(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 2 119 981 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
18.11.2009 Bulletin 2009/47

(51) Int Cl.:
F24J 3/00 *(2006.01)*

(21) Application number: **08475006.6**

(22) Date of filing: **13.05.2008**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MT NL NO PL PT RO SE SI SK TR
Designated Extension States:
AL BA MK RS

(71) Applicants:
- **Kachkalda, Vadym Stanislavovych**
  S. Jasenivske (UA)
- **Shylov, Yuriy Oleksiyovych**
  Donezk (UA)
- **Tatarin, Andriy Petrovych**
  91040 Lugansk (UA)
- **Sekác, Jaroslav**
  040 13 Kosice (SK)

(72) Inventor: **Shylov, Yuriy Oleksiyovych**
Donezk (UA)

(74) Representative: **Bacik, Kvetoslav**
Ul. SNP 76/21
01851 Nova Dubnica (SK)

Remarks:
Claims filed after the date of filing of the application (Rule 68(4) EPC).

(54) Rotor of heat-generator for heating of liquid

(57) Rotor of heat-generator for heating of liquid which contains a housing (2) which three basic walls and a cap (3), the first (4) and the second (5) basic walls of the housing of the rotor are opposite and the third basic wall (6) of the housing of rotor is located between the first and the second basic walls of the housing of rotor, there is an axial channel (15) in the rotor for a shaft. The first and second basic walls of the housing of rotor are executed with the external surfaces (7,8) of the walls in form of a truncated cone and with identical direction of tapering of external surfaces of walls. On the external surface (7) of the first basic wall (4) of the housing the first grooves (10) are executed for a passage-way for liquid.

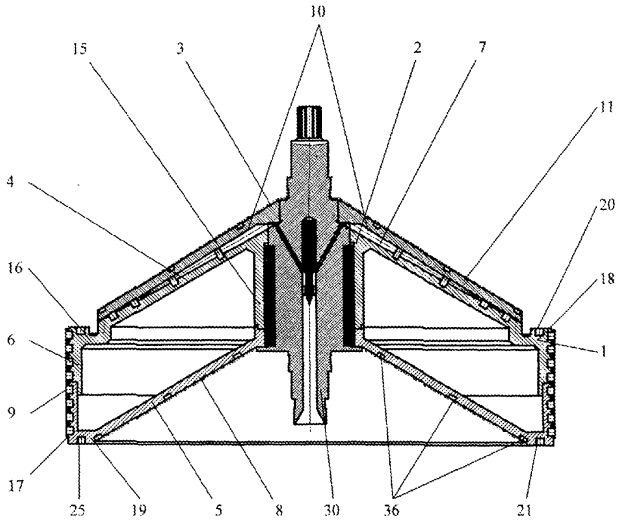

Fig.1

EP 2 119 981 A1

Description

Technical field

[0001] An invention belongs to the heating engineering devices, in particular to the devices for heating the liquid and generating steam which can be used for heat supply.

Background

[0002] For heating the houses and different industrial buildings there already have been used for a long time the heating engineering devices in which the heating of liquid and, at a necessity, generating of steam, is carried out by the transmission of heat from a hot working medium to the liquid. Thus the obligatory condition of such process is a necessity to have a working medium with a temperature more than temperature to which it is necessary to warm a liquid. The use of gases of incineration of fuel such, for example, as natural gas or fuel oil is most widespread for such working medium. The basic lack of the use of such heating engineering devices is a low coefficient of efficiency (CE), which in the best devices does not exceed 40 percents, and in most cases in the conditions of production the real CE makes only 20-25 percents. Gases of incineration of fuel after the use have a temperature far less than temperature of surrounding environments, and this heat is seldom used, the warm gases are simply thrown out in an atmosphere.

[0003] In addition, the use of gases of incineration of fuel creates an ecological problem - these gases contain the harmful oxides of nitrogen, sulphur, carbon, and the emission of unrefined gases results in contamination of atmosphere. Application of facilities and equipment for cleaning of gases of incineration of fuel complicates the installation of heat supply and increases charges for the heat supply.

[0004] As an alternative to the heating engineering devices with a hot working medium there are devices in which the warming of liquid takes place at the terms of creation of motion of liquid with certain hydrodynamic parameters, thus the kinetic energy of motion of liquid changes into thermal energy and the liquid is heated.

[0005] There are known devices for heating liquids, in which a liquid is heated, when it passes through the device, in which there is an immobile element (stator) and mobile element which is revolved (rotor). In literature such devices are often called the heat-generators. Thus, there is a known device for heating the liquid (the patent of the USA of US 6823820 B2, F22B 3/06, is published on 30.11.2004), in which a liquid is heated when it passes through a gap between the internal walls of the housing of stator and external walls of the housing of rotor. The housing of stator consists of two housing elements - the front and back ones, which are united with each other. The axial openings are made in the housing elements through which the shaft of a cylinder form passes. The front housing element has an external form o a cylinder with two walls - butt end and lateral. The internal surface of the butt end wall has a form of a ring, the internal surface of lateral wall has a form of a truncated cone. The back housing element has a form of cylinder in which one of surfaces of wall in form of a ring is internal.

[0006] At connection of the housing elements the butt end wall of front the housing element and wall of back the housing element is spatially opposite, the lateral wall of front the housing element is located between them, here an internal surface of butt end wall of front the housing element and internal surface of wall of back the housing element is perpendicular to the conditional longitudinal axis of billow. In the collected housing there is a chamber the volume of which is limited to the internal surfaces of three walls of the housing elements, and which has a form of a truncated cone.

[0007] On the shaft a rotor is fastened which is located in a chamber. A rotor is made with three walls and has a form of a truncated cone, the external surfaces of walls of which are conjugate with a gap in accordance with the internal surfaces of walls of the housing. In the housing of rotor there is the through axial channel made alignment to the longitudinal axis of the rotor the openings of which go out to two opposite walls of the housing of rotor. The shaft passes through an axial channel in the housing of the rotor. The external surface of the walls of the housing of the rotor is made smooth.

