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Energy efficient, safe, customizable stovetop system

Abstract

A stovetop system comprising a stovetop, wound around a burner, supports a vessel to be heated. The hot gas from the burner is guided through an extended path under the vessel's bottom to improve the heating efficiency of a stove on which this standalone stovetop system is installed. Improvements in safety, vessel adaptability, and automatic temperature control of the heating process are also achieved.

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Background/Summary

CROSS-REFERENCE TO RELATED APPLICATIONS [0001] The present application claims priority to U.S. provisional patent application Ser. No. 63/446,805, filed on 18-Feb-2023.

BACKGROUND OF THE INVENTION

Field of the Invention

[0002] The present invention relates generally to stovetops and gas stoves.

Discussion of the State of the Art

[0003] A stovetop is an intermediate body between a heat source including a gas stove and a vessel heated. The stovetop supports a vessel to be heated above the flame or hot gas.

[0004] Negative aspects of existing gas stove are energy inefficiency, unsafe for humans due to the hazardous chemicals in burning gas, potential fire hazard, heating up of the kitchen by the hot gas leaving the heated vessel, lack of automated thermal control heat control and pollution control.

[0005] Heating efficiency, according to this specification, is the ratio of heat energy absorbed by the heated vessel and its contents to the heat energy content of the burning fuel in a specific time. Flame or hot gas from the burner rises, flows along the bottom and sides of the heated vessel and spreads to the surrounding or kitchen. FIG. **1**A is an elevation view of a gas stove showing a burner B and a stovetop S that supports a vessel FV with a flat bottom. Arrows F show the hot gas path under the vessel. FIG. **1**B similarly shows the stovetop S supporting a vessel CV with a curved bottom under which the hot gas flows all around the vessel's bottom along path F. FIG. **2** is a plan view of the gas stove with the vessel showing the flow paths shown by arrows where the hot gas is fully spread out under the vessels in all directions symbolically shown in arrows. A unit volume of the hot gas stays in contact with the vessel only for a few seconds transferring little of its energy to the vessel. A longer contact time transfers more heat to the vessel. If the path of the hot gas under the vessel is lengthened the contact time and the heat transfer efficiency increases. Some stovetop designs as shown in FIG. **2**A extend the flame travel path to increase the contact time to enhance heating efficiency, but not enough.

[0006] The hot gas flow is not controlled in these designs and the heating efficiency increase is insufficient. The heat transfer efficiency also depends on the vessel's heated surface area exposed to the hot gas. Larger surface area increases heat transfer efficiency.

[0007] Gas burners are of various sizes. Burners with small diameter are used for small vessels. Using burners larger than the diameter or size to heat a small vessel is not heat efficient. Small vessels lose heat in the sides while the side walls of the vessels become very hot scorching the top edge contents of the vessel in contact with the wall.

[0008] Numerous studies have shown that the hot gas from the hydrocarbon-based fuels contains pollutants including NOx, CO, methane, and particulate matter that are harmful to health. Vent systems absorb the gas around the stove and safely dispose of it outside the kitchen or recirculate within the kitchen, which does not eliminate the health hazard. The suction of the vent system that discharges outside of the kitchen does not pull in all the hot gas from the burner as the vent's suction is diluted by clean air in the kitchen. Leaky gas valves release raw fuel into the kitchen when the stove is not in operation.

[0009] If the kitchen is cooled by air conditioning the heat from the flue gas works against the cooling system and increases the cost of air conditioning unless all the flue gases are vented outside the kitchen.

[0010] Boiling over or spilling over liquid from the vessel flow along the vessel's side and bottom could reach the burner, extinguish the flame, and release raw fuel into the surrounding leading to a fire hazard situation if unattended. Fire occurs when the flame from the burner ignites the combustible contents of the food being cooked.

[0011] Flow of fuel through the burner is generally manually controlled by the user and an automatic temperature control in which the optimum cooking parameters of the temperature is desired.

[0012] Therefore, a need exists for a gas burner that solves the above mentioned problems and shortcomings.

SUMMARY OF THE INVENTION

[0013] The invention is a stovetop system that solves the problems described above. Described embodiments of the stovetop system include the following improvements.

[0014] One aspect of the present invention is the improvement of heating efficiency. The flame, herein after referred to as hot gas is guided in a winding and extended path instead of the radial path under the vessel to increase the contact time between the hot gas and the vessel's bottom resulting in higher heating efficiency. Winding paths around a burner as shown in FIG. **3** are examples of patterns of hot gas flow path originating from the center zone flow under a heated vessel.

