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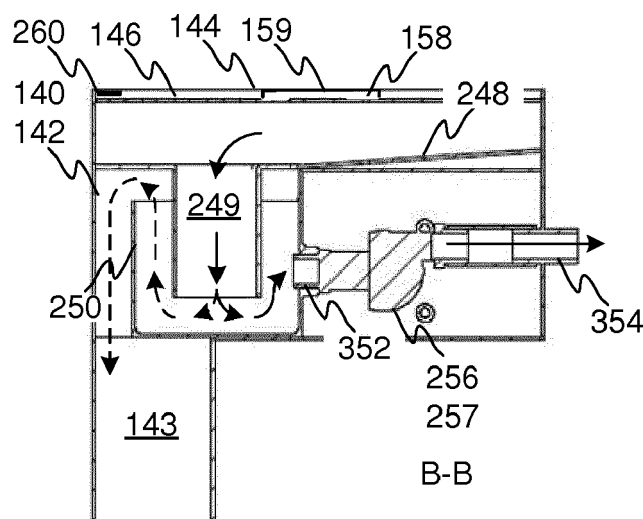
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(54) FLOOR OUTLET

(57) The invention relates to a floor outlet (140) according to an embodiment, which floor outlet comprises an outlet part (142) and a sewer connection (143). The outlet part comprises an inlet opening (144), through which water to be removed enters the floor outlet, and a sewer connection is formed in connection with the outlet part for removing drain water entering it from the floor

outlet. Additionally, the floor outlet comprises a heat recovery connection (354) and a guiding part (256). The heat recovery connection is formed in connection with the outlet part for leading water entering it to the heat recovery device (410) and the guiding part is meant for guiding water through the heat recovery connection out of the floor outlet.

**Fig. 3****EP 3 330 445 A1**

Description

Technical field

[0001] The application generally relates to a floor outlet.

Background

[0002] Traditional floor outlets installed in shower spaces are meant to guide water used in a shower, washing machine, or sink into a sewer connected to the outlet.

[0003] Outlets have a top grate covering its upper part, a surface structure designed for guiding the water that has passed through the grate, and a water seal, where the water is guided by the surface structure. Additionally, outlets have a sewer connection, with which the outlet is connected to the sewer, so that water that passes through the seal can get out of the outlet, and 2-3 side connections e.g. for a washing machine and sink.

[0004] The structure of the outlet can be realized so that water flows in it in a vertical or horizontal direction.

[0005] It is possible to use a floor outlet filter in the outlets for additionally filtering the water to be removed, which filter is installed under the grate to prevent hairs that have passed through it from entering the outlet.

Summary

[0006] One object of the invention is to solve problems in prior art and provide a smart floor outlet, by means of which it is possible to remove impurities (dirt) from the drain water and recover thermal energy more effectively.

[0007] One object of the invention is achieved with a floor outlet and heat recovery system according to the independent claims.

[0008] A floor outlet according to one embodiment comprises an outlet part and a sewer connection. The outlet part has an inlet opening, through which the water to be removed enters the floor outlet, and the sewer connection is formed in connection with the outlet part to remove drain water entering therein from the floor outlet. Additionally, the floor outlet comprises a heat recovery connection and a control part. The heat recovery connection is formed in connection with the outlet part for guiding water entering therein to a heat recovery device and the control part is meant to guide water through the heat recovery connection out from the floor outlet.

[0009] A heat recovery system according to one embodiment, which comprises a floor outlet and a heat recovery device for utilizing the drain water coming from the floor outlet. The floor outlet comprises an outlet part and a sewer connection. The outlet part has an inlet opening, through which the water to be removed enters the floor outlet, and the sewer connection is formed in connection with the outlet part to remove drain water entering therein from the floor outlet. Additionally, the floor outlet comprises a heat recovery connection and a control part.

The heat recovery connection is formed in connection with the outlet part for guiding water entering therein to a heat recovery device and the control part is meant to guide water through the heat recovery connection out from the floor outlet.

[0010] Other embodiments are presented in the dependent claims.

Brief description of the figures

[0011] Embodiments of the invention are presented further with reference to the following figures:

- Fig. 1a-1b show the floor outlet as seen from the side and from above
- Fig. 2 shows a cross-section A-A of the structure of the floor outlet
- Fig. 3 shows a cross-section B-B of the structure of the floor outlet
- Fig. 4 shows a heat recovery system

Detailed description of the figures

[0012] Fig. 1a-1b show a floor outlet (structure) 140, which is used for guiding used tap water into the sewer (sewer pipe) 429.