[0008] The two channels are made in the walls of front housing element of stator for an entrance and output of liquid - the channel of entrance of stream of liquid passes through the lateral wall of the front f housing element, the channel of output of liquid passes through the butt end wall of the front housing element. A liquid which enters in a device under pressure gets in gaps between the internal surfaces of walls of the housing of stator and external surfaces of walls of the housing of rotor. The flow of the liquid at a contact with the walls of rotor which is revolved begins to move in the turbulent mode. On the surface of walls of stator the motion of part of stream of liquid is decelerated and the kinetic energy of motion of liquid changes into thermal energy and the liquid is heated. The efficiency of heating of liquid in a device depends on the degree of turbulence of stream of liquid and degree of decelerating of stream of liquid - the higher degrees of turbulence and decelerating of stream of liquid in the device the more the liquid is heated.

[0009] The lack of the known device is low efficiency of heating of liquid. It is related to the structural features of device: the external surface of basic walls of rotor is made smooth and has a small area - that is why for achievement of the certain value of turbulence of stream of liquid the considerable speeds of rotation of rotor are needed, and accordingly considerable charges of energy are needed; the enter of stream of liquid to the rotor through one channel results in the unevenness of turbulence in the volume of stream of liquid and decline of degree of turbulence of stream of liquid; a device can work only in the small range of volume of speed of stream

of liquid - with change of volume speed of stream of liquid the time of contact of stream of liquid with the surface of walls of rotor at the turbulence of stream of liquid and degree of turbulence of stream of liquid which results in diminishing of degree of turbulence of stream of liquid and decline of temperature of heating of liquid.

Essence of invention

[0010] The task of invention is an improvement of the rotor of heat-generator for heating the liquid by the change of form of the housing of the rotor and implementation of elements of the housing of rotor. It will enable to promote speed of streams of liquid and increase the area of surface of rotor, with which the stream of liquid contacts.

[0011] A task is solved by the rotor of heat-generator for heating the liquid, which contains a housing which three basic walls and a cap, the first and the second basic walls of the housing of the rotor are opposite and the third basic wall of the housing of rotor is located between the first and the second basic walls of the housing of rotor, there is an axial channel in the rotor for a shaft, the first and second basic walls of the housing of rotor are executed with the external surfaces of the walls in form of a truncated cone and with identical direction of tapering of external surfaces of walls, the third basic wall of rotor is executed with the external surface of a cylinder form, on the external surface of the first basic wall of the housing the first grooves are executed for a passage-way for liquid, and the first grooves are executed so, that pass from one edge to other of external surface of the first basic wall of the housing, the cap is executed as a hollow cone with one lateral wall in which the axial opening is made, the external surface and internal one of the wall of cap are executed in form of a truncated cone, and the cap is connected with the housing so that the internal surface of the wall of cap adjoins the external surface of the first basic wall of the housing.

[0012] In addition, the housing contains additionally the first butt end wall which is located between the first and third basic walls of the housing, and the external surface of the first butt end wall of the housing is executed in form of a ring, the housing contains additionally the second butt end wall which is located between the third and second basic walls of the housing, and the external surface of the second butt end wall of the housing is executed in form of a ring, on the external surface of the first basic wall of the housing in the place of transition between the first basic wall and the first butt end wall of the housing the first circular groove is executed, which forms on the external surface of the first basic wall of the housing the surface of a cylinder form on which the coulisses of semi-cylinder form are executed with an even interval, on the external surface of the first basic wall of the housing a few rows of the first blind openings are executed so that in every row the first blind openings are spatially located on identical and certain distance from the conditional longitudinal axis of rotor for every row, thus every row of the first blind openings from the second to the last one contains the identical amount of the first blind openings and the first row of the first blind openings contains twice more blind openings than the second row of the first blind openings on the external surface of the first basic wall of the housing, the first grooves are executed as spiral grooves so that their amount equals the amount of the first blind openings in the second row of the blind openings and each of the first grooves passes from the edge of external surface of the first basic wall of the housing consistently through one first blind opening in every row of the first blind openings and finishes near the coulisse of semi-cylinder form.

[0013] Moreover, on the external surface of the first wall of the housing the additional grooves are executed, thus every additional groove passes consistently through one blind opening of the second and first rows of the first blind openings and finishes near the coulisse of a semi-cylinder form, and the additional grooves pass through such blind openings in the first row of the first blind openings and finish near such coulisses of a semi-cylinder form, through which the first grooves do not pass and near which they do not end.

[0014] Moreover, on the external surface of the first butt end wall of the housing the row of the second blind openings and of the second grooves is executed, thus the second blind openings are executed so that the longitudinal axes of all of the blind openings are located on identical distance from the conditional longitudinal axis of rotor, the second grooves are made so that one groove and longitudinal axes of grooves passes through every second blind opening and is located under an identical corner in relation to conditional radial lines, conducted from axes of the second blind openings to the conditional longitudinal axis of the rotor.

[0015] In addition, on the external surface of the third basic wall of the housing a few rows of the third blind openings, the third grooves and the second circular grooves are executed, all of rows of the third blind openings have an identical amount of the blind openings, and the third blind openings in every row are located so that axes of the third blind openings are in the plane of conditional circle at identical distance to each other and displaced in relation to the axes of the third blind openings in nearby rows at a certain step, the third grooves are executed so that the amount of grooves equals the amount of the blind openings in the row of the third blind openings and each of the third grooves passes from one to other edge of external surface of the third basic wall of the housing consistently through one blind opening in every row of the third blind openings, the second circular grooves are located between the rows of the third blind openings.

[0016] In addition, on the external surface of the wall of cap a few rows of the fourth blind openings are executed so that in every row the fourth blind openings are spatially located on identical and certain distance for eve-

ry row from the conditional longitudinal axis of the rotor.

[0017] In addition, on the external surface of the second basic wall of the housing a few rows of the fifth blind openings are executed so that in every row the fifth blind openings are spatially located on identical and certain distance from the conditional longitudinal axis of rotor for every row.