[0015] The long flow path of the hot gas under the vessel increases the contact time between the hot gas and the vessel. Increased contact time increases the heat transfer between the hot gas and the vessel resulting in higher heat efficiency of the stovetop system.

[0016] Another aspect of the present invention is the vessel adaptability. When a vessel is placed on the winding stovetop the vessel's bottom needs to be in contact with the top of the windings of the stovetop and enable the hot gas to follow the winding path. The present invention is adapted to support vessels of various shapes and sizes and still maintain heating efficiency.

[0017] Another aspect of the present invention is the improvement in preventing harmful chemicals and particulates in the hot gas released into the kitchen. The present invention disposes the hot gas outside the kitchen to ensure health safety;

[0018] The present invention detects harmful chemicals such as benzene in the raw fuel from the burner due to leakage of fuel control valve, using sensors while the stove is off, and starts a draft fan;

[0019] The present invention neutralizes or reduces harmful chemicals in the hot gas by chemical remedial means including catalysis.

[0020] Another aspect of the present invention is the improvement in fire safety. The present invention prevents spillover or boil over contents of the vessel from reaching the burner by flowing along the sides and the bottom of the vessel and extinguishing the flame resulting in the release of raw fuel that may result in a fire if unattended.

[0021] The present invention prevents grease fire since the hot gas does not contact flammable fumes from inside the vessel.

[0022] Another aspect of the present invention is the improvement kitchen heating problem. The present invention prevents heating the stove surrounding, referred to as kitchen, to reduce cooling cost of the kitchen;

[0023] Another aspect of the present invention is the improvement of temperature control of the heating process. The present invention comprises a programmable controller that controls the temperature of the vessel per user settings using temperature sensors at various locations and by controlling the fuel flow rate and draft fan speed.

[0024] Although the invention is illustrated and described herein as embodied in a stovetop, it is, nevertheless, not intended to be limited to the details shown because various modifications and structural changes may be made therein without departing from the spirit of the invention and within the scope and range of equivalents of the claims. Additionally, well-known elements of exemplary embodiments of the invention will not be described in detail or will be omitted so as not to obscure the relevant details of the invention.

[0025] Other features that are considered as characteristic of the invention are set forth in the appended claims. As required, detailed embodiments of the present invention are disclosed herein; however, it is to be understood that the disclosed embodiments are merely exemplary of the invention, which can be embodied in various forms. Therefore, specific structural and functional details disclosed herein are not to be interpreted as limiting, but merely as a basis for the claims and as a representative basis for teaching one of ordinary skill in the art to variously employ the present invention in virtually any appropriately detailed structure. Further, the terms and phrases used

herein are not intended to be limiting; but rather, to provide an understandable description of the invention. While the specification concludes with claims defining the features of the invention that are regarded as novel, it is believed that the invention will be better understood from a consideration of the following description in conjunction with the drawing figures, in which like reference numerals are carried forward. The figures of the drawings are not drawn to scale.
[0026] Before the present invention is disclosed and described, it is to be understood that the terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting. The terms “a” or “an,” as used herein, are defined as one or more than one. The term “plurality,” as used herein, is defined as two or more than two. The term “another,” as used herein, is defined as at least a second or more. The terms “including” and/or “having,” as used herein, are defined as comprising (i.e., open language).
[0027] The term “hot gas” is defined herein in its broadest sense, e.g., burning fuel, flame, fume, heated air from an electric heater controlled by a regulator. The term “kitchen” can also be interpreted as any confined room where the stovetop is used.
[0028] As used herein, the terms “about” or “approximately” apply to all numeric values, whether or not explicitly indicated. These terms generally refer to a range of numbers that one of skill in the art would consider equivalent to the recited values (i.e., having the same function or result). In many instances these terms may include numbers that are rounded to the nearest significant figure.