[0013] The outlet 140 can be installed in a space, where a connection to the sewer 429 has been formed. The space may be a bathroom, utility room, kitchen or vestibule.

[0014] The outlet 140 comprises an outlet part 142, which is meant for receiving water to be removed (drain water) which comes for example from the shower faucet 480 and has been used for washing.

[0015] The part 142 can be formed to have a cylindrical or cup-like shape.

[0016] The upper part 145 of the part 142 is meant to settle substantially at the level of the floor of the installation space when the outlet 140 is installed in the floor. An inlet opening 144 is formed in the upper part 145, through which opening the water to be removed enters the outlet 140.

[0017] The outlet 140 can comprise a top grate, which can be detachably attached to the inlet opening 144, so that the attached grate settles substantially at the level of the floor of the installation space when the outlet 140 is installed in the floor.

[0018] The grate is meant to purify the entering drain water so that with its help for example hair and solid material is separated from the water ending up in the outlet 140.

[0019] Additionally, the outlet 140 can comprise a pre-filter 146, which can be detachably installed in the inlet opening 144 just below the grate.

[0020] The filter 146 can be plate-like or round, and the surface area of the openings therein (mesh size) is significantly smaller than in the grate, i.e. it is denser than the grate.

[0021] Additionally, the filter 146 can have a center hole 158 in the middle, which prevents the outlet 140 from overflowing, if the filter 146 is clogged.

[0022] The center hole 158 can have a raised edge 159, which raises the opening of the center hole 158 higher than the structure of the rest of the filter 146.

[0023] Due to the edge 159, when the filter 146 is clogged, the water can rise on the filter 146 all the way to the height of the upper edge of the edge 159 before it can flow into the outlet 140 via the center hole 158.

[0024] The filter 146 is meant to filter the drain water coming into the outlet 140 through the grate so that with its help for example hair and solid material, which have passed through the grate, are further separated from the drain water.

[0025] Additionally, the outlet 140 comprises a sewer connection 143, which is formed in connection with the part 142 in its lower part 147, so that it can be connected to the sewer 429.

[0026] The connection 143 is meant to remove the drain water that has come into the part 142 from the outlet 140 into the sewer 429.

[0027] Additionally, the outlet 140 can comprise at least one side connection 449 formed therein, through which water to be removed from a washing machine 490 and/or a sink 490 enters the outlet 140.

[0028] There can be 2-3 side connections 449, to one of which the drain pipe 491 from a washing machine connection can be connected and to one of which the drain pipe 493 coming from a sink 492 can be connected.

[0029] Fig. 2-3 show details of the structure of the outlet 140 as cross-sections A-A and B-B.

[0030] Additionally, part 142 can comprise a water seal (trap) 250, which can due to its cup-like shape retain a certain amount of water in the seal 250.

[0031] The seal 250 is meant to prevent smell coming from the sewer from getting into the installation space through the outlet 140.

[0032] Additionally, the seal 250 is meant to guide drain water it receives into the connection 143.

[0033] The seal 250 comprises an open upper part (drain opening) 251, through which it removes drain water to the connection 143.

[0034] Additionally, the seal 250 comprises a pump connection 352, which is meant to guide drain water received by the seal 250 away from the part 142.

[0035] Additionally, the part 142 can comprise a guiding surface 248 and a guiding pipe 249.

[0036] The surface 248 is meant to guide drain water that has passed through the filter 146 to the pipe 249 connected to the surface 248, which in turn is meant to guide the drain water to the seal 250.

[0037] The surface 248 can at least partly be tilted to guide all the drain water to the pipe 249.

[0038] Additionally, the outlet 140 comprises a heat recovery connection 354, which is formed in connection with the part 142, so that it can be connected to the drain pipe 422 leading to a heat recovery device (heat ex-

changer) 410.

[0039] The connection 354 is meant for leading drain water that has entered the part 142 from the part 142 to the device 410.

5 **[0040]** Additionally, the outlet 140 can comprise a sensor part 255, which is meant for observing drain water entering the outlet 140.

10 **[0041]** The sensor part 255 comprises at least one sensor, which is used for measuring at least one of the following parameters: existence (presence, appearance), temperature, purity and surface height of drain water in the outlet 140.