[0018] In addition, on the external surface of the second butt end wall of the housing the row of the sixth blind openings is executed, and the sixth blind openings are executed so that the longitudinal axes of all of the sixth blind openings are located on identical distance from the conditional longitudinal axis of the rotor.

[0019] New substantial signs in an invention have the following connection with the declared technical result:

the presence of the blind openings and grooves on the external surfaces of walls of rotor considerably increases the area of surface of rotor, with which the stream of liquid contacts and the degree of turbulence of stream of liquid is accordingly increased.

an implementation of the first basic wall of the housing of rotor in form of a truncated cone allows and the first grooves as spiral grooves to increase length of first grooves on the external surface of the first basic wall, and accordingly additionally to speed up the streams of liquid and increases the degree of turbulence of streams of liquid;

the presence of the cap form the internal channels in the rotor that additionally speeds up the streams of liquid and increases the degree of turbulence of stream of liquid;

List of figures of drafts

[0020]

Fig.1 is a side-view of rotor in collection with a shaft in a section.

Fig.2 is an above-view of the first basic and first butt end wall of the housing from above.

Fig.3 is a side-view of overhead element of the housing in a cut section.

Fig.4 is a view of separate area B on the surface of the first basic and first butt end walls of the housing on Fig.2 in the expanded scale.

Fig.5 is a view of separate area B on Fig.3 in the expanded scale.

Fig.6 is a cut by the line of G-G on Fig.4 in the expanded scale.

Fig.7 is a cut by the line of A-A on Fig.3 in the expanded scale.

Fig.8 is a side-view of cap.

Fig.9 is an above-view of cap.

Fig.10 is a general view of heat-generator for heating of liquid in a cut section.

Examples of realization of invention

[0021] On figures 1-9, as an example, the one of possible variants of implementation of rotor of heat-generator for heating of liquid is shown and the possible variants of implementation of separate elements of rotor are given.

[0022] Rotor **1** of heat-generator for heating of liquid (Fig. 1) consists of the housing **2** and the cap **3**. The housing contains the three basic walls - the first basic wall **4**, the second basic wall **5** and the third basic wall **6**. The first and second basic walls of the housing are opposite. The third basic wall of the housing is located between the first and second basic walls of the housing.

[0023] The first and second basic walls of the housing are made with external surfaces **7** and **8** in form of a truncated cone and with identical direction of tapering of external surfaces of the walls. The third basic wall **6** of the housing is made with an external surface **9** of cylinder form. The second and third basic walls of the housing simultaneously are the second and third walls of the rotor, and the external surfaces of the second and third basic walls of the housing are the external surfaces of the second and third walls of rotor.

[0024] On the external surface **7** of the first basic wall of the housing the first grooves **10** are made for a liquid passage-ways which pass from one edge to other edge of external surface of the first basic wall of the housing.

[0025] A cap **3** (Fig. 1,8) is made as a hollow cone with one lateral wall **11**, in which the axial opening **12** is made. External and internal surfaces **13** and **14** of walls of cap are made in form of a truncated cone. The cap **3** is connected with the housing so that the internal surface **14** of the wall of cap adjoins to the external surface **7** of the first basic wall of the housing of rotor.

[0026] Thus the internal surface of the wall of cap covers the opened parts of the first grooves **10** on the external surface of the first basic wall of the cap with formation of internal channels in the rotor.

[0027] An axial channel **15** is made for a shaft **30** in the housing. The shaft **30** is made in such way which executes the functions of turbulence promoter and distributor of stream of liquid and through it a liquid passes in the internal channels of the first wall of rotor.

[0028] Presence of internal channels in the rotor, through which the stream of liquid passes, leads at the rotation of rotor (due to influence on the streams of liquid of centrifugal force) to the acceleration of streams of liquid, which speeds up the streams of liquid and increases the degree of turbulence of streams of liquid, implementation of the first basic wall of the housing of rotor in form of a truncated cone allows to increase length of internal channels in the rotor, and accordingly additionally to speeds up the streams of liquid and increases the degree of turbulence of streams of liquid.

[0029] For simplification of making of the housing it can consist of overhead element **16** and lower element **17** that are united between them. For simplification of

explanation of possible variants of implementation of separate elements of the housing on Fig.3 the view of overhead element is shown.

[0030] As a variant, the housing can contain additionally the first and second butt end walls **18** and **19** (Fig. 1). The first butt end wall **18** of the housing is located between the first **4** and third **6** basic walls of the housing. The external surface **20** of the first butt end wall **18** of the housing is made in form of a ring. The second butt end wall **19** is located between the third **6** and second 5 basic walls of the housing. The external surface **21** of the second butt end wall **19** of the housing is made in form of a ring.

[0031] On the external surface of the first butt end wall of the housing the row of the second blind openings **22** and the second grooves **23** (Fig. 2,4) can be made, and the second blind openings are made so that the longitudinal axes of all of the second blind openings are located on identical distance from the conditional longitudinal axis **24** of the rotor, and the second grooves are made so that through every blind opening one groove passes and longitudinal axes of grooves are located under an identical corner in relation to conditional radial lines, conducted from axes of the blind openings to the conditional longitudinal **24** axis of the rotor.

[0032] On the external surface **21** of the second butt end wall of the housing the row of the sixth blind openings **25** can be made (Fig. 1), which is made alike to the row of the second blind openings **22** of the external surface of the first butt end wall **18**.

[0033] On the external surface **7** of the first basic wall of the housing in the place of transition between the first basic and first butt end walls of the housing the first circular groove 2**6** can be made (Fig. 2,3,4,5). The circular groove forms on the external surface of the first basic wall of the housing the surface **27** of a cylinder form, on which the coulisses **28** of semi-cylinder form are made with an even interval (Fig. 2,4,5).

