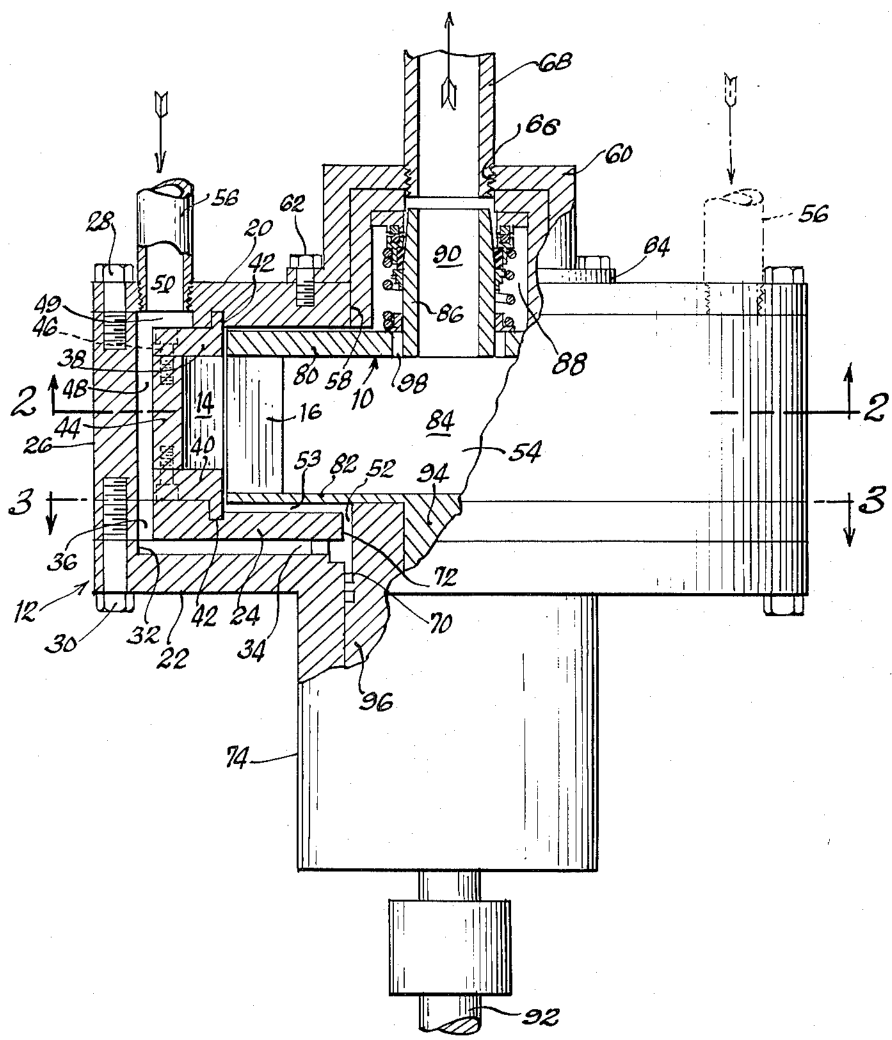

FIG. 1

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Aug. 3, 1965 S. W. WYSZOMIRSKI 3,198,191

