at the relevant optimum place.

[0015] In order to enable a ventilation of some rooms, by way of example the damp rooms, and at the same time an aeration of other rooms, such as by way of

example living or bedrooms, it is preferred if at least one ring channel is provided in the supply room for supplying fresh air from the ventilation device, and at least one further ring channel is provided for directing spent air into the ventilation device. Depending on the position and distribution of the rooms of the building, further rooms can also each be fitted with a ring channel for the fresh air supply and a ring channel for the removal of spent air.

[0016] The channel dimensions are preferably matched with one another so that the lowest possible overall air resistance is produced in relation to the expected length of the respective ring channel and the volume flow which is to be directed through each ring channel. The air volume flow which is to be directed through the first ring channel which is attached directly to the ventilation device is then greater than or equal to the air volume flow in the ring channels connected in series. This (overall) air volume flow is separated at an infeed distributor member of the ventilation device into two individual volume flows which are each distributed into one of the two ring line directions. The air resistance and the air speed in the respective air channels are thereby considerably reduced. The dimensioning of the first ring channel can hereby be reduced correspondingly which enables the requirement of visible mounting in the room or wall region.

[0017] According to the invention further ring channels of other rooms are attached to the first ring channel which is connected directly to the ventilation device. The air volume flow to be distributed through these other ring channels is then at most equal to the (overall) air volume flow which is directed through the first ring channel. If several ring channels are linked together in series then the conduit cross-section of the ring channel closer to the ventilation device is preferably greater than or equal to the conduit cross-section of the ring channel which is connected thereto and is further away from the ventilation device. In this way slightly larger conduits, corresponding to the overall air volume flow which is to be distributed, can be used only in the supply room, by way of example the WC, bathroom or kitchen, wherein in these rooms smaller optical demands are required in any case whilst only comparatively small dimensioned channels have to be used in living rooms.

[0018] In order to clad the pipelines of the channels, matching profiles can be used which according to a preferred embodiment of the invention can already be a component part of the pipeline or shaped pieces. Various different designs of the profiles from “stucco” to “modern” can then be used. The ring channels can be fastened in the ceiling edge region by means of special holders. These holders preferably also serve at the same time to fasten an outer cladding, for example, on the basis of an L-shaped screen profile for the air ring channel itself or channel shaped pieces or T-shaped control distributor elements.

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[0019] In a building according to the invention in which several rooms are fitted with a ventilation system of the type described above, at least one ring channel is arranged running in an edge between a wall and the room ceiling and/or an edge between a wall and the room floor. A connecting element which can be formed from two T-shaped control distributor elements is then configured as a through channel passing through a wall between two adjacent rooms.

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[0020] The ventilation system according to the invention is particularly suitable for retrofitting existing buildings, by way of example within the scope of renovations.

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[0021] The invention will now be explained in further detail below with reference to an exemplary embodiment and with reference to the drawing. The single figure shows a diagrammatic illustration of a ventilation system according to the invention in a building.

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[0022] In the illustrated embodiment, the building comprises a hallway 1 with an entrance region 2, as well as further rooms which branch off from the hallway 1. These rooms are the bathroom 3, the kitchen 4, the living room 5 as well as two bedrooms 6 and 7. In order to aerate and ventilate the rooms of the building, a ventilation device 8 is provided in the bathroom 3 and is connected to inflow and outflow pipes (not shown) and the surroundings.

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[0023] A first ventilation ring channel 9 is provided in the bathroom 3 and branches off via an infeed distribution member (not shown in further detail) in or on the ventilation device 8 into two directions which form a closed ring. A connecting element 10 is provided inside the ventilation ring channel 9 in the wall
5 connecting the bathroom 3 to the kitchen 4, wherein this connecting element 10 is formed by way of example from two T-shaped control distributor elements which form a conduit passing through this wall.