[0034] In addition, on the external surface **7** of the first basic wall of the housing a few rows of the first blind openings **29** can be made (Fig. 2). The rows of the first blind openings are made so that in every row the first blind openings are spatially located on identical and certain distance from the conditional longitudinal axis **24** of rotor for every row, every row of the blind openings **29** from the second to the last one contains the identical amount of the blind openings, the first row of the blind openings **29** contains blind openings twice more than the second row of the blind openings and amount of coulisses **28** equals the amount of the blind openings in the first row of the first blind openings **29**.

[0035] In addition, the first grooves on the external surface **7** of the first basic wall of the housing can be made as spiral grooves (Fig. 2). First grooves **10** are made so that their amount equals the amount of the blind openings in the second row of the first blind openings **29** and each of first grooves **10** passes from the edge of external surface 7 of the first basic wall of the housing consistently through one blind opening in every row of the first blind openings **29** and ends near the coulisse **28**. Implementation of grooves **10** as spirals accordingly results in formation of internal channels of spiral form in the rotor. It increases the speed of streams of liquid on an exit from internal channels and increases the degree of turbulence of the stream of the liquid.

[0036] In addition, on the external surface of the first wall of the housing the additional grooves **31** can be made (Fig. 2). Additional grooves **31** are made so that every additional groove passes consistently through one blind opening of the second and first rows of the first blind openings **29** and ends near the coulisse **28** of a semi-cylinder form, here additional grooves **31** pass through such blind openings in the first row of the first blind openings **29** and coulisse **28**, through which the first grooves **10** do not pass and near which they are not ended.

[0037] In addition, on the external surface **9** of the third basic wall of the housing a few rows of the third blind openings **32**, the third grooves **33** and second circular grooves **34** can be made (Fig. 3,7). All the rows of the third blind openings **32** have an identical amount of the blind openings, and the blind openings in every row are located so that axes of the blind openings are in the plane of conditional circle at the identical distance to each other and are displaced in relation to the axes of the third blind openings **32** in nearby rows at a certain step. The third grooves **33** are made so that the amount of grooves equals the amount of the blind openings in the row of the third blind openings **32** and each of the third grooves **33** passes from one to other edge of external surface **9** of the third basic wall of the housing consistently through one blind opening in every row of the third blind openings **32**. The second circular grooves **34** are made so that they are located between the rows of the third blind openings **32**.

[0038] In addition, on an external surface **13** the walls of cap a few rows of the fourth blind openings **35** can be made (Fig. 8,9). In every row the fourth blind openings **35** are spatially located on identical and certain distance from the conditional longitudinal axis **24** of rotor for every row.

[0039] In addition, on the external surface 8 of the second basic wall of the housing a few rows of the fifth blind openings **36** are made (Fig. 1), they are made like the rows of the fourth blind openings **35** on the external surface **13** of wall of cap.

[0040] The presence of the blind openings and grooves on the external surfaces of walls of rotor considerably increases the area of surface of rotor, with which the stream of liquid contacts and the degree of turbulence of stream of liquid which results in the increase of efficiency of transformation of kinetic energy of motion of stream of liquid in thermal energy and increase of temperature of heating of liquid.

[0041] The example of work of rotor of heat-generator is shown on Fig. 10, where the general view of heat-generator is represented. The rotor **1** is located in the

stator **37**, the internal surfaces of walls of which are conjugated with a gap with the external surfaces of the walls of the rotor. An engine (it is not shown) drives the shaft **30** of heat-generator and rotor **1** of heat-generator into the rotation. Liquid, for example, water, is driven by a pump to the entrance of the branch pipe **38** for a liquid. Passing through the entrance branch pipe, the flow of liquid gets in the axial channel **39** of the shaft. Then the general stream of liquid is distributed into a few even streams and passes through radial channels **40** in the housing of the shaft, whereupon streams get in internal channels **41** of the rotor. In internal channels the streams of liquid move in direction from the axis of the shaft rotation. As a result of the rotation of rotor the streams of liquid in internal channels **41** get an additional centrifugal acceleration and due to it there is an increase of speed of streams of liquid and the degree of turbulence of streams of liquid rises.

[0042] Afterwards the internal channels of rotor the streams of liquid go out on the external surface of the first wall of rotor and get in a gap between the external surfaces of wall of rotor and internal surface of wall of stator, where on the walls of the stator there is slowing down of part of the stream of liquid and the liquid is heated. The heated liquid goes out from the heat-generator through a channel **42** in the wall of stator.

[0043] The given examples only illustrate the invention but they do not limit it.

Claims

1. Rotor of heat-generator for heating of liquid, which contains a housing which three basic walls, the first and second basic walls of the housing of the rotor are opposite and the third wall of the housing of rotor is located between the first and second basic walls of the housing of rotor, there is an axial channel in the rotor for a shaft, **characterized in that** the rotor (1) contains additionally a cap (3), the first and second basic walls (4,5) of the housing (2) are executed with the external surfaces (7,8) of the walls in form of a truncated cone and with the identical direction of tapering of external surfaces of the walls, the third basic wall (6) of housing (2) is executed with the external surface (9) of cylinder form, on the external surface (7) of the first basic wall (4) of the housing the first grooves (10) are executed for a passageway for liquid, and the first grooves (10) are executed so, that pass from one edge to other of external surface (7) of the first basic wall (4) of the housing, the cap (3) is executed as a hollow cone with one lateral wall (11) in which the axial opening (12) is made, the external surface (13) and internal one (14) of the wall of cap (3) are executed in form of a truncated cone, and the cap (3) is connected with the housing (2) so that the internal surface (14) of the wall of cap (3) adjoins the external surface (7) of the first basic wall (4) of the housing (2).

