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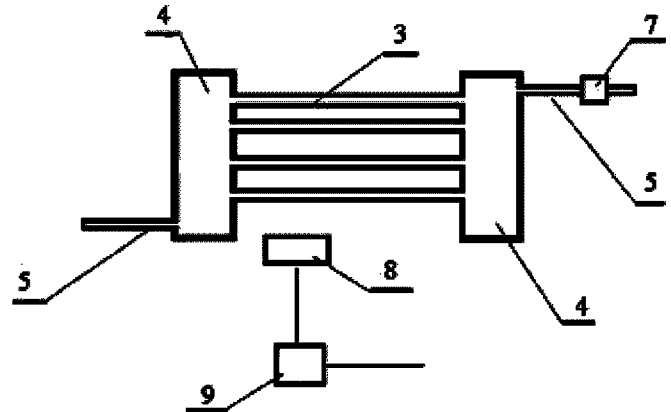
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(54) Title **Device for heating and cooling in particular for hot water central heating**

(57) Abstract

Device for heating and cooling is suitable for hot water central heating. It includes a heat exchanger consisting of several rows of tubes (3) situated at an angle not greater than 650. The tubes (3) have an aerodynamic profile. A collecting space (4) is on the sides of the heat exchanger, into which the tubes (3) discharge. It is provided with feed piping (5) and/or discharge piping (5) with a regulating element (7). The heat exchanger is made from copper or aluminium. It can contain a bellows. It contains an electric fan (8) with a regulator (9) because of air flow. The whole unit is provided with a housing.



Device for heating and cooling in particular for hot water central heating

Technical field

The invention refers to a device for heating and cooling, in particular for hot water central heating. The device is suitable for use in habitable rooms, where accent is put on efficient and aesthetical heat and cooling sources.

Existing state of engineering

Heat sources in particular central heating bodies have been made from steel sheets, which are circumferentially welded. Their disadvantage is low efficiency, respectively large dimensions required to transfer an additional amount of heat. Heat sources fabricated of iron casting are also known, however those are heavy and inefficient.

Subject matter of the invention

The above mentioned disadvantages have been removed to a great extent by device for heating and cooling, in particular for hot water central heating, according to this invention, which subject matter lies in the fact that it consists of at least one heat exchanger which is provided with a housing. Hereat the heat exchanger consists of at least one row of tubes situated towards the horizon at an angle α not greater than 65° . Each row of tubes consists of at least two tubes with aerodynamic profile formed at least in principle as a rectangle or in principle as an oval where the longer axis length in a cross section is at least two times greater than the length of the shorter axis b . The distance h between at least some tubes is not greater than 13 mm. The heat exchanger is at least on one side finished with collecting space, into which at least some tubes discharge and which is provided with supply piping and / or discharge piping.

The subject matter of the invention is also that the heat exchanger is made from material containing copper. Furthermore, it is essential that the heat exchanger is made from material containing aluminium. It is also essential that at least a part of a metal bellows is situated among some rows of tubes. It is also essential that that the supply piping and / or discharge piping is provided with a regulating element. Furthermore, it is essential that at least

one electric fan is mounted above and / or below the heat exchanger. Finally, it is essential that the electric fan is equipped with a controller for speed control.

Explanation of particular definitions used in this technical solution:

Device for heating and cooling, is such a device that transfers heat from the space in which the device is located, or it takes heat into this area. Heat transfer is accomplished using a liquid which passes through this device.

The tubes with aerodynamic profile formed in principle as a rectangle or in principle as an oval where the longer axis length in a cross section is at least two times greater than the length of the shorter axis in it are such tubes, where their section is in a preferred shape from aerodynamic point of view, when air flows towards the tube and there is an effort to make the aerodynamic resistance toward the air flow small. The ideal solution is an aero dynamical teardrop section of the tube. However, an oval shape, which is easier to manufacture, where the longer axis length in a cross section is at least two times greater than the length of the shorter axis in the cross section, is also admitted. A rectangular section of the tube is also allowed in principle, but it has to be only such a rectangle in which the length of its longer axis is at least two times greater than the length of its shorter axis.

Metal bellows.....is a metallic, thermally conductive element with a large surface that touches the tubes and thus transfers heat flowing in the tubes to its surface, which is substantially larger than the surface of the tubes. This ensures a better heat transfer from the fluid flowing in the tubes to the air.

Brief description of drawings

Figure 1 schematically shows a heat exchanger, which has a collecting space on each side, to which the tubes discharge. Feed piping and discharge piping with a regulating element are connected to the collecting space. The heat exchanger is provided with tubes situated towards the horizon at an angle α of 40° .

