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(19) **United States**(12) **Patent Application Publication**
Zhu et al.(10) **Pub. No.: US 2014/0238282 A1**(43) **Pub. Date: Aug. 28, 2014**(54) **BONFIRE OVEN***F24B 7/04* (2006.01)*F24B 1/08* (2006.01)(75) Inventors: **Hongfeng Zhu**, Yiwu (CN); **Qianxi Chen**, Yiwu (CN)(52) **U.S. Cl.**CPC . *F24B 1/024* (2013.01); *F24B 1/08* (2013.01);*F24B 7/005* (2013.01); *F24B 7/045* (2013.01)USPC **110/241**; 110/248; 110/293; 110/297(21) Appl. No.: **14/351,139**

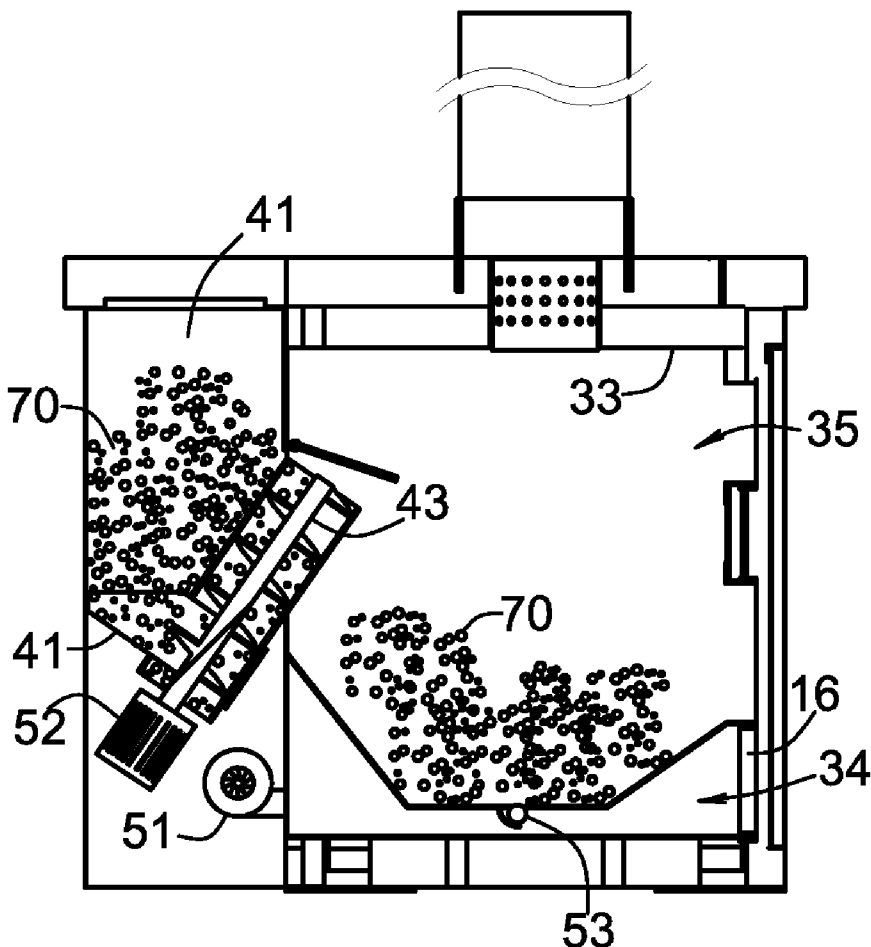
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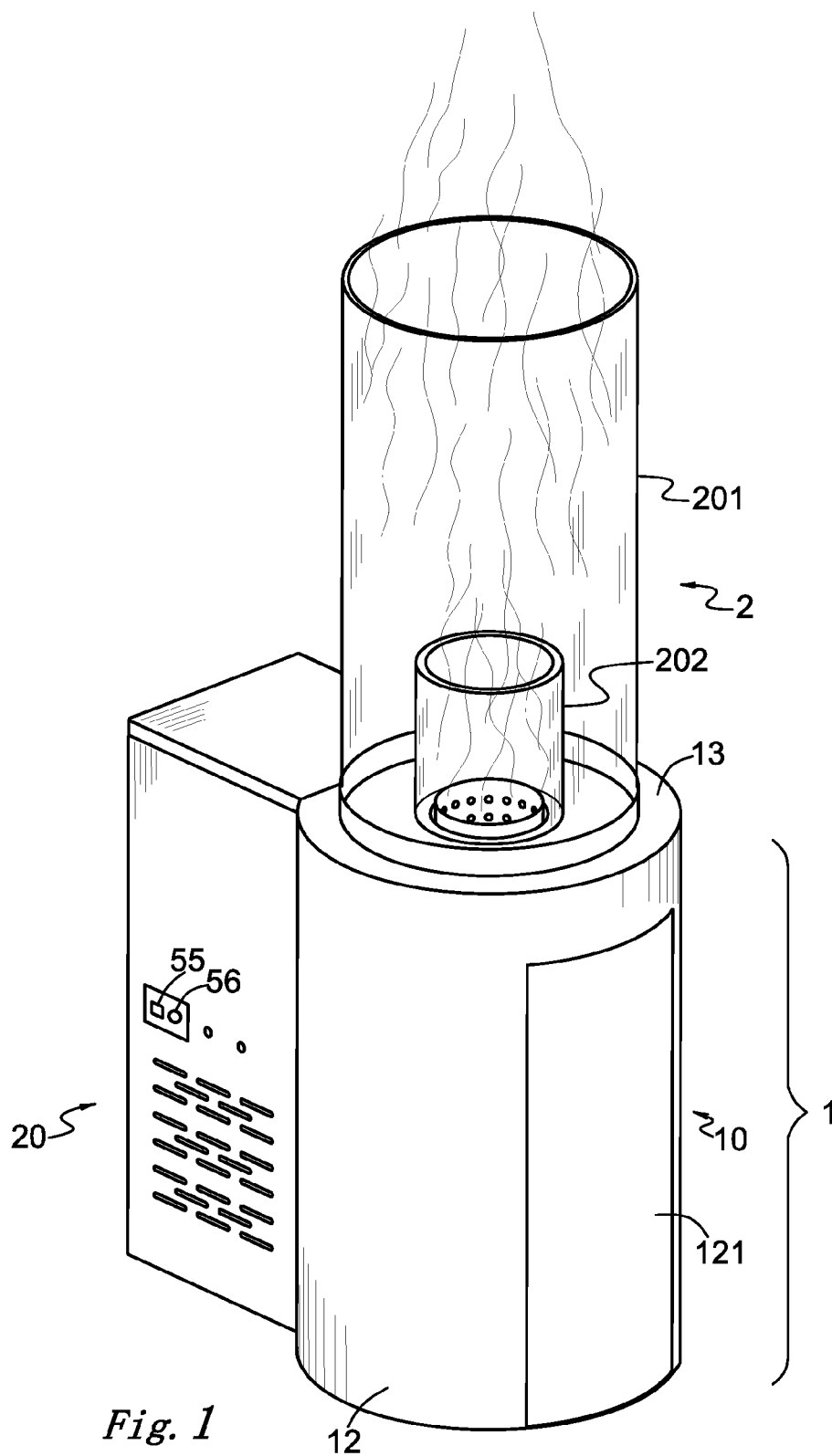
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§ 371 (c)(1),