2. Rotor of heat-generator for heating of liquid according to claim 1, **characterized in that** the housing (2) contains additionally the first butt end wall (18) which is located between the first (4) and third (6) basic walls of the housing (2), and the external surface of the first butt end wall (20) of the housing is executed in form of a ring, the housing (2) contains additionally the second butt end wall (19) which is located between the third (6) and second (5) basic walls of the housing, and the external surface of the second butt end wall (21) of the housing is executed in form of a ring, on the external surface (7) of the first basic wall (4) of the housing in the place of transition between the first basic wall (4) and the first butt end wall (18) of the housing the first circular groove (26) is executed, which forms on the external surface (7) of the first basic wall (4) of the housing (2) the surface of a cylinder form (27) on which the coulisses (28) of semi-cylinder form are executed with an even interval, on the external surface (7) of the first basic wall (4) of the housing a few rows of the first blind openings (29) are executed so that in every row the first blind openings (29) are spatially located on identical and certain distance from the conditional longitudinal axis (24) of rotor (1) for every row, thus every row of the first blind openings (29) from the second to the last one contains the identical amount of the first blind openings (29) and the first row of the first blind openings (29) contains twice more blind openings than the second row of the first blind openings (29) on the external surface (7) of the first basic wall (4) of the housing, the first grooves (10) are executed as spiral grooves so that their amount equals the amount of the first blind openings (29) in the second row of the blind openings and each of the first grooves (10) passes from the edge of external surface (7) of the first basic wall (4) of the housing consistently through one first blind opening (29) in every row of the first blind openings (29) and finishes near the coulisse (28) of semi-cylinder form.

3. Rotor of heat-generator for heating of liquid according to claim 2, **characterized in that** on the external surface (7) of the first wall (4) of the housing (2) the additional grooves (31) are executed, thus every additional groove (31) passes consistently through one blind opening of the second and first rows of the first blind openings (29) and finishes near the coulisse (28) of a semi-cylinder form, and the additional grooves (31) pass through such blind openings in the first row of the first blind openings (29) and finish near such coulisses (28) of a semi-cylinder form, through which the first grooves (10) do not pass and near which they do not end.

4. Rotor of heat-generator for heating of liquid accord-

ing to any claims 2-3, **characterized in that** on the external surface of the first butt end wall (20) of the housing the row of the second blind openings (22) and of the second grooves (23) is executed, thus the second blind openings (22) are executed so that the longitudinal axes of all of the blind openings are located on identical distance from the conditional longitudinal axis (24) of rotor (1), the second grooves (23) are made so that one groove and longitudinal axes of grooves passes through every second blind opening and is located under an identical corner in relation to conditional radial lines, conducted from axes of the second blind openings (22) to the conditional longitudinal axis (24) of the rotor (1).

5. Rotor of heat-generator for heating of liquid according to any claims 1-4, **characterized in that** on the external surface (9) of the third basic wall (6) of the housing (2) a few rows of the third blind openings (32), the third grooves (33) and the second circular grooves (34) are executed, all of rows of the third blind openings (32) have an identical amount of the blind openings, and the third blind openings (32) in every row are located so that axes of the third blind openings (32) are in the plane of conditional circle at identical distance to each other and displaced in relation to the axes of the third blind openings (32) in nearby rows at a certain step, the third grooves (33) are executed so that the amount of grooves equals the amount of the blind openings in the row of the third blind openings (32) and each of the third grooves (33) passes from one to other edge of external surface (9) of the third basic wall (6) of the housing (2) consistently through one blind opening in every row of the third blind openings (32), the second circular grooves (34) are located between the rows of the third blind openings (32).

6. Rotor of heat-generator for heating of liquid according to any claims 1-5, **characterized in that** on the external surface (13) of the wall of cap (3) a few rows of the fourth blind openings (35) are executed so that in every row the fourth blind openings (35) are spatially located on identical and certain distance for every row from the conditional longitudinal axis (24) of the rotor (1).

7. Rotor of heat-generator for heating of liquid according to any claims 2-6, **characterized in that** on the external surface (8) of the second basic wall (5) of the housing (2) a few rows of the fifth blind openings (36) are executed so that in every row the fifth blind openings (36) are spatially located on identical and certain distance from the conditional longitudinal axis (24) of rotor (1) for every row.

8. Rotor of heat-generator for heating of liquid according to any claims 3-7, **characterized in that** on the external surface of the second butt end wall (21) of the housing the row of the sixth blind openings (25) is executed, and the sixth blind openings (25) are executed so that the longitudinal axes of all of the sixth blind openings (25) are located on identical distance from the conditional longitudinal axis (24) of the rotor (1).

Amended claims in accordance with Rule 137(2) EPC.

1. Rotor of heat-generator for heating of liquid, which contains a housing which three basic walls and a cap, the first and second basic walls of the housing of the rotor are opposite and the third basic wall of the housing of rotor is located between the first and second basic walls of the housing of rotor, there is an axial channel in the rotor for a shaft, **characterized in that** the first and second basic walls (4,5) of the housing (2) are executed with the external surfaces (7,8) of the walls in form of a truncated cone and with the identical direction of tapering of external surfaces of the walls, the third basic wall (6) of housing (2) is executed with the external surface (9) of cylinder form, on the external surface (7) of the first basic wall (4) of the housing the first grooves (10) are executed for a passage-way for liquid, and the first grooves (10) are executed so, that pass from one edge to other of external surface (7) of the first basic wall (4) of the housing, the cap (3) is executed as a hollow cone with one lateral wall (11) in which the axial opening (12) is made, the external surface (13) and internal one (14) of the wall of cap (3) are executed in form of a truncated cone, and the cap (3) is connected with the housing (2) so that the internal surface (14) of the wall of cap (3) adjoins the external surface (7) of the first basic wall (4) of the housing (2).