[0024] A further ventilation ring channel 11 is provided in the kitchen 4 and is
10 likewise split up starting from the connecting element 10 into two sub-channels forming a closed ring. The ventilation ring channel 11 is thus in fluidic connection with the ventilation device 8 via the ventilation ring channel 9. Both in the bathroom 12 and also in the kitchen 4 there is an air inlet 12 in the first ventilation ring channel 9 and the further ventilation ring channel 11 respectively,
15 via which spent air can be drawn into the ventilation ring channels 9 and 11 and supplied to the ventilation device 8.

[0025] In a similar way, a first ventilation ring channel 13 is formed in the bathroom 3 and is again split up via an infeed distribution member on or in the
20 ventilation device 8 into two sub-channels which define the ring channel. A connecting element 10 is provided in the wall connecting the bathroom 3 to the hallway 1 and connects the first ventilation ring channel 13 to a distributor ring channel 14 which is provided in the hallway 1.

[0026] Further ventilation ring channels 15, 16 and 17, which are provided in the living room 5, the bedroom 6 and the bedroom 7, again branch off from the distributor ring channel 14 via further connecting elements 10. The further ventilation ring channels 15, 16 and 17 are then each provided with one or more outlets 18 through which fresh air can be delivered into the respective rooms.

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[0027] Since the air volume stream which is delivered through the further ventilation ring channels 15, 16 and 17 is comparatively slight, the conduit sections of these ventilation ring channels 15, 16, 17 can be formed with

comparatively small dimensions. On the other hand, the overall air volume flow for ventilating the rooms is directed both via the distributor ring channel 14 and also the first ventilation ring channel 13. The channel elements of the first ventilation ring channel 13 and the distributor ring channel 14 are therefore
5 dimensioned more expediently larger than the further ventilation ring channels 15, 16 and 17.

[0028] The further ventilation ring channel 11 for the kitchen 4 can also correspondingly be dimensioned smaller than the first ventilation ring channel 9
10 which runs in the bathroom 3 and has to take up both the air extracted from the bathroom 3 and the air extracted from the kitchen 4.

[0029] The configuration of the air channels as ring channels is based on the idea according to the invention of dividing the overall air volume flow into two air
15 volume flows in order to arrive at smaller pressure losses and smaller air conduit cross-sections. The air inlets and outlets can be configured for this purpose as separate components and can be docked more expediently onto the ring channel system. This takes place as a rule only downstream of the T-shaped control distributor elements which are integrated into the ring channels and produce a
20 connection between the individual ring channels.

[0030] A main ring channel, by way of example the distributor ring channel 14, can serve here solely as an air distributor, and thus does not have an air inlet or air outlet at the same time. The distributor ring channel 14 is particularly
25 efficient for the air distribution since this is positioned inside the building so that any other area or room, which is to be supplied, can be supplied via the connecting elements 10 formed from the T-shaped control distributor elements.

Reference numeral list:

[0031]

5	1	Hallway
	2	Entrance area
	3	Bathroom
	4	Kitchen
	5	Living room
10	6	Bedroom
	7	Bedroom
	8	Ventilation devices
	9	First ventilation ring channel
	10	Connecting element (T-shaped control distributor elements)
15	11	Further ventilation ring channel
	12	Air inlet
	13	First ventilation ring channel
	14	Distributor ring channel
	15	Further ventilation ring channel
20	16	Further ventilation ring channel
	17	Further ventilation ring channel
	18	Outlet

PATENTKRAV

1. En bygning med flere rum (1, 3, 4, 5, 6, 7) og med et ventilationssystem til luftning og udluftning af rummene (1, 3, 4, 5, 6, 7), hvor ventilationssystemet omfatter flere strømningskoblede kanaler (9, 11, 13, 14, 15, 16, 17) til luftning og udluftning af rummene (1, 3, 4, 5, 6, 7), hvor mindst en, især flere, af kanalerne er ringkanaler (13) dannet med to fluidforbundne parallelle underkanaler, hvorved en ventilationsindretning (8) er tilvejebragt i et forsyningsrum (3), som er fluidmæssigt forbundet med den mindst ene ringkanal (13) og som udgør et første luftfordelingspunkt og er forbundet til mindst en luftkilde og/eller en udluftnings dræn og hvor en fordelingsringkanal (14) er tilvejebragt i et centralt rum, der omfatter mindst tre luftfordelingspunkter (10), hvorved fordelingsringkanal (14) er fluidmæssigt forbundet med kanalerne (9, 11, 13, 14, 15, 16, 17) til luftning og udluftning af rummene (1, 3, 4, 5, 6, 7) og hvor der i forsyningsrummet (3) som et andet luftfordelingspunkt (10) er et forbindelseselement (10) tilvejebragt til forbindelses af den mindst ene ringkanal (13) med fordelingsringkanalen (14).