HEAT GENERATOR

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FIG. 2

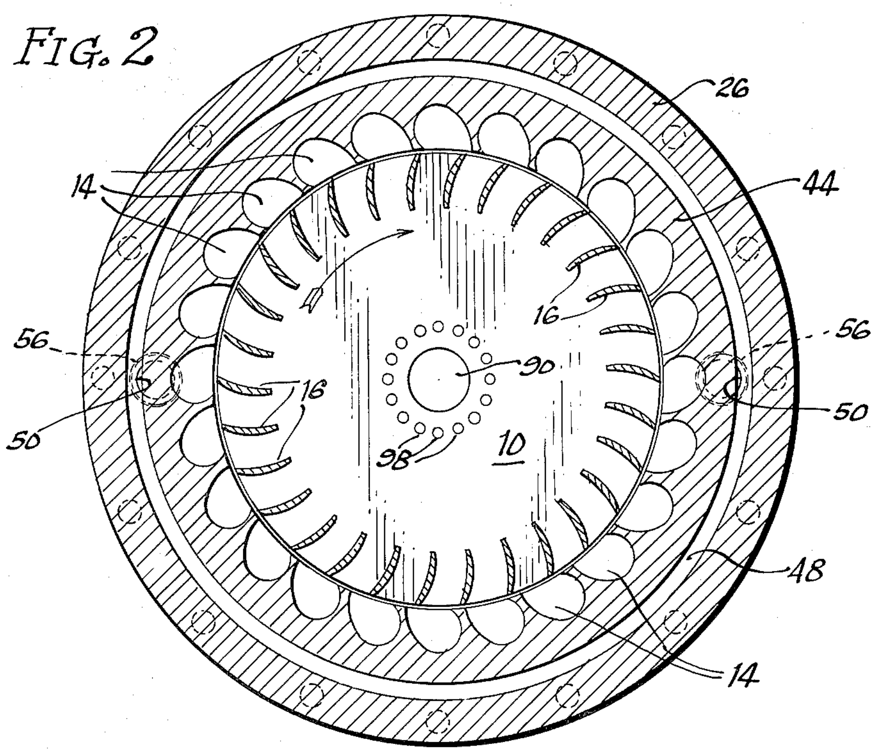
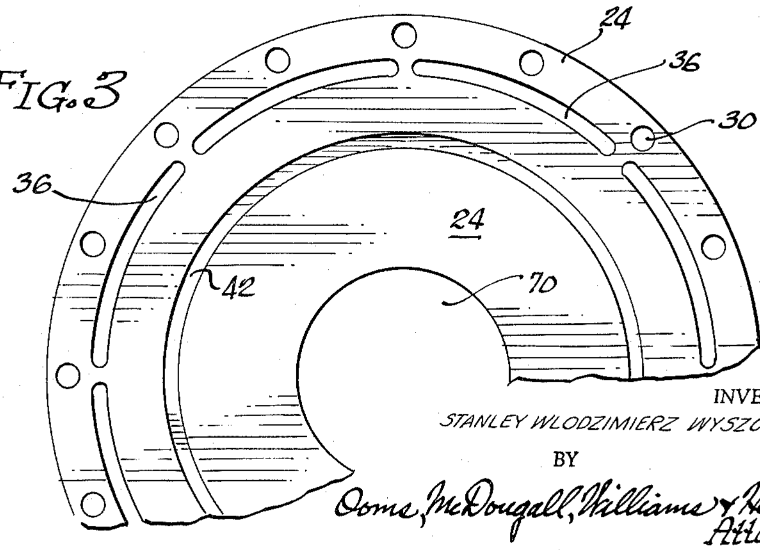