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A bonfire oven has a body placeable on the ground. The body has a combustion cabinet and an auxiliary equipment cabinet. A burner contained in the combustion cabinet has a fire grate, a side plate extending upward from the fire grate, a top plate opposite to the fire grate, a blowing space beneath the fire grate, and a hearth defined by the fire grate and the side plate. A fuel supply mechanism, an electrical equipment and an air blower is contained in the auxiliary equipment cabinet. The bonfire oven further has a flame portion on the top which is a flame roaring space formed by at least one piece of high temperature resistant glass.





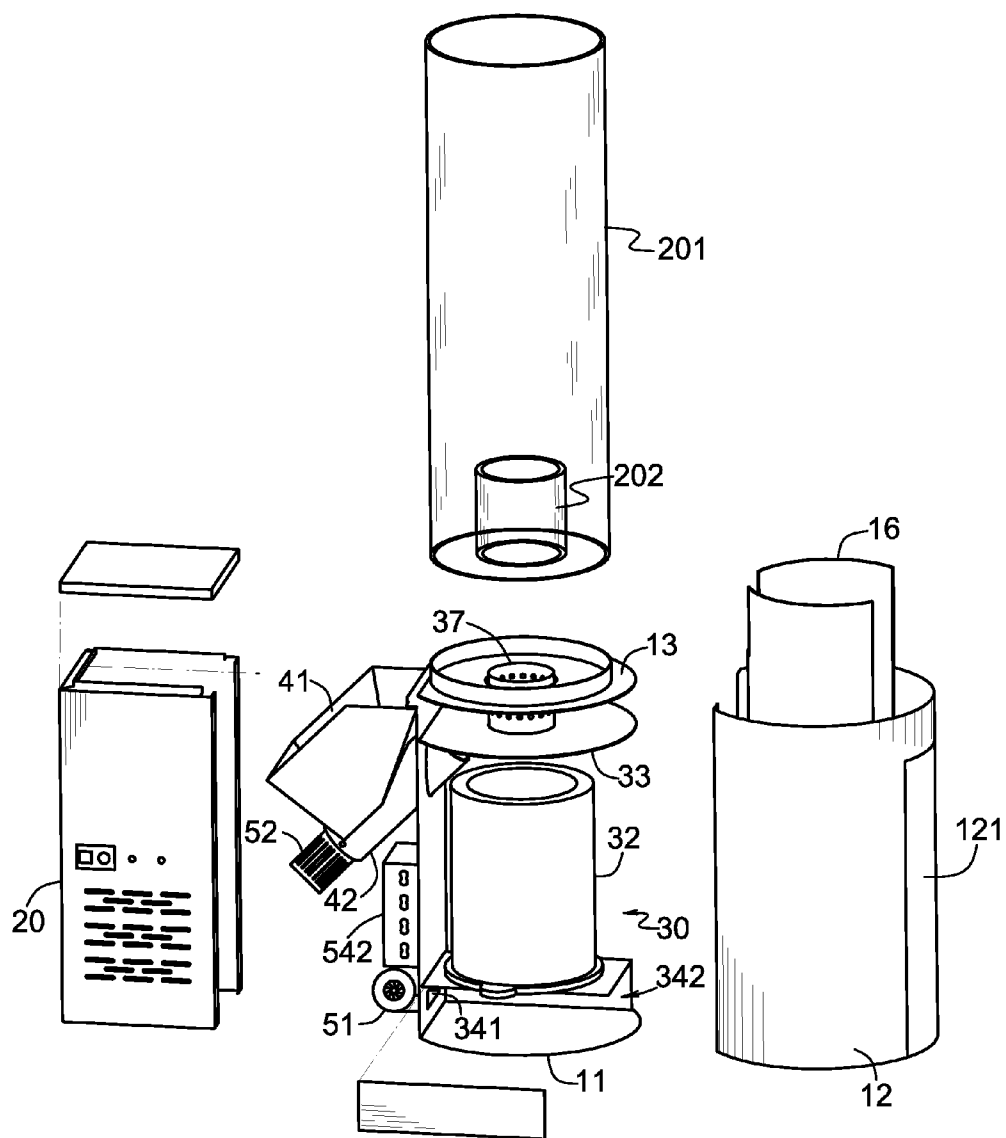


Fig. 2

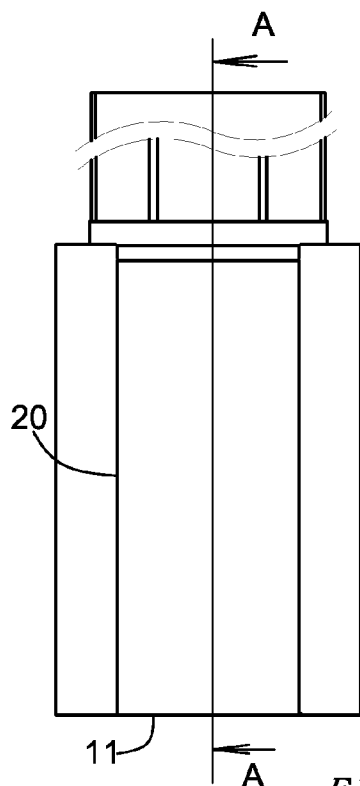


Fig. 3

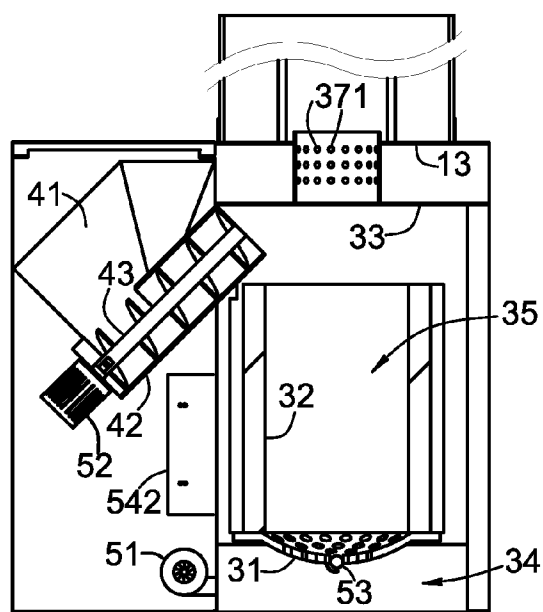


Fig. 4

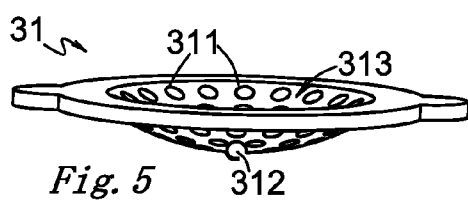


Fig. 5

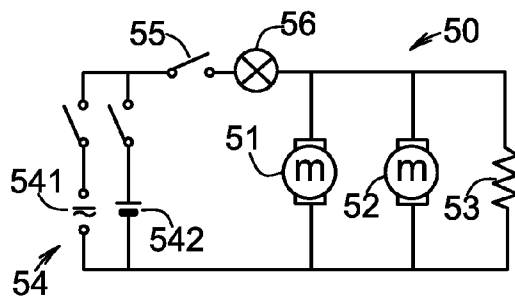
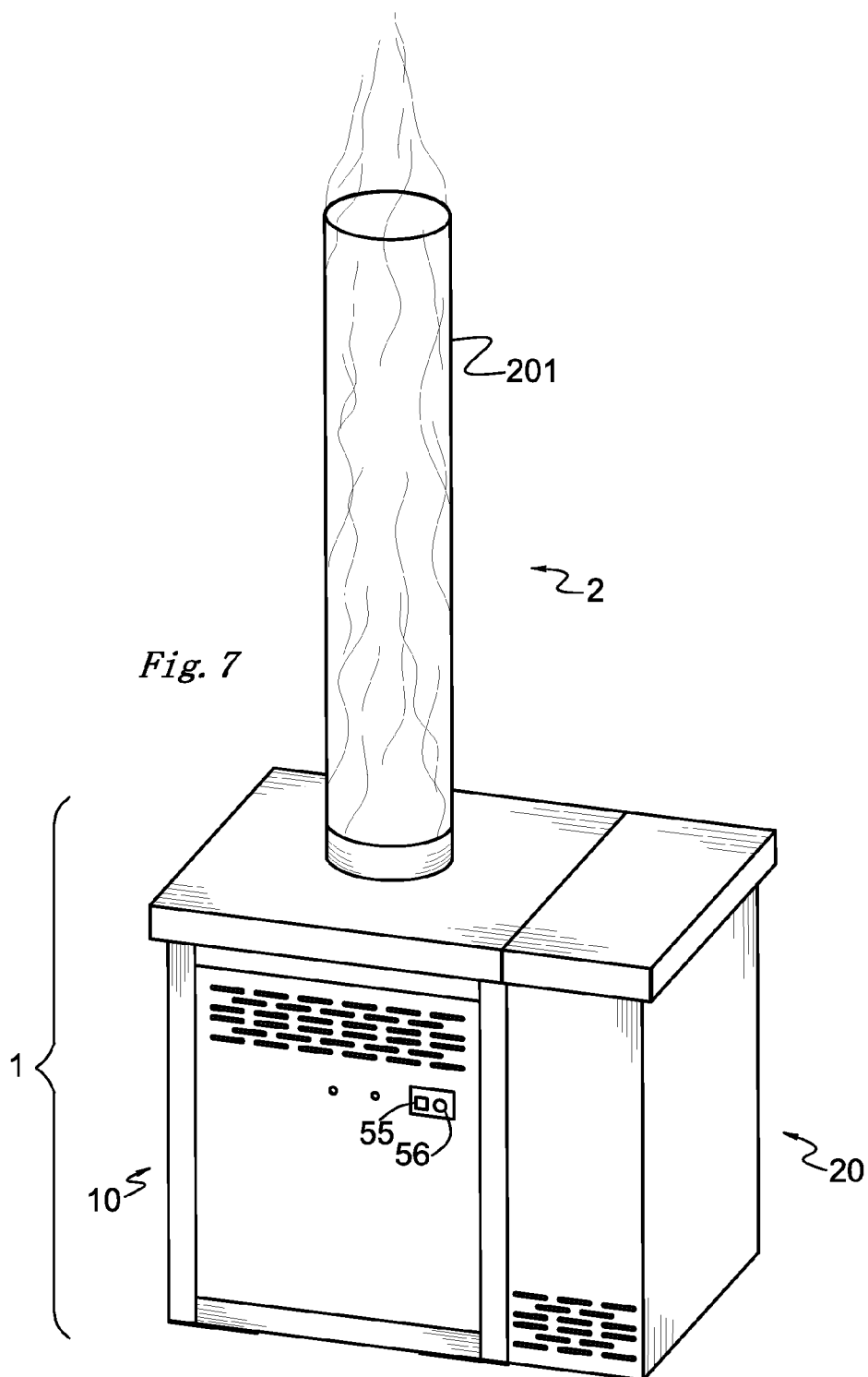
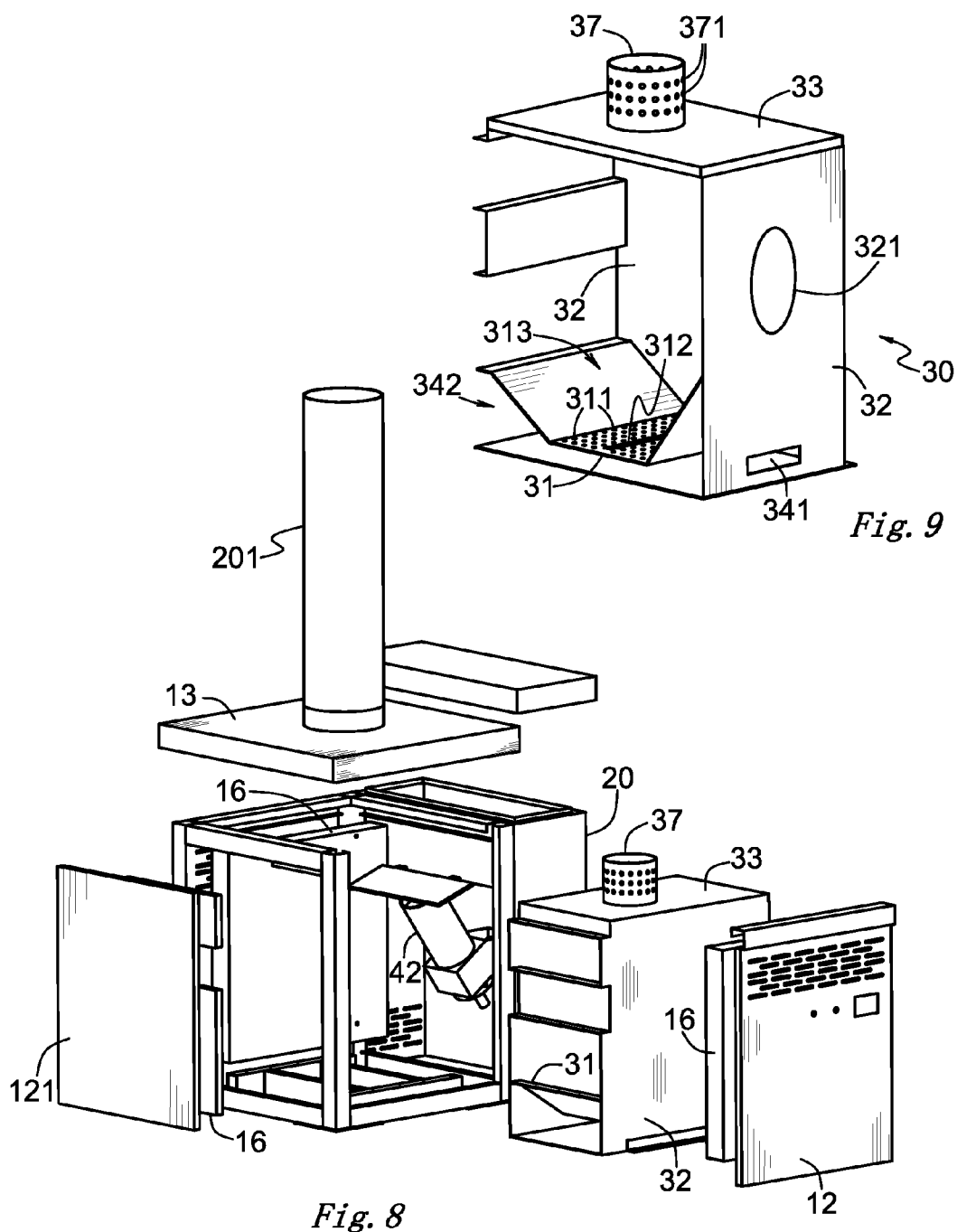