15 **[0042]** The sensor part 255 can comprise a capacitive sensor, which is used for measuring surface height of the water, or a sensor functioning as an ON/OFF switch, which only informs if the surface height of the water is at the height of the sensor or above it.

20 **[0043]** The sensor part 255 is installed in the seal 250 and/or in the outlet 140 structures between the inlet opening 144 and the seal 250, e.g. in the surface 248 or the upper part 145.

[0044] The sensors of the sensor part 255 can be installed at different heights in the outlet 140 if the sensor part 255 comprises several sensors.

25 **[0045]** Additionally, the outlet 140 comprises a guiding part 256, which is meant to guide drain water received in the seal 250 through the connection 251 to the connection 354 and through there out from the outlet 140.

30 **[0046]** The guiding part 256 can be installed in a horizontal direction in connection with the seal 250, so that it is protected by the structure of the part 142 of the outlet 140.

[0047] The guiding part 256 can comprise a pump 256 and a control part (electronics) 257 for it.

35 **[0048]** The control 257 is meant to receive measurement data retrieved by the sensor part 255 regarding each measured parameter and to control the operation of the pump 256 based on the measurement data so that drain water is guided to the connection 143 and/or connection 354.

40 **[0049]** Alternatively, the guiding part 256 can comprise a motor valve and a control part for it, which is meant to receive measurement data and control the operation of the valve in the same way as the control 257.

45 **[0050]** Alternatively, the outlet 140 can comprise a pump 256, a valve and a control 257, which is meant to control the operation of the pump 256 and valve based on the received measurement data.

50 **[0051]** The control 257 can comprise a processor, a memory, where the control program is stored, and data transfer means, by means of which measurement data is received from each sensor and control commands are sent to the pump 256 and/or valve.

55 **[0052]** The processor performs the procedures determined by the control program, due to which the control 257 can receive measurement data, determine control commands based on the measurement data and send control commands to the pump 256 and/or valve in order

to control their operation.

[0053] Additionally, the outlet 140 can comprise a post-filter, which can be detachably installed between the pump 256 and connection 354 in the structures of the part 142, so that it is protected by the structures.

[0054] The surface area of the openings in the post-filter are smaller than in the filter 146, i.e. it is denser than the filter 146.

[0055] The post-filter can be plate-like, round, oval or star-shaped.

[0056] The post-filter is meant to filter the drain water exiting from the outlet 140 so that with its aid, finer solid material is further separated from the drain water, which material has passed through the grate and filter 146.

[0057] The center hole 158 of the filter 146 can be meant to guide exiting water to the seal 250, so that it does not go to the pump 256 and cause clogging of the pump 256.

[0058] Additionally, the outlet 140 can comprise a surface height sensor 260 for observing the surface height of the water on the filter 146.

[0059] The sensor 260 can be installed in the upper edge of the upper part 145 of the part 142, so that it is at the height of the filter 146, which is lower than the upper edge of the edge 159.

[0060] The sensor 260 can comprise data transfer means, by means of which it can send data to the control 257.

[0061] If the filter 146 is clogged, then the sensor 260, when it observes the water surface rising on the filter 146, sends information to the control 257, which based on the information keeps the pump 256 turned off or turns it off, so that dirty unfiltered water can not get from the outlet 140 via the pump 256 to the filtering unit 430 and the device 410.

[0062] The filter 146 and the post-filter are replaceable or self-cleaning.

[0063] Due to the outlet 140 the carbon footprint caused by purification of the sewer water is reduced, when due to the filter 146 and the post-filter the amount of impurities ending up in the sewers is reduced and less energy is used in water treatment plants for purifying cleaner sewer water.

[0064] Fig. 4 shows a heat recovery system 400, by means of which it is possible to recover thermal energy from used water.

[0065] The system 400 comprises an outlet 140 as shown in connection with the preceding figures.

[0066] Additionally, the system 400 comprises a device 410, which is meant to utilize drain water coming from the outlet 140 for preheating cold tap water.

[0067] The system 400 can comprise a filter 430, which is meant for purifying drain water going to the device 410.

[0068] The filter 430 can be a filtering unit presented in patent application FI 20165355.

[0069] Additionally, the system 400 can comprise a faucet 480, where water coming from the cold-water pipe 482, 484 and hot water pipe 481 are mixed, so that a

user gets mixed water of a desired temperature from the upper shower, hand shower or faucet tap 486.