FIG. 3



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HEAT GENERATOR

Filed April 2, 1962 3 Sheets-Sheet 3

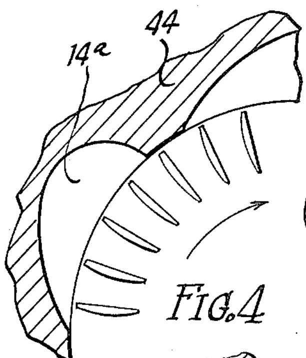

FIG. 4

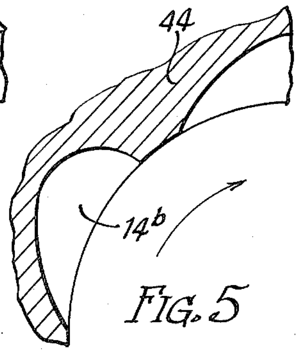

FIG. 5

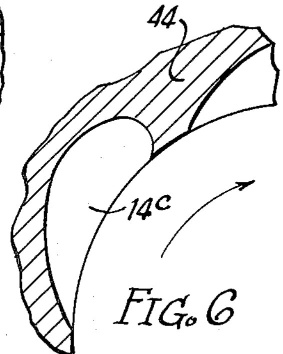

FIG. 6

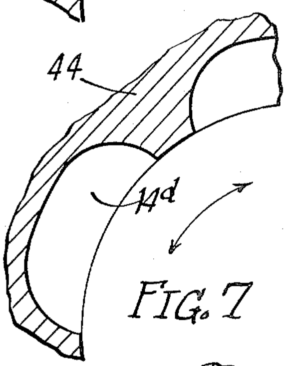

FIG. 7

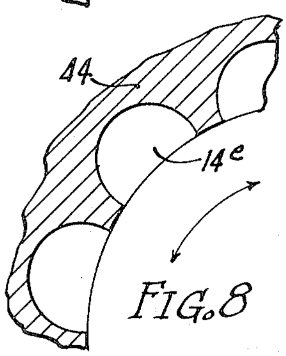

FIG. 8

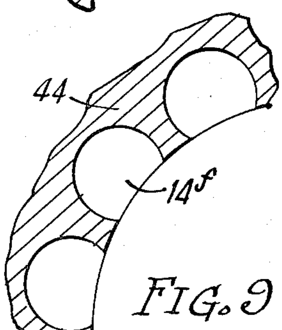

FIG. 9

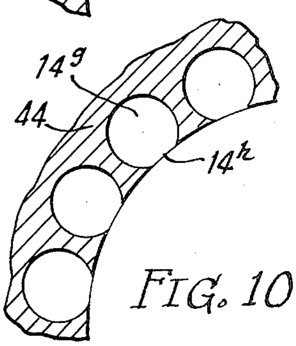

FIG. 10

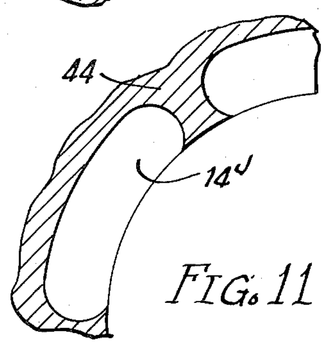

FIG. 11

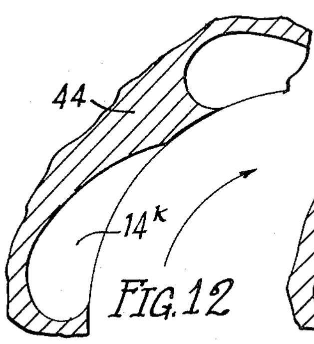

FIG. 12

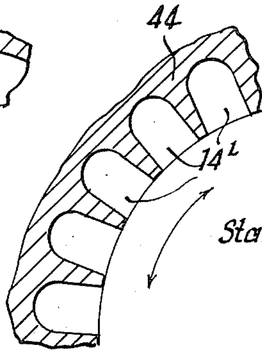

FIG. 13

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3,198,191
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1

3,198,191
HEAT GENERATOR

Stanley W. Wyszomirski, Chicago, Ill., assignor to Kinetic Heating Corporation, Chicago Heights, Ill., a corporation of Illinois

Filed Apr. 2, 1962, Ser. No. 184,480
8 Claims. (Cl. 126—247)

This invention relates to a heat generator and more particularly to a device which operates on a fluid system and which is believed to make use of forces and principles not heretofore employed or made available in a device for the generation of heat.

This application is a continuation-in-part of my copending application Serial No. 784,636, filed January 2, 1959, and entitled "Heat Generator."

The term "heat pump" or "heat generator" is used to denote a device or devices adapted to convert energy made available from electrical or mechanical sources to heat. Such heat generators have taken various forms. For the most part, the amount of heat generated from such devices has been found to represent but a small fraction of the energy input. As a result, little, if any, commercial utilization has been made of heat generators of the types heretofore produced.

One of the most common and well known systems for the generation of heat comprises that which is generated by frictional forces of rubbing surfaces of solids one upon the other. In an assembly of this type, the amount of heat generated is dependent somewhat upon the coefficients of friction of the materials at the surfaces, and the rate of relative movement. In any event, however, the amount of heat made available is small by comparison with the energy input and the wear and tear on materials, such as to make the system of little commercial value.

Heat can also be generated by compression of a gas, often referred to in the industry as "heat of compression." The amount of heat made available by compression is so small compared to the amount of energy input that this concept is seldom, if ever, employed commercially as a heat source. Heat can also be made available in a system wherein liquid or fluid is forced under pressure through one or more restricted openings. The concept is somewhat similar to the development of heat by shear as a fluid or liquid is cut by one or more stationary or moving blades. Both of these related concepts, based upon shear, have been found to be inefficient sources of heat such that systems of the type described have not found wide commercial acceptance.

In accordance with the practice of this invention, new and different forces are brought into operation by mechanical means for the efficient conversion of energy into heat to produce a heat generator capable of commercial use. The theoretical concepts of operation differ materially from the concepts of heat generation heretofore employed in devices of the type heretofore produced. An attempt will be made to set forth some of the theories upon which operation is based but it will be understood that other explanations may be possible for the extremely high and unexpected yields of heat which are obtainable by conversion from energy input in a device embodying the features of this invention.

It is an object of this invention to produce a generator for the conversion of energy into heat and which is

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capable of high yield by comparison with the energy input and it is a related object to produce a heat generator of the type described which is capable of either continuous or intermittent operation.

Another object is to produce a heat generator of the type described which operates mechanically on a fluid system to convert energy into heat and it is a related object to provide a new and different method for the generation of heat by conversion from energy introduced mechanically into a fluid system.

Another object is to produce a heat generating device which is capable of exceptionally high yield with reference to the energy input and which makes such heat available either in a liquid or vapor form at various pressures.

A further object is to provide a heat generator which makes use of physical forces not heretofore brought into play for the generation of heat; which is simple in construction and efficient in operation; which can be constructed of relatively few and simple parts that are easily assembled into a compound unit; which is capable of being operated through a conventional drive; which is sturdy in construction and capable of continuous operation over an extended period of time, and which can be operated without the need for extensive supporting equipment or highly skilled labor thereby to enable commercial utilization of the generator as a variable source of heat.

These and other objects and advantages of this invention will hereinafter appear and, for purposes of illustration, but not of limitation, embodiments of the invention are shown in the accompanying drawings, in which—

FIGURE 1 is an elevational view partially in section of a heat generator embodying the features of this invention;

FIGURE 2 is a sectional view taken along the line 2—2 of FIGURE 1;

FIGURE 3 is a fragmentary sectional view taken substantially along the line 3—3 of FIGURE 1; and

FIGURES 4–13 are sectional views showing various modifications in the shapes of pockets which may be employed in the stationary member employed in the practice of this invention.