Description

BRIEF DESCRIPTION OF DRAWINGS
[0029] FIG. **1** shows the elevation views of a gas stove showing the flow path of the hot gas under vessels of prior art.
[0030] FIG. **2** shows a flow path of hot gas under a vessel in prior art.
[0031] FIG. **2**A shows other flow paths of hot gas under a vessel in prior art.
[0032] FIG. **3** shows the various possible patterns of windings of stovetops.
[0033] FIG. **4** shows a few examples of the number of windings of stovetops.
[0034] FIG. **5** is an isometric view of one embodiment of the stovetop system.
[0035] FIG. **6** is an isometric view of the exhaust system.
[0036] FIG. **7** is an isometric view of the burner and valve.
[0037] FIG. **8** is an isometric view of one embodiment of the stovetop system and burner system.
[0038] FIG. **9** is an isometric view of the flow path of hot gas under a vessel.
[0039] FIG. **10** is an isometric view of the flow path of hot gas under a plate.
[0040] FIG. **11** is an elevation view of the first embodiment of the stovetop system with a vessel.
[0041] FIG. **12** is a top view of the stovetop system showing the flow path of hot gas.
[0042] FIG. **13** is the profile across the flow path.
[0043] FIG. **14** is a top view of a large vessel and relative orientation of the exhaust inlet.
[0044] FIG. **15** is an isometric view of a large vessel and relative orientation of the exhaust inlet.
[0045] FIG. **16** is a top view of a small vessel and relative orientation of the exhaust inlet.
[0046] FIG. **17** is an isometric view of a small vessel and relative orientation of the exhaust inlet.
[0047] FIG. **16**A shows various views of the first embodiment with a large, curved bottom vessel and relative orientation of the exhaust inlet.
[0048] FIG. **16**B shows various views of the first embodiment with a small, curved bottom vessel and relative orientation of the exhaust inlet.
[0049] FIG. **18** shows an elevation view of a curved bottomed vessel heated placed over the strip **11**.
[0050] FIG. **19** is an isometric view of another embodiment.
[0051] FIG. **20** is an isometric view of another embodiment with a vessel.

[0052] FIG. **21** is an isometric view of the strip **11** with one of the risers **16**.
[0053] FIG. **22** is the view through direction A of FIG. **21**.
[0054] FIG. **23** is the side view of riser **16**.
[0055] FIG. **24** is an elevation view of this embodiment showing the curved bottom vessel **14** mounted on a stovetop system.
[0056] FIG. **25** is the plan view of the stovetop system with risers **16**.
[0057] FIG. **26** A section B-B of FIG. **25** is shown in FIG. **20**.
[0058] FIG. **27** is the profile across the hot gas path.
[0059] FIG. **28** shows the temperature and chemical control system.

DETAILED DESCRIPTION OF THE INVENTION

[0060] The inventor provides a unique stovetop system for an energy efficient, safe, customizable, standalone operation.

[0061] In one embodiment, a stovetop system **10**, shown in FIG. **5**, comprises a stovetop **11** that is in the form of a thin strip, made of material capable of withstanding high temperature and load and an exhaust system **20**. This strip is wound around a heat source **31**, including a gas burner. Sample winding patterns are shown in FIG. **3** and FIGS. **4**A through **4**G with space between each winding. The exhaust system **20** comprises an inlet **21** and an outlet **23** connected by a conduit **22**.

[0062] A vessel **12** to be heated is supported by stovetop **11**. The upper edge of the stovetop **11** matches the bottom shape of a vessel **12**. In this embodiment the bottom surface of the vessel **12** is flat and circular.

[0063] The stovetop **11** is installed over and around a burner **31** by supporting means including legs attached to the stovetop **11**. This standalone stovetop **11** can be adapted to be installed over a gas stove **30** with a burner **31** connected to a gas valve **32** in series with an electronic control valve **33** shown in FIG. **7**. The centers of stovetop **11**, the vessel **12**, and the burner **31** are substantially aligned.

[0064] The stovetop **11** has a one single continuous path beginning from the burner and ends at outer most winding. The single port exit helps processing of all the exiting hot gas from the stovetop **11**. The hot gas from the burner **31** moves through the space between the windings of stovetop **11** under the vessel **12** and exits the stovetop **11** through the inlet **21** of the exhaust system **20**. The outlet **23** is located optimally in a place so that free flow of the hot gas is established. The inlet **21** is at a negative pressure by natural draft through the exhaust system due to the location of the outlet **23**. In the event the negative pressure is insufficient a draft fan **24**, shown in FIG. **6**, is installed in the exhaust system downstream of the inlet **21**. The inlet **21** is inserted in the space between the winding or at the end of the winding is tightly held. The inlet **21** is inserted in the space through which the hot gas passes within the stovetop **11** or at the end of the winding. The stovetop **11** can be encased in a casing, not shown in figures, into which the inlet **21** can be inserted. All the hot gas passing through the space between the windings and under the vessel exits only through the inlet **21** followed by the conduit **22** and outlet **23** and not into the surrounding of the stove on which the stovetop **11** is installed.