[0070] In the system 400 the tap water coming from the faucet 480 through the shower or tap 486 goes into the outlet 140, where exceedingly cold or dirty drain water is guided to the sewer 429, and sufficiently warm and clean drain water is guided by means of the guiding unit 256 along the pipe 422 to the filter 430, where the water is further purified for the device 410.

[0071] Purified water which has passed through the filter 430 runs along the pipe 423 to the device 410, where cold water coming from the pipe 482 is preheated with its thermal energy.

[0072] Drain water that has relinquished its thermal energy is transported along the drain pipe 424 to the sewer 429.

[0073] Alternatively, water removed from the outlet 140 can be transported directly for example as flushing water to a toilet bowl or into a water tank, from where it is available for example for a toilet bowl or device 410.

[0074] Alternatively, the drain water which has relinquished its thermal energy in the device 410 can be transported to a toilet bowl as flushing water or to a tank, from where it is available for a toilet bowl or some other device, which can use purified water.

[0075] Preheated water in turn continues from the device 410 along the pipe 484 to the faucet 480, from where a user can use it as such or as mixed with hot water that has come to the faucet 480 along the pipe 481.

[0076] Drain water coming from a washing machine 490 along pipe 491 and/or from a sink 492 along pipe 493 can be used in a corresponding way as water coming from the faucet 480 for preheating cold water in the device 410.

[0077] The outlet 140 is meant to operate independently without outside control when it receives water to be removed. The pump 256 starts when its control 257 receives measurement data from a sensor of the sensor part 25, which fulfils a predetermined condition for starting the pump 256. The pump 256 is in turn turned off, when the condition is no longer fulfilled based on the measurement data.

[0078] The condition can be a certain water surface height, whereby when the water surface rises in the seal 250, the pump 256 is turned on and water starts to flow through the pump 256 instead of through the connection 143 onwards to the connection 352 and the device 410. The pump 256 shuts off when the water surface has sunk below the level of the surface height sensor functioning as an ON/OFF switch. If the power of the pump 256 is not sufficient for pumping water, the surplus water normally goes into the connection 143.

[0079] Alternatively, the condition can be the measured surface height, whereby when the water surface rises in the seal 250, the pump 256 is turned on and water starts to flow through the pump 256 and connection 354 instead of through the connection 143 to the device 410. The capacitive sensor measures the water surface height

and adjusts the pump 256 power to be suitable based thereon. When the water flow has stopped, or the water flow is very low, the pump 256 shuts off, because the water level has sunk in the seal 250 below the level predetermined as the condition for running the pump 256. The pump 256 restarts when the sensor observes more water in the seal 256.

[0080] Alternatively, the condition can be the water temperature and/or purity, whereby the pump 256 can be used for guiding water of different temperatures for example to a centralized heat recovery tank, which is situated for example in an apartment house's basement. If the temperature sensor observes that the water to be removed is too cold, and/or the optic sensor observes that it is too dirty, the pump 256 is not turned on. Thus, the water is guided directly to the connection 143. When the sensor(s) observe that the water temperature has risen, and/or the water has become cleaner, the pump 256 is turned on and the water is guided by means of the pump 256 to the connection 352.

[0081] Additionally, the system 400 can comprise flow sensors in the pipes 481, 484 going to the faucet 480 and a magnetic, motor or corresponding valve, with which it is possible to shut off the water flow.

[0082] The flow sensors comprise data transfer means, by means of which it is possible to send data to the control 257, and the valve comprises data transfer means, by means of which it is possible to receive data from the control 257.

[0083] The flow sensors are meant to observe a flow in the pipes 481, 484 when the shower or tap 486 is open and to inform the control 257 that it has observed the flow. If the sensor of the sensor part 255 which observes presence of water observes that no water is entering the outlet 140 during a predetermined time, the control 257 can deduce that the outlet 140 grate is clogged and send a command to the valve to shut.

[0084] Additionally, the system 400 can have a water tank in the pipe 491 for washing machine water.

[0085] A valve has been connected to the tank in the pipe 491, which valve is equipped with data transfer means, by means of which it is possible to communicate with the flow sensors of the pipes 481, 484 and/or control 257.

[0086] When the flow sensors in the pipes 481, 484 observe that the washing machine 490 is taking in water and send information about it to the control of the tank valve or the control 257, the valve control or control 257 commands the valve to open, so that the tank is emptied into the outlet 140. The control 257 commands the pump 256 to pump water from the tank to the device 410.