Since, as previously pointed out, the invention cannot fully be described with reference to all of the forces that are brought into play, since some of the mechanisms of the initiated reactions are yet undetermined, it is deemed most expedient to define the inventive concepts with reference to the construction and operation of a device in which the as yet undefined mechanics are brought into being to provide the unexpected high yields in heat generation. The adaptations of the described principles to other constructions of equivalent character will be obvious to those skilled in the art such that it should be sufficient specifically to describe the construction and operation of the device illustrated in the drawings.

For this purpose, reference will be made to the use of water as representative of the liquid with which the device is adapted to operate in the generation of heat wherein the water is either heated to an elevated temperature or converted by the heat to steam. It will be understood that liquids other than water may be employed as the fluid constituent in the system. For example, use can be made of oils, lubricants, alcohols, liquid hydrocarbons, liquid organic polymers and the like, such as a polyethylene glycol, but it is preferred that the liquid comprise a single component system as distinguished from a solution or mixture of liquids, especially where the liquid component is converted either to a vapor or gas by the heat generation.

Referring now to the drawings, the essential elements comprise an impeller 10 in the form of a multiple vaned squirrel cage mounted for free rotational movement within a stationary cylindrical housing 12 having a plurality of vortex chambers in the form of pockets 14 extending radially into the walls of the housing adjacent the outer ends of the vanes 16 of the impeller with the pockets and vanes being dimensioned and shaped to set up conditions whereby such new and novel forces are created that energy input is converted to heat in extremely high yields.

The stationary housing, in the form of a cylindrical member, comprises a top wall 20, a bottom wall 22, an upper bottom wall 24 and a cylindrical side wall 26 all of which are secured together in the assembled relation. The side wall section is secured in sealing relation between the top wall 20 and the upper bottom wall 24 by means of bolt members 28 extending through openings in the peripheral edge portion of the top wall and into threaded engagement with the aligned threaded openings into the upper surface of the side wall and by bolt members 30 extending through aligned openings through the peripheral edge portions of the lower bottom wall 22 and upper bottom wall 24 into threaded engagement with aligned threaded openings in the lower surface of the side wall 26.

The bottom wall 22 is formed with a short upwardly extending portion 32 about its peripheral edge in alignment with the side wall to form a part or extension thereof thereby to space the upper bottom wall 24 from the remaining inner portion of the lower bottom wall 22 to provide a continuous disc-shaped opening 34 therebetween. The upper bottom wall is formed with discontinuous annular slots 36 extending therethrough adjacent the side wall portion and into communication with the disc-shaped opening 34 between the bottom walls.

Forming a part of the stationary cylindrical housing is an inner cylindrical section formed of an upper disc member 38 and a lower disc member 40 keyed, as at 42, into the adjacent top wall 20 and upper bottom wall 24. An annular sleeve 44 is secured between the disc members by means of the nut members 46 extending through openings in the peripheral edge portions of the top and bottom disc members 38 and 40 respectively into threaded engagement with threaded openings in the top and bottom surfaces of the sleeve member 44. The disc members 38 and 40 are dimensioned to extend outwardly to a point short of the side wall 26 to provide a cylindrical slot 48 located between the annular sleeve 44 and the side wall 26 of the housing. The slot is thus formed in direct communication with the annular slots 36 through the upper bottom wall 24.

An annular groove 49 is formed in the upper surface in the periphery of the top wall to provide an annular slot between the top wall and the outer edge portion of the upper disc member which slot is contiguous with the upper edge of the annular slot 48. The top wall is formed with one or more inlet openings 50 extending therethrough into communication with the annular groove 49 to provide a continuous passage from the inlet opening about the periphery of the cylindrical housing between the side wall 26 and the sleeve member 44 and into the disc-shaped slot 34 extending across the bottom wall of the housing into communication with passages 52 with the central portion of the cylindrical opening 54 in the interior of the housing assembly. A conduit 56 communicates the feed opening 50 with a source of liquid for feeding into the housing.

The top wall 20 of the housing is provided with a central opening 58 in communication with the cylindrical opening 54 within the housing. A tubular member 60 is received in fitting relationship on the top wall of the housing about the opening 58 and it is secured thereto as by means of bolt members 62 extending through openings in ears 64 fixed to the tubular member into engagement with threaded openings in the top wall of the housing. The tubular member 60 is provided with an outlet opening 66 at the center through which the steam or fluid flows from the heat generator into a conduit 68 communicating the outlet opening with a use for the steam or heated liquid.

The bottom walls 22 and 24 are provided with similar openings 70 and 72 through the central portion thereof. The lower bottom wall can be formed with a tubular section 74 extending downwardly therefrom with a central bore dimensioned to correspond with the dimension of the central openings 70 and 72 to form a continuation thereof.

The sleeve section 44 is formed with a plurality of separated pockets 14 spaced relatively uniformly about its periphery and extending outwardly from the inner surface of the sleeve section about the cylindrical opening 54 defined thereby. In the preferred modification illustrated in FIGURE 2, these pockets 14 extend substantially throughout the length of the sleeve section and are curvilinear in cross-section with the walls being shaped to define a decreasing radius from the leading edge to the trailing edge when measured in the direction of rotation of the impeller 10.

