

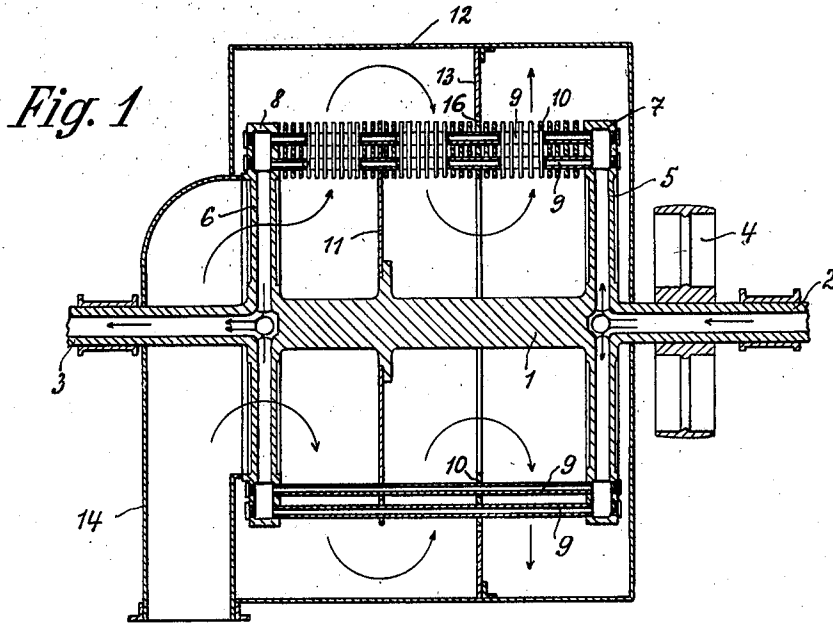
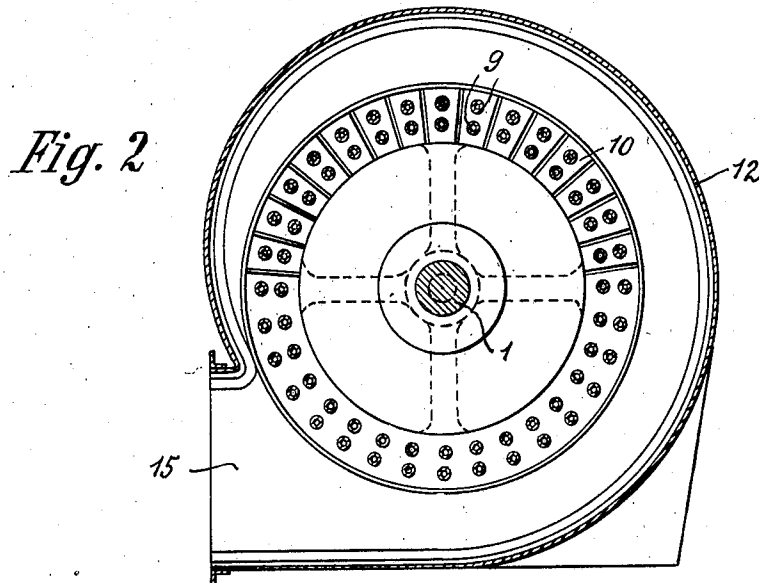
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APPARATUS FOR EXCHANGE OF HEAT

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APPARATUS FOR EXCHANGE OF HEAT

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The invention consists in improvements in an apparatus for the exchange of heat, the rotatable hollow radiator of which is arranged in a casing and acts as a fan. The radiator is provided with annular ribs arranged coaxially with and perpendicular to the axis of rotation, presenting thereby an extended heat contacting surface with the surrounding medium and offering little resistance to said medium upon rotation. According to the invention the tubes of the radiator are arranged in parallel rows and the ribs are so shaped, that they connect several tubes together and are arranged in the same radial row, thus reinforcing the tubes of the radiator against bending under the influence of centrifugal force. By having partitions arranged alternately at the inside and at the outside of the radiator the medium surrounding the radiator can be forced to flow in counter current with the medium flowing through the hollow radiator.

The invention is shown in the accompanying drawing in which Fig. 1 is a vertical axial section through the apparatus, and Fig. 2 is a side elevation, the cover being omitted.

The shaft 1 of the radiator is pivoted by means of hollow trunnions 2 and 3 serving as inlet and outlet for the water, steam or gas. A pulley 4 is mounted on and drives the shaft. Hollow arms 5 and 6 connect the hollow trunnions with the hollow rims 7 and 8, and which are connected together by means of the tubes 9 of the radiator. The tubes 9 are provided with ribs or fins 10 arranged perpendicular to the axis of the shaft and extending axially in the direction of the rotary motion, so that they cleave the medium flowing through the casing 12 and having a considerable heat radiating surface. The ribs 10 may be divided into sectors, as shown in the upper part of Fig. 2 or may be annular, as shown in the lower part of the same figure and are so arranged, that they radially connect the tubes together. This arrangement reinforces the tubes against bending under the action of centrifugal force. The radiator is divided