2. Rotor of heat-generator for heating of liquid according to claim 1, **characterized in that** the housing (2) contains additionally the first butt end wall (18) which is located between the first (4) and third (6) basic walls of the housing (2), and the external surface of the first butt end wall (20) of the housing is executed in form of a ring, the housing (2) contains additionally the second butt end wall (19) which is located between the third (6) and second (5) basic walls of the housing, and the external surface of the second butt end wall (21) of the housing is executed in form of a ring, on the external surface (7) of the first basic wall (4) of the housing in the place of transition between the first basic wall (4) and the first butt end wall (18) of the housing the first circular groove (26) is executed, which forms on the external surface (7) of the first basic wall (4) of the housing (2) the surface of a cylinder form (27) on which the coulisses

(28) of semi-cylinder form are executed with an even interval, on the external surface (7) of the first basic wall (4) of the housing a few rows of the first blind openings (29) are executed so that in every row the first blind openings (29) are spatially located on identical and certain distance from the conditional longitudinal

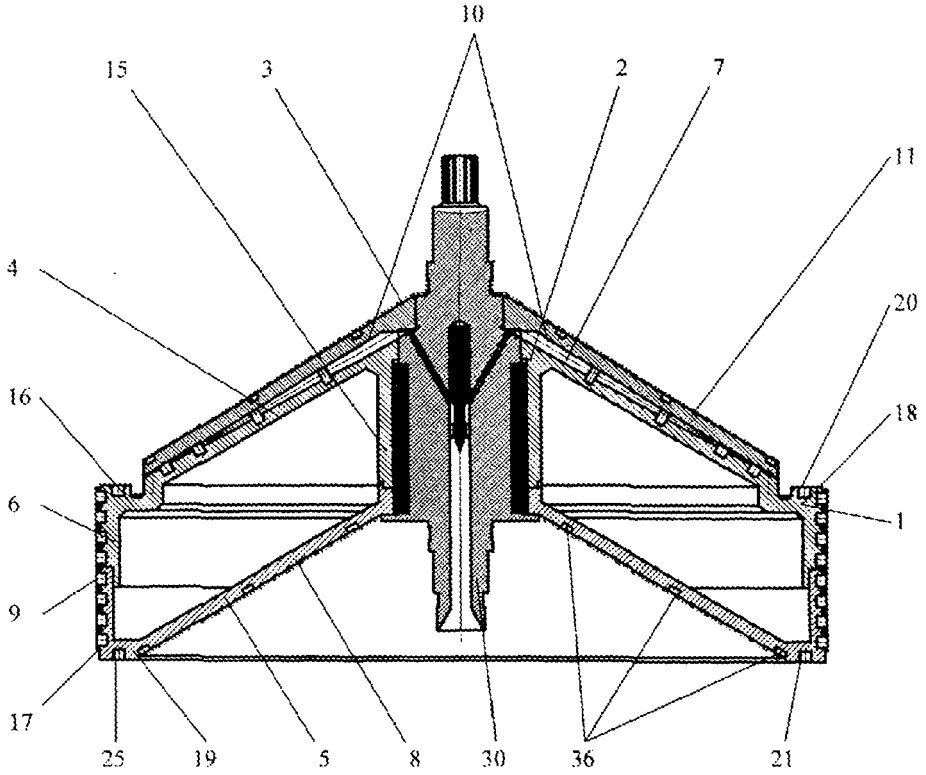

Fig.1

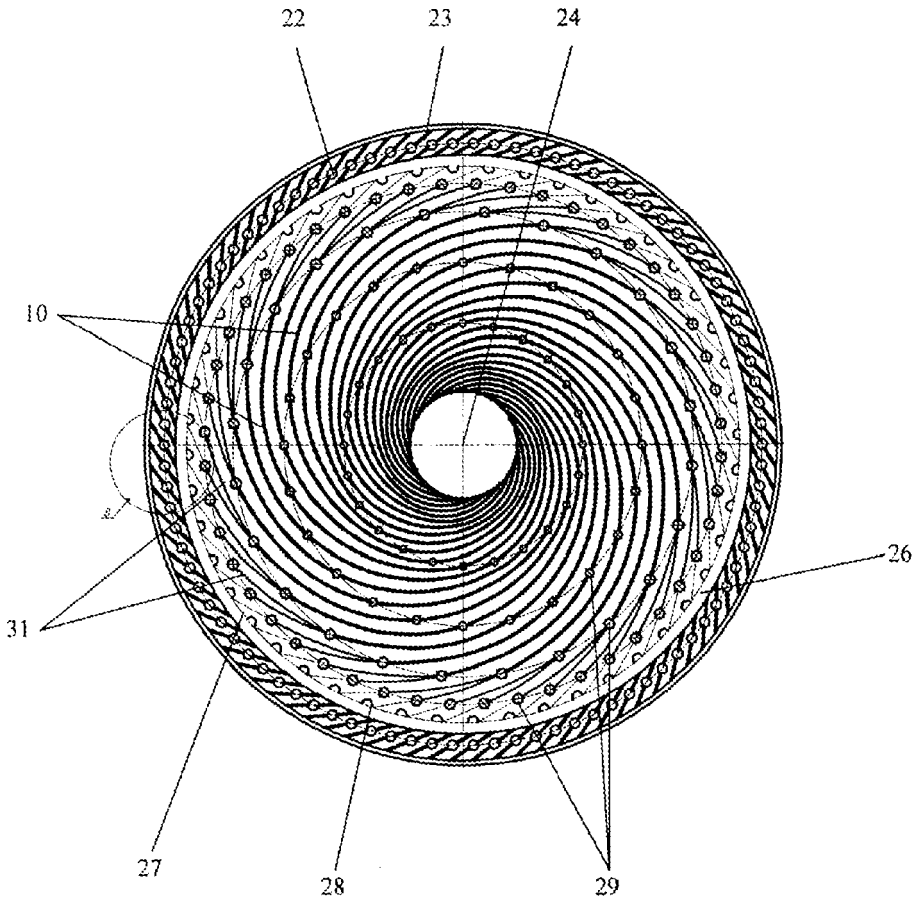

Fig.2

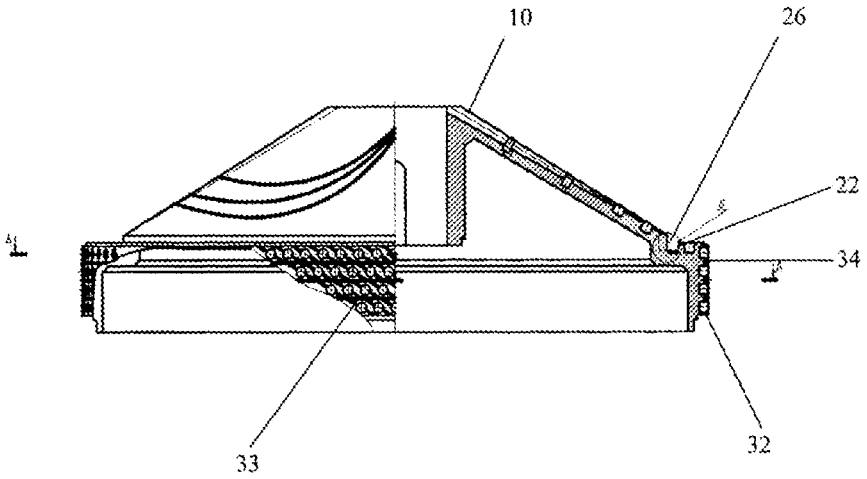

Fig.3

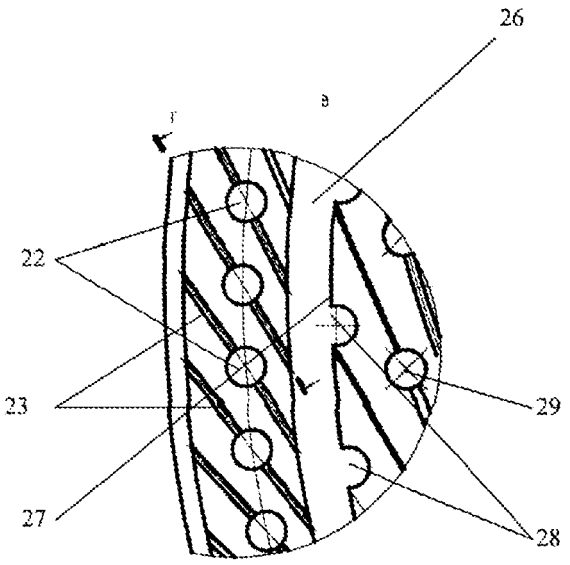

Fig.4

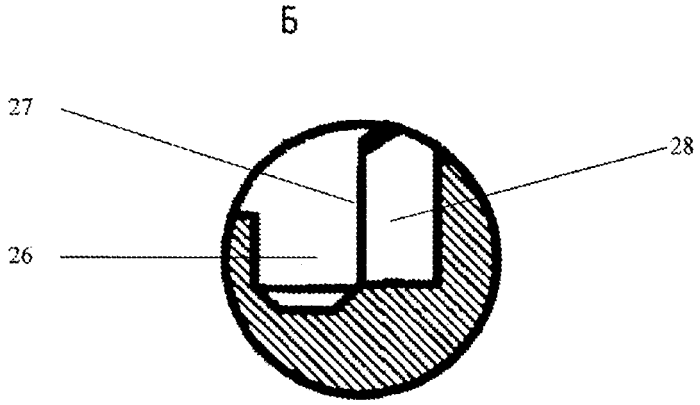

Fig.5

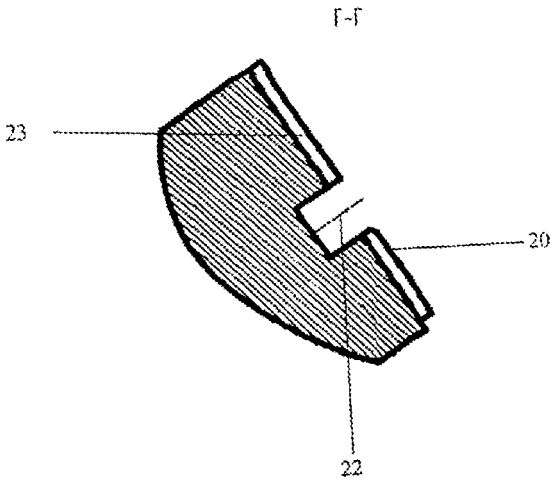

Fig.6

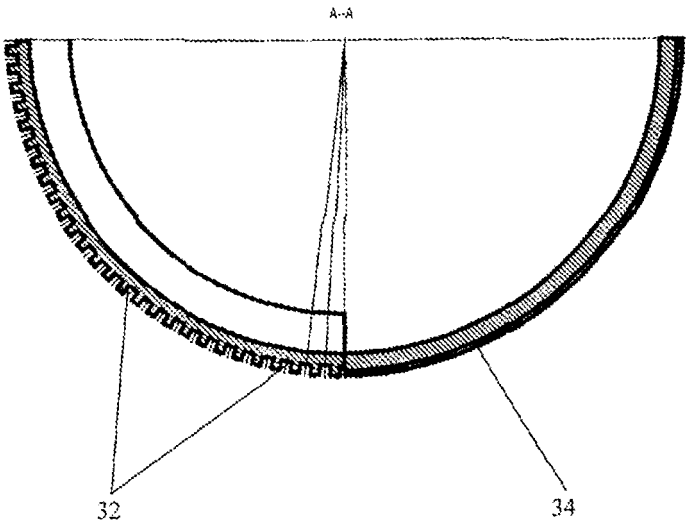

Fig.7

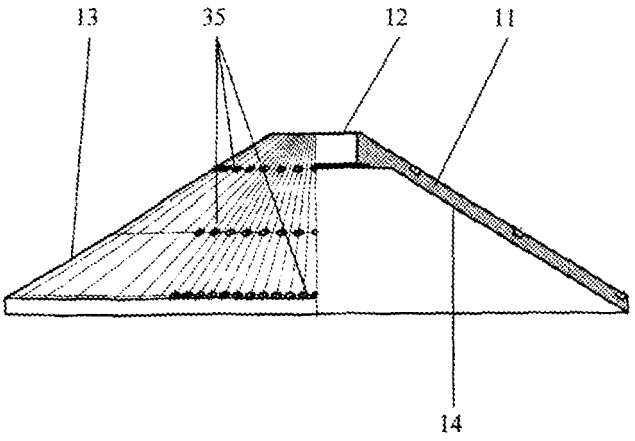

Fig.8

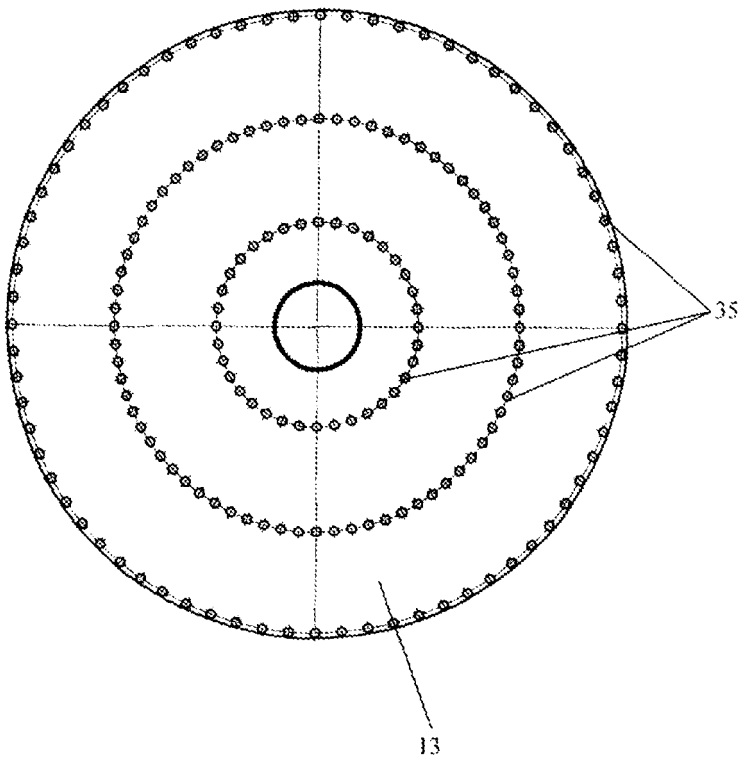

Fig.9

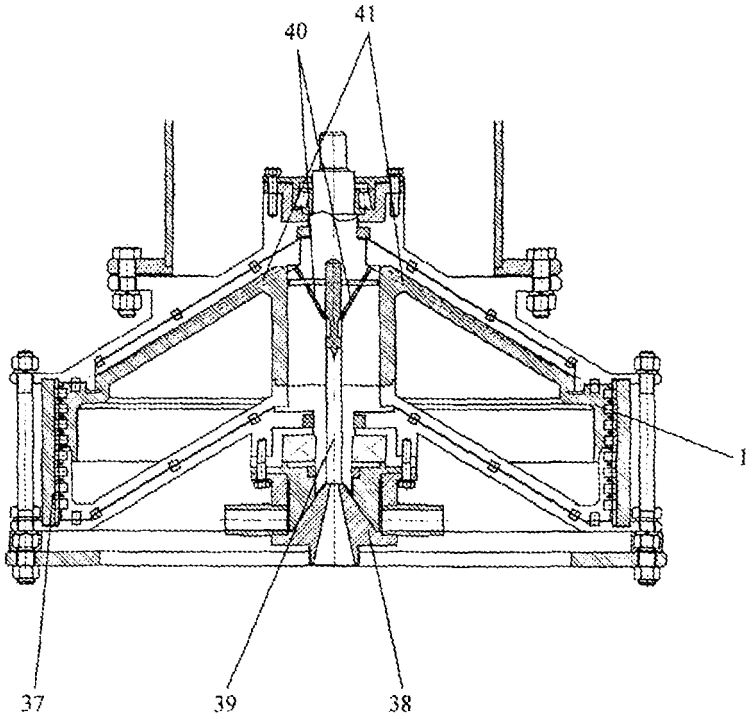

Fig.10

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 08 47 5006

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 3 791 349 A (SCHAEFER C) 12 February 1974 (1974-02-12) * column 4, line 4 - line 24; figures *	1-8	INV. F24J3/00
A	US 2008/060588 A1 (ISOPO CRISTIAN [IT]) 13 March 2008 (2008-03-13) * the whole document *	1-8	
A	US 6 959 669 B2 (THOMA CHRISTIAN HELMUT [GB]) 1 November 2005 (2005-11-01) * abstract; figures *	1	
A	DE 102 22 947 A1 (BEHR GMBH & CO [DE]) 4 December 2003 (2003-12-04) * abstract; figures *	1	