Water or other fluid introduced into the cylindrical opening 54 of the described housing is thrust at high velocity radially outwardly against the inner face of the sleeve section and into the curvilinear pockets 14. This sets up conflicting movements which provide for repeated collisions between thin cross-sections of the liquid rebounding from the pockets and from the walls and liquid being thrust outwardly at high speed in the radial direction. Such conflicting movements take place in combination with the creation of a large number of free vortices each having their cores within each of the pockets 14 with continual displacement of the core of the vortex outwardly from the pockets into additional collisions with the radially thrust liquid.

The water or other fluid is thrust radially at high speed against the side walls of the housing and into the chambers as by means of the impeller 10 or other bladed member adapted to rotate at high speed within the housing to cause circulation of the water at high velocity about the cylindrical chamber within the housing whereby the outward thrust is effected by any one of a combination of forces including centrifugal force and positive displacement between rotating blades.

In the illustrated modification, the displacement means for imparting the described movements to the introduced water or other fluid comprises an impeller 10 formed with multiple blades 16 arranged in the form of a squirrel cage dimensioned to be received in fitting relationship within the cylindrical opening 54 with as small clearance as possible between the outer edges of the blades and the adjacent walls of the housing in which the pockets are formed.

In the illustrated modification, the impeller is formed of a pair of disc plates 80 and 82 spaced one from the other by an amount corresponding to the height of the cylindrical opening with the exception of a small spaced relationship between the bottom face of the bottom disc member 82 and the adjacent surface of the upper bottom wall of the housing to provide a narrow passage therebetween through which the liquid can enter into the cylindrical opening. The disc plates are joined one to the other in their outer edge portions by the plurality of circumferentially arranged vanes or blades 16 extending crosswise between the disc plates in equally spaced apart relation and with the vanes arranged to extend substantially in a radial direction. The vanes 16 which may be formed integrally with the disc members or otherwise fixed therebetween are dimensioned to have a length less than the diameter of the disc plates thereby to terminate short of its center and provide a common cylindrical opening 84 therebetween. The outer ends of the vanes are adapted to terminate flush with the periphery of the disc members and to have a minimum spaced relationship from the inner faces of the sleeve member 44 defining the cylindrical opening. The vanes are dimensioned to have a height which is at least as great as that of the pockets 14 but it is preferred to form the blades with a slightly greater height so as to extend beyond the ends of the pockets as indicated in FIGURE 1.

The hub 86 of the upper disc plate 80 projects outwardly into a larger opening 88 defined by the tubular member 60 and into communication with the outlet opening 66 therein. Bearing means of conventional construction are provided rotatably to support the hub 86 within the described tubular member and included within the bearing assembly are sealing means which operate to provide a sealing relationship between the hub and the housing while permitting free rotational movement therebetween. An opening 90 extends axially through the hub 86 for communicating the interior of the housing with the outlet opening 66 to enable vapor or fluid to escape from within the housing.

Rotational movement is imparted to the impeller by a suitable drive adapted operatively to be connected to a shaft 92 extending axially outwardly from the hub 94 on the opposite wall of the impeller. A suitable drive may comprise a motor or engine having a drive shaft operatively connected to the shaft 92, as by means of a suitable clutch or spline for transmitting rotational movement to the impeller 10. A bearing block 96 is keyed to the shaft 94 and is rotatably received within the tubular member 74 to mount the shaft for rotational movement therein. Suitable sealing means are provided between the block 96 and the tubular member 74 by which a sealing relationship can be maintained between the shaft and housing.

The disc plate 80 is provided with a plurality of openings 98 extending therethrough for communicating the interior of the housing with the opening 88 between the hub 86 and the tubular member 60. These openings 98 function as a means for neutralizing the pressures within the opening 88 to facilitate the maintenance of a sealing relationship therein and the openings function further as a means for the drainage of fluid from the opening 88 back into the housing. While the illustrated modification shows the unit arranged for rotational movement of the impeller about a vertical axis, it will be apparent that the forced flow and conditions existing during operation will permit utilization of the device in the generation of heat when disposed at any other position such as for operation about a horizontal axis or an inclined axis, or the like.

Having specifically defined the illustrated modification, description will now be made of the operation of the heat generator. The impeller 10 is mechanically driven for rotational movement at high speed about its axis, as by means of an electrical motor or other drive connected to the shaft 92.

Water or other fluid is simultaneously delivered in a continuous stream and preferably under positive pressure from the conduit 56 to the inlet opening 50 for passage into the housing. Upon entrance into the housing, the water will be distributed substantially uniformly about the top of the housing through the annular slot 49 and from there it will flow about the housing through the opening 48 and the connecting disc-shaped opening 34 prior to its flow through the connecting openings 52 and 53 into the outer portions of the cylindrical opening.