Figure 2 schematically shows a heat exchanger with a row of four tubes, which is provided with feed piping and discharge piping, in which the tubes are located toward the horizon at an angle α of 0° . A fan with regulating element is also evident.

Figure 3 shows a cross section of the tube with aero dynamical profile, which is formed by an oval, where the longer axis length in a cross section is at least two times greater than the length of its shorter axis b .

Figure 4 is a cross section of a heat exchanger with four rows of tubes, each row also consists of four tubes. The figure shows the distance h among the tubes. Two parts of the metal bellows are situated among some rows of tubes.

Figure 5 schematically shows a heat exchanger provided with a housing.

Examples of implementation of the invention

It was determinate to implement a hot water central heating with gas boiler with an output of 40 kW and five central heating bodies, each with an output of about 12 kW in a house. It is required to provide individual rooms with small yet powerful central heating bodies, which are able to transfer the duty of a boiler into individual rooms. For the implementation of each of the five central heating bodies is used a heat exchanger 1 consisting of four rows of tubes 3 situated towards the horizon at an angle $\alpha = 35^\circ$. The length of each tube 3 is 720 mm. Each row of tubes 3 consists of eight tubes 3 with an aero dynamical profile formed by a rectangle with rounded corners. The length of the longer axis of the tube 3 is 20 mm and the length of the shorter axis of the tube 3 is 8 mm.

The distance h between the lower row of tubes 3 and the row of tubes 3 situated above it is 10 mm. The distance h among the other rows of tubes 3 is $h = 22$ mm. All materials used are made of brass. The heat exchanger 1 is finished on both sides with a collecting space 4, in which the individual tubes 3 discharge. A metal bellows 6 is inserted between the second and third row of tubes 3. The collecting space 4 is provided with a feed piping 5 as well as discharge piping 5. All piping 5 is from copper. The discharge piping 5 is provided with a regulating element 7. Two axial electric fans 8, each provided with a regulator 9, are mounted below the heat exchanger 1. Such an exchanger is provided with a housing 2, which has an aesthetical design.

Industrial application

The invention can be used when implementing the hot water central heating systems. However, it is also suitable for use in cooling units.

PATENT CLAIMS

1. Device for heating and cooling in particular for hot water central heating **characterized in that** it consists of at least one heat exchanger (1) provided with a housing (2), whereas the heat exchanger (1) consists of at least one row of tubes (3) situated towards the horizon at an angle α not greater than 65° , whereas each row of tubes (3) consists of at least two tubes (3) with aerodynamic profile formed at least in principle as a rectangle or in principle as an oval where the longer axis length in a cross section is at least two times greater than the length of its shorter axis b , hereat the distance h between at least some tubes (3) is not greater than 13 mm, hereat the heat exchanger (1) is at least on one side finished with collecting space (4), into which at least some tubes (3) discharge and which is provided with supply piping (5) and/or discharge piping (5).
2. Device according to claim 1 **characterized in that** the heat exchanger (1) is made from material containing copper.
3. Device according to claim 1 **characterized in that** the heat exchanger (1) is made from material containing aluminium.
4. Device according to one of the preceding claims **characterized in that** at least a part of a metal bellows (6) is situated among some number of tubes (3).
5. Device according to one of the preceding claims **characterized in that** the supply piping (5) and / or discharge piping (5) is provided with a regulating element (7).
6. Device according to one of the preceding claims **characterized in that** at least one electric fan (8) is mounted above and / or below the heat exchanger (1).
7. Device according to claim 6 **characterized in that** the electric fan (8) is equipped with a regulator (9) for speed control.