[0065] Heat transfer efficiency is one of the improvements of this embodiment. The hot gas from the burner moves under the vessel through a path created by the space between the windings as shown in FIG. **9** and FIG. **10**. FIG. **9** is an isometric view of the stovetop system with vessel **12**, shown translucently, placed over the stovetop **11** and the hot gas path is shown by arrows. FIG. **10** is an isometric view of a stovetop system with a plate, shown translucently, and the path of the hot gas by arrows. FIG. **11** is an elevation view of the stovetop system showing a flat-bottomed vessel **12** placed over the stovetop **11** with a gas burner **31** in its center zone. The hot gas exits at the inlet **21** of the exhaust system **20**.

[0066] FIG. **12** is a top view of the stovetop system. The hot gas path, shown by arrows, is many times longer than the radial path R, the distance from the center of the source to the edge of the vessel under the vessel.

[0067] A section A-A cut in the plan view in FIG. **12** is shown in FIG. **13**. The profile across the hot gas path, as shown in FIG. **13**, is confined on the sides by the adjacent windings W and WA and the vessel's bottom surface **13** on top. The gap between the stovetop **11** windings W and WA and the bottom surface **13** of the vessel **12** is kept negligibly small for efficient functioning so that hot gas does not flow through any gap directly into adjacent winding instead of moving around through the path.
[0068] Since the hot gas is lighter than colder air the hot gas moves up and is in contact with the bottom surface **13** of the vessel **12**. The height of the profile is tall enough such that the hot air does not flow downwards and into adjacent winding or exit the stovetop **11** through the bottom.
[0069] This winding path being longer than the radial path R, increases the contact time between the hot gas and the vessel thereby increasing the heat transfer between the hot gas and the vessel resulting in a higher heating efficiency. Heating efficiency can be defined as the ratio of energy Qa, the energy absorbed by the vessel to the energy content of the hot gas Qi from the burner during the time of the heating. n=Qa/Qi. The longer the hot gas path, the higher the time of contact between the hot gas and the vessel and the higher the heating efficiency. After a steady state is reached in the heating process the heating efficiency drops significantly since the vessel absorbs little energy as the vessel temperature remains steady and the fuel flow to the burner **31** is reduced to a minimum just enough to make up for the heat loss or temperature drop of the vessel due to thermal radiation.
[0070] FIG. **4**A shows a winding path under a heated vessel with a circular bottom with radius R. The length of the winding path along the boundary shown is three times longer than R. It is safe to say that the contact time between any unit volume of the hot gas and the vessel's bottom is three times than the contact time through the direct path along R making this flow path three times heat efficient. Winding paths shown in FIGS. **4**B through **4**G show paths with an increasing number of windings. The increase in energy efficiency of paths shown in FIGS. **4**B, **4**C, **4**D, **4**E, **4**F, and **4**G are 8, 11, 14,17, 21, 25, and 28 times longer than the radial path R respectively. It can be safely estimated that the heating efficiency increment is also in the same multiple.
[0071] The heat transfer efficiency is affected by many factors such as the temperature difference between the hot gas and the vessel, specific heat of the vessel, fuel flow rate into the burner that affects the hot gas flow rate, and the time of contact between the hot gas and the vessel. This embodiment can customize the time of contact for improved heating efficiency by the inserting location of the inlet **21**.
[0072] Vessel adaptability is one of the improvements of this embodiment. FIGS. **14** through **16** show the vessel size and inlet **21** orientation inside the stovetop **11**. FIG. **14** is the plan view of the stovetop system on which a large vessel **12**L is placed. The inlet **21** of the exhaust system is inserted into the stovetop **11** at a location LL near the edge of the bottom of the vessel **12**L to maximize the contact time. For a smaller vessel **12**S the inlet **21** needs to be moved towards its edge so that the inlet is completely within the boundary of the smaller vessel **12**S.
[0073] If the inlet **21** is located partially outside the bottom of the vessel the suction at the inlet is diluted with surrounding air which may affect the hot gas flow rate. If the inlet is fully outside the bottom of the vessel the heating efficiency is low and undeterminable and the hot gas escapes into the stovetop surrounding that might cause health and fire hazards. The inlet **21** of the exhaust system is inserted into the stovetop under the vessel in a location that is close to the edge of vessel's bottom for achieving the best heating efficiency and preventing hot gas escape into the kitchen.
[0074] Kitchen heat reduction is one of the improvements of this embodiment. If the kitchen is cooled by air conditioning letting the hot air escape into the kitchen will heat up the kitchen and result in higher cooling cost. This embodiment disposes the hot gas from the stovetop **11** outside of the kitchen through the outlet **23** of exhaust system **20**.
[0075] Health risk prevention is one of the improvements of this embodiment. The hot gas from the stove is disposed outside of kitchen preventing the harmful chemicals and particles from human inhalation.