During such passage from the inlet opening to the cylindrical opening within the housing, the feed water functions in the manner of a heat exchange medium to absorb heat from the body of metal forming the exterior portions of the housing thereby to recover generated heat from the housing to prevent the overheating thereof while at the same time preheating the water thereby to make more efficient use of the conditions existing. It will be understood that the water or fluid may instead be fed directly into the cylindrical opening without first passing in heat exchange relationship with the outer walls forming the housing but it is believed that greater efficiencies can be achieved by the described operations.

After the start, the cylindrical opening of chamber 84 will be filled with the preheated water or other liquid. The water thus introduced into the housing will flow along the passage 53 into the narrow area between the rotating vanes of the impeller and the inner surface of the stationary, pocketed sleeve member 44. The water will usually enter the chamber at a slow speed, such as at a rate of about 1 inch per second.

Upon entrance of the water into the space that is influenced by the vanes of the impeller, a reaction will take place in response to the rotational movement of the impeller at high speed whereby radial and centrifugal forces will combine to impart movement of the water to cause the water to be thrown at high speed outwardly in the direction of the inner face of the sleeve section and into the curvilinear pockets formed therein. Such movements at high speed into the curvilinear pockets will set up a vortex in each pocket having its core more or less in constant migratory movement in the trailing portion of the pocket of smaller dimension.

Such free vortex embodies a property wherein its radial velocity is inversely proportional to its radius such that as the axis or core of the vortex is approached, the velocity would become infinite with negative pressures existing at or about such core. The foregoing sets forth a theoretical condition which can be closely approached under the conditions described whereby extremely high velocities and corresponding low pressures are achieved near the core of each vortex which is continuously developed in each of the curvilinear pockets or chambers. Thus each core becomes a center of energy captured from the impeller wherein forces of a molecular character are believed to be developed to convert such energy into heat. It is believed that conditions are thus created under which molecular changes can be caused to take place whereby additional thermal energy is released.

Further, the collisions which occur at high frequency between the thin walls of water thrown at high velocity against the cylindrical walls and into the curvilinear pockets with the water rebounding from the walls and pockets and thrown outwardly with centrifugal force by the vortex generated in each pocket adds to the forces of shock and reactions further to enhance the generation of heat whereby a high yield of heat is secured by comparison with the amount of energy introduced by mechanical force.

It has been found that the construction and arrangement of the vanes of the impeller will have some effect upon the amount of heat capable of being generated by the device. While high heat yields can be secured with straight impeller vanes extending outwardly or inclined slightly in either direction, best results are secured when the impeller vanes are of curvilinear shape, as of parabolic shape, or when the vanes are inclined slightly in the direction of rotational movement. Under such conditions, the rapidly rotating vanes act as a bladed scoop which imparts compound movements to the water lying in its path to subdivide the water into a larger segment which is thrown radially outwardly as described and a smaller segment which is scooped up by the curvilinear vane and thrown inwardly by each vane to a common vortex at about the center of the cylindrical opening to provide one or more cores at about the center of the housing which represents the composite of the reactions of all or a large number of the vanes and provides a main center for heat generation based upon the principles previously described. The peripheral velocity of the vortices can be controlled somewhat by the angle of inclination of the vanes but it is undesirable to make use of a forward angle of inclination greater than 20° or a backward inclination of angle greater than 10° and it is preferred to maintain the angle of inclination between 1° and 5° in the forward direction.

In addition to the ability to control the velocities of the vortices by the angle of inclination of the vanes, it is possible also to influence the peripheral velocity by the shape and size of the vortex chambers or pockets in a manner to redirect the centrifugal force to obtain a maximum magnitude of collisions. It is believed that the maximum quantity of collisions and maximum peripheral velocity at the vortex can be obtained by maintaining the opening to the vortex chambers to correspond with the spacing between consecutive vanes. However, it will be understood that high yields of conversion of energy to heat may be secured when other spacings are employed.

With reference to the shape and size of the vortex chambers or pockets, illustration is made in FIGURES 4–13 of the shapes and sizes of other vortex chambers which may be employed in the practice of this invention.

In FIGURE 4, the pocket 14^a comprises a curvilinear section which is the exact opposite of the curvilinear pocket previously described with reference to FIGURE 2. In this modification, the pocket is formed with a back wall of increasing radius from the leading end to the trailing end. In such instance, the vortex would migrate between the center of the pocket and the leading end portion of greater curvature. It will be noted that the vanes employed in combination with the pocket 14^a are formed with a flat front wall radially aligned with the axis of the impeller.

In FIGURE 5, the pocket 14^b is of curvilinear section having its greater depth at about the center with the leading end portion being of slightly smaller radius than the trailing end portion.

In FIGURE 6, the pocket 14^c is elongate in cross-section and of lesser depth with the leading end portion being of cylindrical shape and joined with a cycloidal section forming the trailing end portion. In this construction, the vortex would tend to locate somewhat in the leading end portion of the pocket.

In FIGURE 7, the pocket 14^d comprises a rectangular section having curvilinear end walls of substantially equivalent curvature. The reaction to the water thrown outwardly by the impeller would be to form two possible vortices in each of the trailing and leading end sections of the pockets at about the center thereof to generate additional conflicting forces effective in the generation of heat.