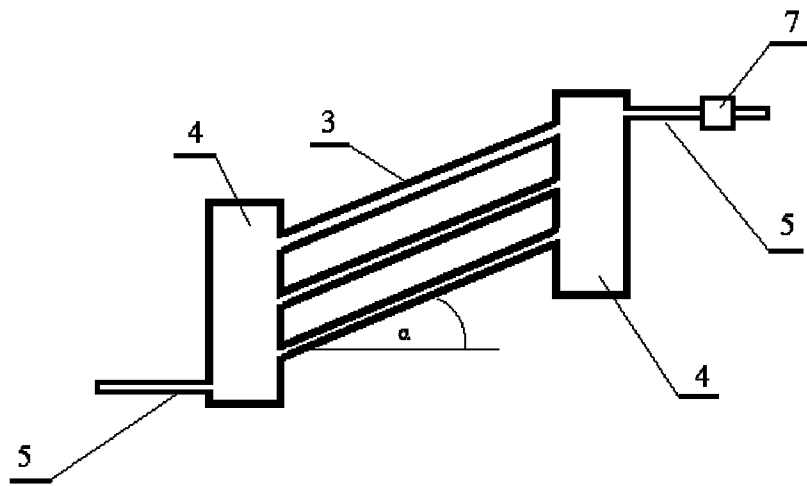


Fig. 1

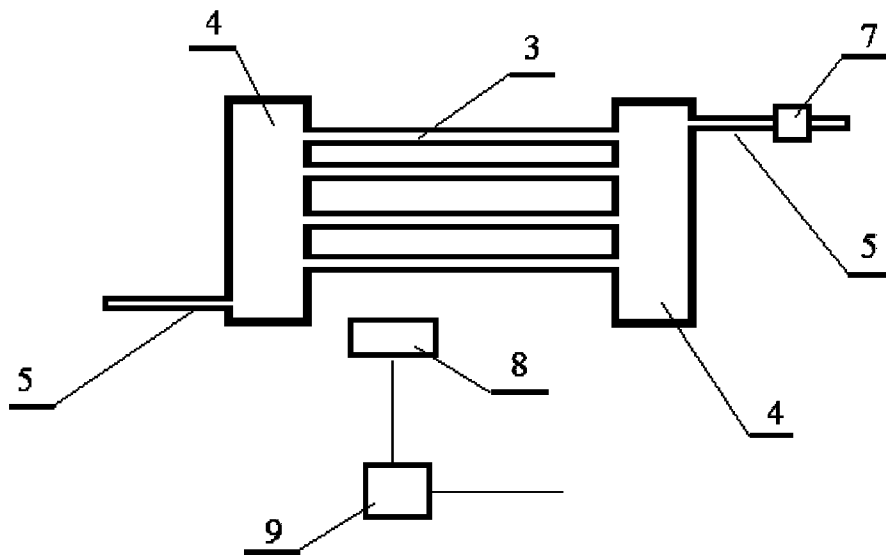


Fig. 2

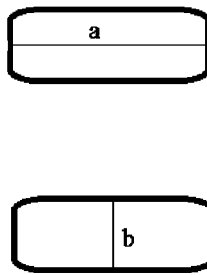


Fig. 3

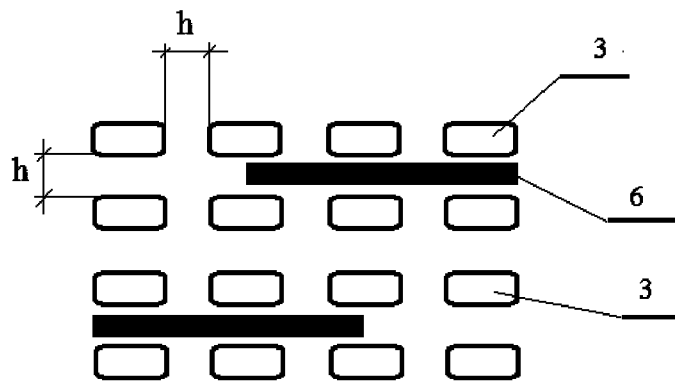


Fig. 4

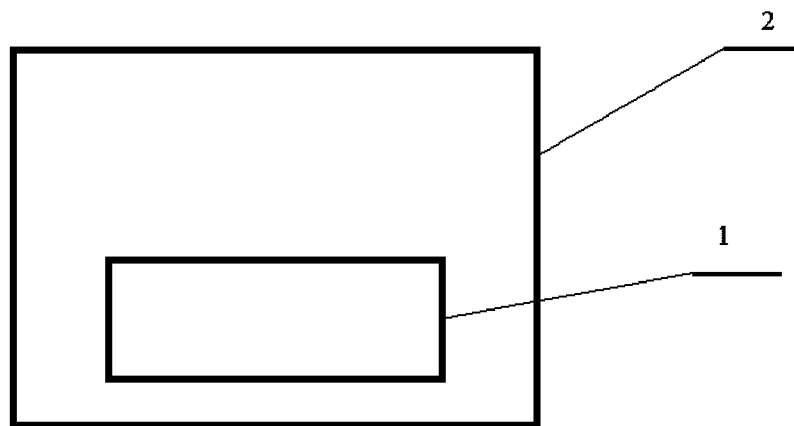


Fig. 5