[0076] Spill over and grease fire prevention is another improvement of this embodiment. If the contents of the vessel spill over or boil over the overflow liquid can reach the burner and extinguish the flame resulting in the release of raw fuel into the surrounding causing fire and health hazards. The stovetop in this embodiment prevents the overflow of the vessel contents from reaching the burner since the bottom of the vessel is contact with the upper edge of the stovetop **11** stops the flow of overflow contents of the vessel under the vessel thereby eliminating a fire incident.
[0077] If the flames from the burner encounter any flammable fumes from the hot contents in the vessel fire can occur. In this embodiment the cooking fumes do not come in direct contact with the hot gas from the burner **31** exits through the inlet **21**. The end of the winding can be modified to extend away from the vessel.
[0078] Vessel adaptability is another improvement resulting in this invention. FIG. **16**A shows elevation, top and isometric views of a stovetop system with stovetop **11**S on which a vessel **14**SL with curved bottom is placed. The upper edge of the stovetop **11**S matches the bottom shape of the vessel **14**SL to ensure the profile across the hot gas path is without gaps at the junction of the windings and the bottom surface of the vessel **14**SL. The inlet **21** is located at the edge of the vessel **12**SL to take in hot gas from the stovetop **11**S. FIG. **16**B shows the elevation, top and isometric views of a stovetop system with stovetop **11**S on which a vessel **14**SS with curved bottom is placed. Vessel **14**SS is smaller than vessel **14**SL but has the same bottom shape of **14**SL. When the smaller vessel **14**SS is placed over stovetop **11**S the inlet **21** is moved towards the center at its edge. This establishes the vessel adaptability feature of this embodiment.
[0079] Another embodiment of stovetop system **10** is a further improvement of the one embodiment described.
[0080] FIGS. **18**, **19**, **20**, **21**, **22**, and **23** are referred to in the description of this embodiment. A vessel **14** with a curved bottom is used in this embodiment. FIG. **18** shows an elevation view of a curved bottomed vessel placed over the stovetop **11** with its upper edges flat. The curved bottom of the vessel is in contact only with a small section of the windings of the stovetop **11** with a flat upper edge profile. Hence the extended path created by a flat bottomed vessel over the stovetop **11** as shown in FIG. **12** is not created with a curved bottomed vessel. The hot gas does not flow through the space between the windings. Hot gas escaping through the gap between the top edge of the stovetop **11** and the curved bottomed vessel is shown by the arrows in FIG. **18**.
[0081] To prevent the escape of the hot gas through the gap a plurality of closely packed risers **16** are installed over the top of the stovetop **11** as shown in FIG. **19**. The risers **16** move up and contact the curved bottom vessel **14** as shown in FIG. **24**. All the risers **16** move up and literally seem to extend the upper edge of the stovetop **11** to conform to the shape of the vessel's bottom.
[0082] A riser **16** is a casing wrapped around a small section the stovetop **11**. FIG. **21** is an isometric view of the stovetop **11** with one of the risers **16**. FIG. **22** is the view through direction A of FIG. **21** and FIG. **23** is the side view of riser **16** showing the riser **16** lifted by a spring **17** that rests on the stovetop **11**. At the top of the riser **16** is a soft pad to close any gap between the contact surface of the vessel and the riser **16** to prevent hot gas passing across the top of the riser **16**. A pin **18** across the riser **16** below the stovetop **11** holds the riser in place. Without this pin the riser **16** will pop out of the stovetop **11** due to the force of the spring **17**. As an alternative means, the riser **16** can be folded under the stovetop **11** to prevent the popping out of the stovetop **11**. Each riser **16** is shaped to move freely on the section of the stovetop **11** it is installed and to withstand the forces exerted by the vessel and its contents. The risers guide the hot gas along the space between the windings.
[0083] FIG. **24** is an elevation view of this embodiment showing a curved bottom vessel **14** mounted on a stovetop system with a stovetop. FIG. **25** is the plan view of the stovetop system with risers **16**. As shown in FIG. **20** a section B-B of FIG. **19** the risers at the outer windings have moved up to engage with the bottom surface **15** of the curved bottomed vessel **14** there by creating a profile of the path covered on the sides by the risers of consecutive windings and on the top by