[0087] The system 400 can be integrated into different stages of process industry, for example cleaners, whereby water passing into the sewers 429 can first be treated in the outlet 140 and thereafter be transferred into the sewer system of the cleaners to be utilized.

Claims

1. A floor outlet (140), which comprises an outlet part (142) and a sewer connection (143), which outlet part comprises an inlet opening (144), through which water to be removed comes into the floor outlet, and which sewer connection is formed in connection with the outlet part for removing drain water entering it from the floor outlet, **characterised in that** the floor outlet further comprises a heat recovery connection (354) and a guiding part (256), which heat recovery connection is formed in connection with the outlet part for leading water entering it to a heat recovery device (410) and which guiding part is meant for guiding water through the heat recovery connection out of the floor outlet.
2. The floor outlet according to the preceding claim, which additionally comprises a water seal (250), which comprises a pump connection (352) for guiding drain water received by the water seal out of the outlet part and in connection with which water seal has been installed a guiding part in such a way that it is protected by the structure of the outlet part and it can guide drain water from the water seal to the heat recovery connection.
3. The floor outlet according to any of the preceding claims, which additionally comprises at least one sensor (255), which is installed in the water seal and/or between the inlet opening and the water seal in the structures of the outlet part, and which is adapted to measure at least one of the following from the drain water coming into the floor outlet: existence, temperature, purity of the water, and surface height of the water.
4. The floor outlet according to any of the preceding claims, where the guiding part comprises a pump (256) and a pump control part (257), which is adapted to control the pump based on measurement data given by at least one sensor, so that drain water is guided to the sewer connection and/or heat recovery connection.
5. The floor outlet according to any of the preceding claims 1-3, where the guiding part comprises a motor valve and a valve control part, which is adapted to control the valve based on the measurement data given by at least one sensor, so that drain water is guided to the sewer connection and/or the heat recovery connection.
6. The floor outlet according to any of the preceding

claims, which additionally comprises a top grate, which can be detachably attached to the inlet opening for purifying drain water coming into the floor outlet.

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7. The floor outlet according to any of the preceding claims, which additionally comprises a pre-filter (146), which can be detachably installed to the inlet opening for filtering drain water coming through the top grate into the floor outlet. 10
8. The floor outlet according to any of the preceding claims, in which at least one side connection (449) has been formed, through which water to be removed from a washing machine (490) and/or sink (492) comes into the floor outlet. 15
9. The floor outlet according to any of the preceding claims, which additionally comprises a post-filter, which can be detachably installed between the control part and the heat recovery connection in the structures of the outlet part. 20
10. A heat recovery system (400), which comprises a floor outlet (140) and 25 a heat recovery device (410) for utilizing drain water coming from the floor outlet, which floor outlet comprises an outlet part (142) and a sewer connection (143), 30 which outlet part comprises an inlet opening (144), through which water to be removed comes into the floor outlet, and which sewer connection is formed in connection with the outlet part for removing drain water entering it from the floor outlet, 35 **characterised in that** the floor outlet further comprises a heat recovery connection (354) and a guiding part (256), 40 which heat recovery connection is formed in connection with the outlet part for leading water entering it to a heat recovery device (410) and which guiding part is meant for guiding water through the heat recovery connection out of the floor outlet. 45

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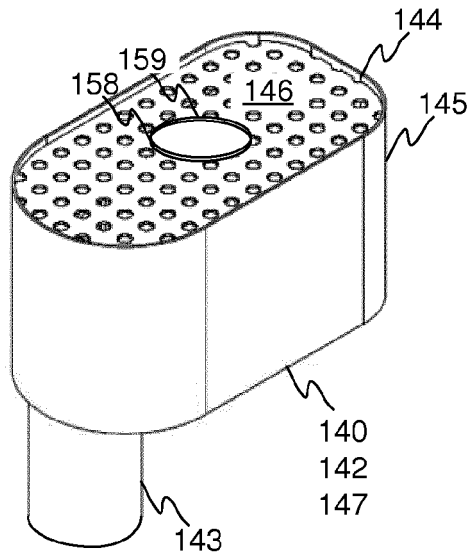