In FIGURE 8, each of the pockets 14^e comprises a curvilinear section in the form of a sector of a circle such that the vortex would appear near the center thereof.

In FIGURE 9, the pockets 14^f are somewhat similar to the pockets 14^e with the exception that a larger segment of the cylinder is included in the pocket. Here again, the vortex would form at about the center of the pocket.

In FIGURE 10, the pocket 14^g is cylindrical in cross-section with substantially the full cylinder being provided as pockets such that only a small segment constitutes the entrance portion 14^h.

In FIGURE 11, the pockets 14^j are curvilinear in cross-section with the back wall being formed along a curvature having the axis of the cylindrical housing as its center with the end portions being formed of the segment of a circle having a much smaller diameter. In this construction, each of the curvilinear end sections would be influential in the development of separate vortices which would migrate within sections of the pocket.

In FIGURE 12, the pockets 14^k are of a cycloidal shape corresponding somewhat to the pockets 14 of FIGURE 2 with the exception that the leading end portions are formed upon a curvature of considerably greater diameter to provide pockets of elongate dimension. In this construction, the vortex would appear in the trailing end portion, as in FIGURE 2.

In FIGURE 13, the pockets 14^l are formed with straight side walls leading into a curvilinear back wall portion whereby a vibratory effect will be developed in combination with the vortex formed in the rearward end portion of each of the pockets further to develop vibrational shock along with the reaction described in the vortex and the movements of the water from the vortex.

It is undesirable to have the center vortex solidify at about the center of the cylindrical opening. The position of the vortex can be caused to change by external forces such as variation in the pressure of the water introduced into the housing.

The intentional development of vortices by the construction described and claimed is believed to be contrary to concepts previously employed where every effort has been exerted to eliminate possible developments of free vortices in such elements as pumps, turbines, or other rotating devices. It is believed that the intentional development of vortices having separate and independent reactions is instrumental in the development of high heat yields by comparison with energy input especially when the vortex concept is employed in combination with the concept of collision as generated by the relative movements imposed in response to the movement of the impeller, the liquid rebounding from the walls and the liquid thrown at high velocities by the vortex.

The steam or hot water generated within the device by the mechanics described or other mechanisms incapable of explanation for the present finds its way to the center of the housing for escape from the device through the passage 90 and the outlet opening 66 into the conduit 68. The temperature of the steam may be controlled as by the pressure of the water introduced through the inlet opening 50. In the absence of the conversion of the liquid to vapor or steam, the temperature of the liquid issuing from the device may be controlled by the rate of input.

The following examples will illustrate the extremely high efficiencies of conversion into heat which are achieved by the use of the heat generator embodying the features of this invention.

Example I

Time	Kw. Consumed	Water Consumed in Pounds	Water Temp., ° F.		Pressure of Water, p.s.i.g.	
			Intake	Steam Exhaust	Intake	Exhaust
7:03:00	0	0				
7:15:30	1	3.0	76	257	31	25
7:28:00	2	3.0	76	257	31	25
7:40:00	3	3.0	76	257	31	25
7:51:30	4	2.75	76	257	31	25
8:04:00	5	3.0	76	257	31	25

15 H.P. motor rated to operate at 220 v. operated at 241 volts and 24 amps.:

Water consumed 14.75#.
Water input temp. 76° F. at 31 p.s.i.g.
Steam exhaust 257° F. at 25 p.s.i.g., 98% quality.

Steam enthalpy at 98%	1144.5
Water enthalpy	44.0
Net gain per pound	1100.5
Total output B.t.u.	16,232
Total input of work B.t.u.	17,065
Over-all efficiency percent	95.4

Example II

In a larger unit embodying the features of this invention, the following is the data that was collected during a run of one hour using 60 pounds of water at 63° F. and 30 p.s.i.g. with a production of steam at a temperature of 275° F. and 30 p.s.i.g.

Input water:	
Temperature	74° F.
Pressure	28 p.s.i.g.
Enthalpy	42 B.t.u.
Exhaust steam:	
Temperature	258° F.
Pressure	20 p.s.i.g.
Quality (+222° F.)	98.5%.
Enthalpy	1155.2 B.t.u.±1.0 B.t.u.
Water consumption during 54¼ minutes	14 lbs. (±1%).
Power input:	
Motor current	24 amps. average.
Voltage	239 volts average.
Power factor	0.56.
Kw.h. consumption (through Kw.h. meter reading)	5 kw. (±0.5%).

Output:

Minimum (for 98.5 quality)

$$14\times(1155.2-42)=15{,}600 \text{ B.t.u.}$$

Maximum (for dry saturated steam)

$$14\times(1166.7-42)=15{,}800 \text{ B.t.u.}$$

Over-all efficiency:

$$\frac{\text{Output}}{\text{Kw.h. consumption}}$$

For 98.5 quality—

$$\frac{15{,}600}{5\times 3415}=91.5\%(\pm 1.5\%)$$

For dry sat. steam—

$$\frac{15{,}800}{5\times 3415}=92.5\%(\pm 1.5\%)$$

The foregoing represents actual readings which were made in the conversion of tap water into steam. The results obtained indicate an extremely high efficiency in the conversion of work into heat which conversion gives indications of even producing molecular disassociation of the water molecules with an apparent release of additional energy.