2. Bygning ifølge krav 1, hvor der i forsyningsrummet (3) i det mindste er tilvejebragt det første og det andet luftfordelingspunkt (8, 10, 12, 18) og i det mindste er tilvejebragt ringkanalen (9, 13) der forbinder disse, **kendetegnet ved, at** ringkanalen (13) og/eller fordelingsringkanalen (14) i det mindste er udformet som en ringkanal (13, 14) således at en luftstrøm, som skal transporteres mellem to luftfordelingspunkter (8, 10, 12, 18) kan adskilles i to understrømme, som kan føres gennem to dele af ringkanalen (13, 14) arrangeret i parallelt.

3. Bygning ifølge krav 2 **kendetegnet ved, at** de flere ringkanaler (9, 11, 13, 14, 15, 16, 17) er hver tildelt til forskellige rum (1, 3, 4, 5, 6, 7) af en bygning.

4. Bygning ifølge krav 1 eller 3 **kendetegnet ved, at** mindst en af ringkanalerne udgøres som en fordelingsringkanal (14) omfattende mindst tre luftfordelingspunkter (10).

5. Bygning ifølge et hvilket som helst af de foregående krav **kendetegnet ved at** mindst en af kanalerne eller ringkanalerne (9, 11, 13, 14, 15, 16, 17) omfatter mindst et luftindløb eller udløb (12, 18) som luftfordelingspunkt.
- 5 6. Bygning ifølge et hvilket som helst af de foregående krav **kendetegnet ved, at** i det mindste en ringkanal (13) til tilførsel af og mindst én ringkanal (9) til udledning af luft er tilvejebragt i mindst et forsyningsrum (3).
- 10 7. Bygning ifølge et hvilket som helst af de foregående krav **kendetegnet ved, at** flere ringkanaler (9, 11, 13, 14, 15, 16, 17) er efterfølgende arrangeret i serie, hvor ledningstværsnittet af ringkanalen, som ligger ved siden af ventilationsindretningen (8), fortrinsvist er større eller lig med ledningstværsnit af den tilsluttede ringkanal (11, 15, 16, 17), der ligger længere væk fra ventilationsindretningen (8).
- 15 8. Bygning ifølge et hvilket som helst af de foregående krav **kendetegnet ved at** mindst en af kanalerne (9, 11, 13, 14, 15, 16, 17) er dækket af et profileret element.
- 20 9. Bygning ifølge et hvilket som helst af de foregående krav **kendetegnet ved, at** i det mindste en ringkanal (9, 11, 13, 14, 15, 16, 17) løber i en kant mellem en væg og et loft i rummet og/eller i en kant mellem væggen og gulvet i rummet.
- 25 10. Bygning ifølge krav 9 **kendetegnet ved at** mindst et forbindelseselement (10) er udformet som en passagekanal, der gennemtrænger en væg mellem to tilstødende rum (1, 3, 4, 5, 6, 7).
- 30 11. Fremgangsmåde især til eftermontering af en bygning til en bygning ifølge et hvilket som helst af kravene 1 til 10, hvor i det mindste i nogle af værelserne (1, 3, 4, 5, 6, 7) hver af den mindst ene ringkanal (9, 11, 13, 14, 15, 16, 17) lægges i en kant mellem en væg og rummets loft og/eller i en kant mellem en væg og rummets gulv og er direkte eller indirekte forbundet med udluftningsindretningen (8).

Fig. 1