Fig. 1a

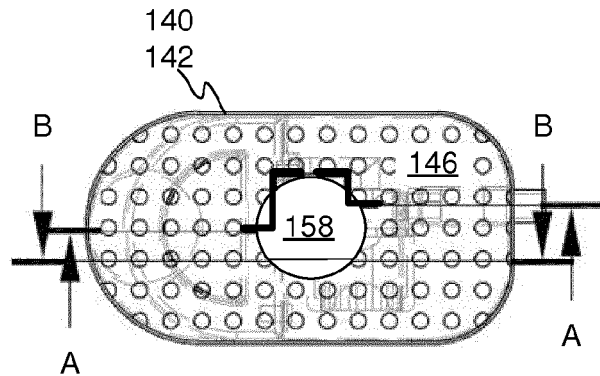


Fig. 1b

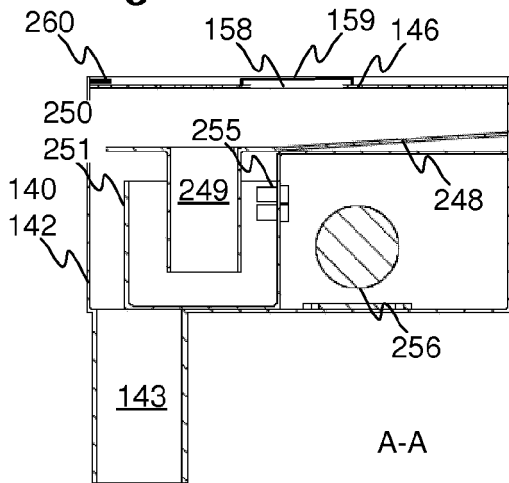


Fig. 2

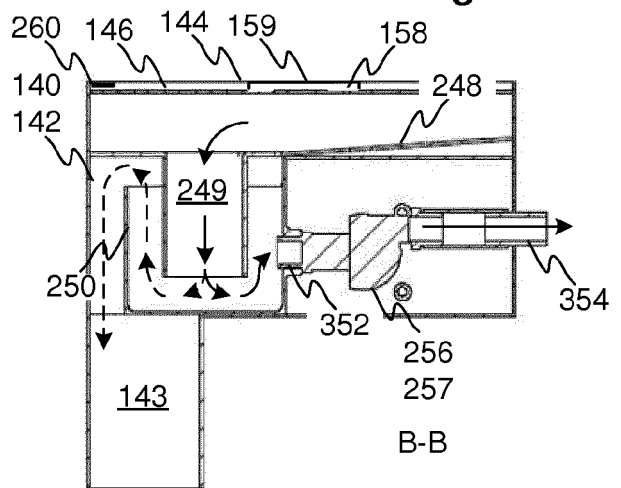


Fig. 3

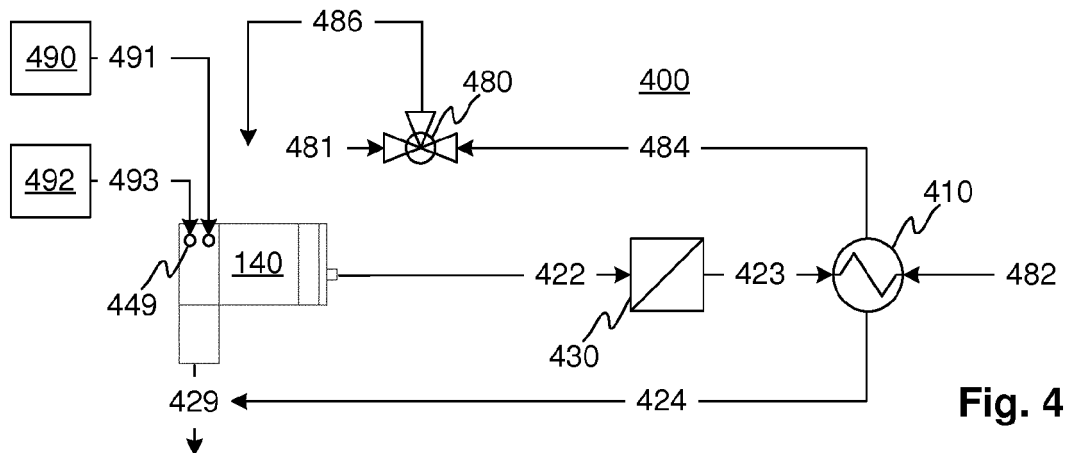


Fig. 4



EUROPEAN SEARCH REPORT

 Application Number
 EP 17 20 4579

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			TECHNICAL FIELDS SEARCHED (IPC)
			E03F E03C E03B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 26 April 2018	Examiner Flygare, Esa
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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