the bottom surface **15** of the curved bottom vessel **14**. The profile across the hot gas path is shown in Detail C in FIG. **27**. The profile boundaries are the risers **16** on the sides and the bottom surface **15** of the vessel **14** on the top. The bottom of the profile is left open for combustion air to enter. The height of the profile is designed such that the hot gas does not come out of the profile through the bottom creating a heat efficiency reduction. All the improvements of the previously described embodiment are applicable to this embodiment while the uniqueness of this embodiment is that it can support vessels of various shapes and sizes while maintaining increased heating efficiency. The vessel adaptability of the first embodiment is shown in FIG. **16**A and FIG. **16**B are also applicable to this embodiment. But FIG. **16**A and FIG. **16**B do not show the risers.

[0084] Temperature and chemical control are added to the embodiments as an improvement. The schematic diagram in FIG. **28** shows the temperature and chemical control system. This system comprises a controller **34** that receives input data regarding temperature from various locations including the exhaust system, vessel, and strip, chemical concentration sensing system **51** to sense the presence of harmful chemicals, control software to operate draft fan **24** and electric fuel flow control valve **33** based on operating parameters, user input parameters, and temperature and chemical threshold.

[0085] The user can set temperature parameters for the heating process including the temperature of the hot gas at the stovetop, exhaust system, vessel, and vessel contents. The controller operates the electric fuel flow control valve **33** and draft fan **24** to operate per user set parameters and a control software program in the memory storage of the controller. The electric fuel flow control valve **33** is closed in case a threshold temperature is exceeded in the system to prevent uncontrolled fire due to system malfunction.

[0086] A chemical control system detects hazardous chemicals in the hot gas or leaking fuel through a closed fuel control valve. The hot gas passing through the exhaust system **20** is routed through chemical reaction chambers including catalytic converters, not shown in figure, to reduce or eliminate hazardous chemical release.

[0087] Temperature and chemical quantity threshold are set to control fire hazard or chemical hazard events by activating control draft fan and shutting off electric fuel flow control valve **33**.

Claims

1-**7**. (canceled)

8. An energy-efficient, customizable stovetop system comprising: at least one stovetop (**11**) wound a plurality of times with continuous space between the windings around a hot gas source to support a vessel substantially aligned with the hot gas source, with its bottom surface in contact with the edge of the windings to create a path bound by the windings on the sides and said vessel's bottom surface on the top for the hot gas to flow thereby increasing the contact time of the hot gas with said vessel manyfold compared to the contact time along a guided or unguided radial path under said vessel thereby increasing the heating efficiency; and an exhaust system (**20**) comprising an outlet located away from the stovetop surrounding, outside the room of the stovetop, and dispose hot gas from an inlet (**21**) located at the end of or anywhere in the space between the windings at the periphery of said vessel thereby adapting to the vessel's size, drawing all the hot gas with harmful chemicals away from the stovetop, not heating the stovetop surrounding and preventing the hot gas from coming in contact with flammable fumes from the contents of the vessel that can result in a fire incident.

9. The energy-efficient, customizable stovetop system of claim 8, further comprises risers (**16**) installed on the stovetop (**11**) windings biased upward by springs to close gaps between the stovetop (**11**) windings and the bottom surface of a vessel thereby confining the hot gas in the winding path.

10. An energy-efficient, customizable stovetop system comprising: at least one stovetop (**11**) wound a plurality of times with continuous space between the windings around a hot gas source to support a vessel substantially aligned with the hot gas source, with its bottom surface in contact with the edge of the windings to create a path bound by the windings on the sides and said vessel's bottom surface on the top for the hot gas to flow thereby increasing the contact time of the hot gas with said vessel manyfold compared to the contact time along a guided or unguided radial path under said vessel thereby increasing the heating efficiency; an exhaust system (**20**) comprising an outlet located away from the stovetop surrounding, outside the room of the stovetop, and dispose hot gas from an inlet (**21**) located at the end of or anywhere in the space between the windings at the periphery of said vessel thereby adapting to the vessel's size, drawing all the hot gas with harmful chemicals away from the stovetop, not heating the stovetop surrounding and preventing the hot gas from coming in contact with flammable fumes from the contents of the vessel that can result in a fire incident; and a control system comprising a computer processor with software to control the hot gas temperature at said inlet (**21**) by operating a valve supplying fuel to said burner based on the input from a temperature sensor located at said input (**21**) and the operating parameters set in the software program thereby controlling the heating of the vessel.