TECHNICAL FIELDS SEARCHED (IPC)

F24J

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	17 October 2008	Mootz, Frank

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 08 47 5006

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

17-10-2008

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3791349 A	12-02-1974	AU 476739 B2	30-09-1976
		AU 6342973 A	12-06-1975
		CA 959731 A1	24-12-1974
		CH 580254 A5	30-09-1976
		DE 2400588 A1	08-08-1974
		FR 2309795 A1	26-11-1976
		GB 1441980 A	07-07-1976
		IL 43907 A	31-08-1976
		IT 1008669 B	30-11-1976
		JP 892791 C	18-01-1978
		JP 49104002 A	02-10-1974
		JP 52019243 B	26-05-1977
		NL 7317007 A	31-07-1974
		SE 389902 B	22-11-1976
US 2008060588 A1	13-03-2008	EP 1779045 A1	02-05-2007
		WO 2006011176 A1	02-02-2006
US 6959669 B2	01-11-2005	AU 2003298159 A1	23-06-2004
		WO 2004051154 A1	17-06-2004
		US 2004103855 A1	03-06-2004
		US 2004103856 A1	03-06-2004
DE 10222947 A1	04-12-2003	AT 305390 T	15-10-2005
		AU 2003236628 A1	12-12-2003
		WO 03099596 A1	04-12-2003
		EP 1511643 A1	09-03-2005
		US 2005199207 A1	15-09-2005

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 6823820 B2 **[0005]**