It will be understood that the inventive concepts herein described are not dependent upon the dimensional characteristics of the elements as long as a suitable number of chambers or pockets 14 are provided within the side walls of the housing and as long as sufficient velocity is imparted to the water or fluid to set up the centrifugal forces and vortices described, coupled with the possible exposure of relatively thin cross-sections of the water to shock-wave actions or collisions. The inventive concepts are not dependent upon the rate of rotational movement of the impeller as long as sufficient speed is maintained as can be easily determined by the heat output from the generator.

It will be understood that numerous changes may be made in the details of construction, arrangement and operation without departing from the spirit of the invention, especially as defined in the following claims.

I claim:

1. A hot liquid generator comprising a stationary housing having a cylindrical chamber therein, an inlet through the housing in communication with the chamber for the introduction of liquid into the chamber, an outlet coaxially of and in communication with the interior central portion of the chamber for the removal of the product of the liquid raised to elevated temperature within the housing, a plurality of pockets of curvilinear cross-section formed within the stationary wall about the periphery of the chamber and arranged to extend crosswise of the chamber in circumferentially spaced apart relation, a plurality of generally radially extending impeller vanes extending crosswise of the chamber in circumferentially spaced apart relation with the space between the impeller vanes being open for radially inward direct communication between the interior of the chamber and the plurality of pockets in the stationary wall, with the outer edges of the vanes in contiguous relation with said wall and with the inner edges of the vanes terminating short of the interior portion of the chamber, the interior portion of the chamber being free of obstruction, means for driving said vanes at high speed in a circular path about the chamber relative to the said wall whereby liquid in the chamber is thrust radially outwardly against the wall and into said pockets and inwardly into the interior portion of the chamber with a pulsating effect to create free vortices in the pockets and in the interior portion of the chamber with a forced vortex within the area between the vanes.

2. A heat generator as claimed in claim 1 in which the vanes are combined in a squirrel cage formed of a pair of flat spaced disc plates and in which the plurality of impeller vanes extend crosswise therebetween.

3. A heat generator as claimed in claim 1 in which the impeller vanes extend in a radial direction at an angle of inclination within the range of 0° to 20° in the direction of rotational movement and 0° to 10° in the direction opposite rotational movement.

4. A heat generator as claimed in claim 1 in which the impeller vanes are curvilinear in cross-section with the forward face being concave thereby to thrust liquid radially outwardly and simultaneously to thrust liquid radially inwardly from each of the blades towards the center of the cylindrical chamber to form a common vortex therein.

5. A heat generator as claimed in claim 1 in which the spaced relationship between the vanes corresponds with the dimension of the entrances to the pockets.

6. A heat generator comprising a housing having a cylindrical chamber therein, an inlet through the housing in communication with the chamber for introducing a liquid into the chamber, said cylindrical chamber communicating with the inlet through passages through the body of the housing spaced outwardly from the cylindrical chamber whereby heat can be extracted from the walls of the housing while simultaneously preheating the liquid introduced into the cylindrical chamber, an outlet in communication with the chamber for the removal of the product of the liquid when raised to elevated temperature within the housing, a plurality of pockets of curvilinear cross-section formed within the wall about the periphery of the chamber and arranged in circumferentially spaced apart relation, an impeller mounted for rotational movement within the cylindrical chamber having peripherally arranged, radially extending impeller vanes in circumferentially spaced apart relation with the outer edges of the vanes terminating in a closely spaced apart relation with the wall about the periphery of the cylindrical chamber, and means for rotating the impeller at high speed in one direction whereby the liquid introduced into the cylindrical chamber is thrust radially outwardly against the wall and into said pockets.

7. A heat generator as claimed in claim 6 in which the passages are so formed that liquid issues from the passages into the outer peripheral edge portions of the cylindrical chamber between the ends of the impeller vanes and the wall of the housing about the cylindrical chamber.

8. A heat generator comprising a housing having a cylindrical chamber therein, an inlet through the housing in communication with the chamber for introducing a liquid into the chamber, said cylindrical chamber communicating with the inlet through passages through the body of the housing spaced outwardly from the cylindrical chamber whereby heat can be extracted from the walls of the housing while simultaneously preheating the liquid introduced into the cylindrical chamber, an outlet in communication with the chamber for the removal of the product of the liquid when raised to elevated temperature within the housing, a plurality of pockets formed with at least one curvilinear wall within the wall defining

the periphery of the chamber and arranged in circumferentially spaced apart relationship, said wall defining the periphery of said chamber and having communicating relationship with said chamber, and means for thrusting the liquid introduced into the chamber at high velocity in a radial direction against the walls and into the pockets.

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