in axial direction in three parts of about equal size by means of an annular partition 11, connected with the shaft and a partition 13 fixed to and arranged at the inner circumference of the casing 12. The partition 13 extends to the fins but is spaced a very slight distance therefrom, as indicated at 16, to allow for rotation of the radiator. The liquid or steam to be heated enters through the trunnion 2, while the heating gases enter through the inlet 14. The heating gases drawn in are first of all forced from the chamber in front of the partition 11 of the radiator in the chamber of the casing 12 located in front of the partition 13, where an increased pressure arises due to the action of centrifugal force. The gases contained in the chamber on the other side of the partitions 13 are also forced outwardly and leave the casing through the outlet 15. In view of this a vacuum will be built up on the other side of the partition 11 of the radiator so that in the middle part of the apparatus the gases flow inwardly, as indicated by the arrows in Fig. 1. The action of the centrifugal force in the two outer compartments overcomes the action of the centrifugal force in the middle part, so that the desired flow through the apparatus is attained. The two mediums flow in opposed directions, so that a very good efficiency is attained. Instead of the two partitions shown in the example of execution any number of such partitions may be used and it is also possible to omit such partitions.

The apparatus is of course primarily adapted to heat a liquid flowing in inlet 2, arms 5, tubes 9, arms 6 and outlet 3 by means of hot gases flowing in the casing 12 as indicated by the arrows. It would, however, be possible to reverse the foregoing so that the liquid gives up its heat to heat the gases in the casing.

I claim:

1. An apparatus for the exchange of heat comprising a casing adapted to have a gas circulated therethrough; a shaft mounted to rotate in said casing and having hollow arms secured thereto; a plurality of tubes

connected to and in communication with said arms and through which a liquid is adapted to circulate; a plurality of fins on said tubes adapted to radiate heat; and an inlet and outlet in the casing for the gas which is forced through the casing by the centrifugal effect of the rotation of the tubes.

2. An apparatus for the exchange of heat comprising a casing adapted to have a gas circulated therethrough; a shaft mounted to rotate in said casing and having hollow arms secured thereto; a plurality of tubes connected to and in communication with said arms and through which a liquid is adapted to circulate; a plurality of fins on said tubes adapted to radiate heat; a partition mounted on said shaft; a partition mounted in said casing; and an inlet and an outlet in the casing for the gas which is forced through the casing by the centrifugal effect of the rotation of the tubes and the partitions forcing the gases to pass around the tubes.

3. An apparatus for the exchange of heat comprising a casing adapted to have a gas circulated therethrough; a shaft mounted to rotate in said casing, the ends of the shaft being hollow; hollow arms secured to the shaft; a plurality of tubes connected to said arms, said tubes, arms and ends of the shaft being adapted for the circulation therethrough of a liquid; a plurality of fins on said tubes adapted to radiate heat; and an inlet and an outlet in the casing for the gas which is forced through the casing by the centrifugal effect of the rotation of the tubes.

4. An apparatus for the exchange of heat comprising a casing adapted to have a gas circulated therethrough; a shaft mounted to rotate in said casing, the ends of the shaft being hollow; hollow arms secured to the shaft; a plurality of tubes connected to said arms, said tubes, arms and ends of the shaft being adapted for the circulation therethrough of a liquid; a plurality of fins on said tubes adapted to radiate heat; a plurality of partitions within the casing to cooperate with the tubes; and an inlet and an outlet in said casing for the gas which is forced through the casing by the centrifugal effect of the rotation of the tubes and the partitions forcing the gases to pass around the tubes.

5. An apparatus for the exchange of heat comprising a casing adapted to have a gas circulated therethrough; a shaft mounted to rotate in said casing, the ends of the shaft being hollow; hollow arms secured to the shaft; a plurality of tubes connected to said arms, said tubes, arms and ends of the shaft being adapted for the circulation therethrough of a liquid; a plurality of fins on said tubes adapted to radiate heat; a partition mounted on said shaft; a partition mounted in said casing; and an inlet and an outlet in said casing for the gas which is

forced through the casing by the centrifugal effect of the rotation of the tubes and the partitions forcing the gases to pass around the tubes.

6. An apparatus for the exchange of heat comprising a casing adapted to have a gas circulated therethrough; a shaft mounted to rotate in said casing, the ends of the shaft being hollow; hollow arms secured to the shaft; a plurality of tubes connected to said arms, said tubes, arms and ends of the shaft being adapted for the circulation therethrough of a liquid; a partition mounted on said shaft and extending toward and embracing the tubes; a partition mounted in said casing and extending to said tubes; and an inlet and an outlet in said casing for the gas which is forced through the casing by the centrifugal effect of the rotation of the tubes and the partitions forcing the gases to pass around the tubes.

7. An apparatus for the exchange of heat comprising a casing adapted to have a gas circulated therethrough; a shaft mounted to rotate in said casing and having hollow arms secured thereto; a plurality of tubes connected to and in communication with said arms and through which a liquid is adapted to circulate; a plurality of partitions within the casing to cooperate with the tubes; and an inlet and an outlet in the casing for the gas which is forced through the casing by the centrifugal effect of the rotation of the tubes and the partitions forcing the gas to pass around the tubes.

8. An apparatus for the exchange of heat comprising a casing adapted to have a gas circulated therethrough; a shaft mounted to rotate in said casing; a plurality of tubes mounted on said shaft adapted to rotate therewith and through which a liquid is adapted to circulate; and an inlet and outlet in the casing for the gas which is forced through the casing by the centrifugal effect of the rotation of the tubes.

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