Fig. 6





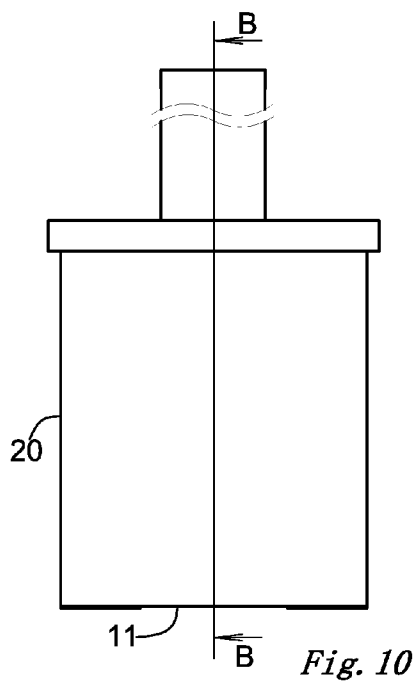


Fig. 10

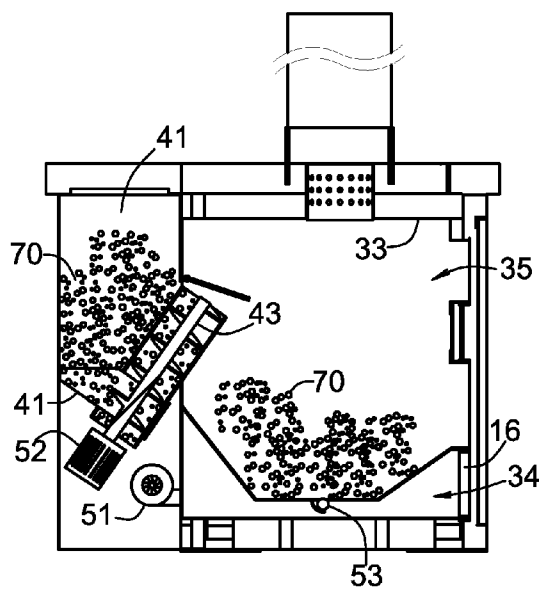


Fig. 11

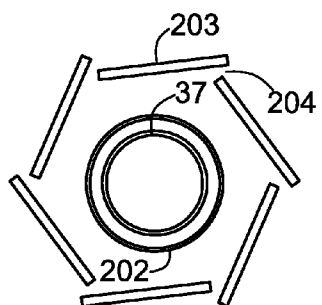


Fig. 15

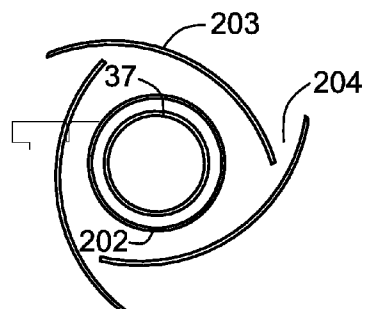


Fig. 16

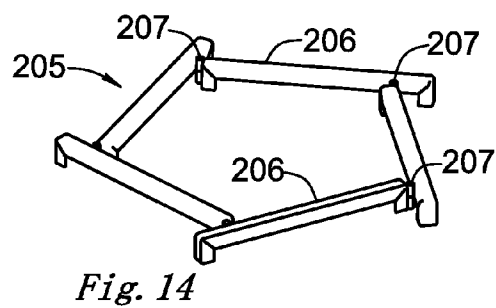
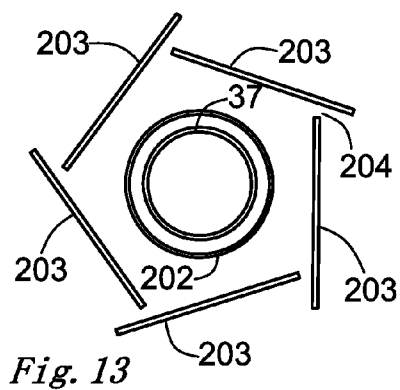
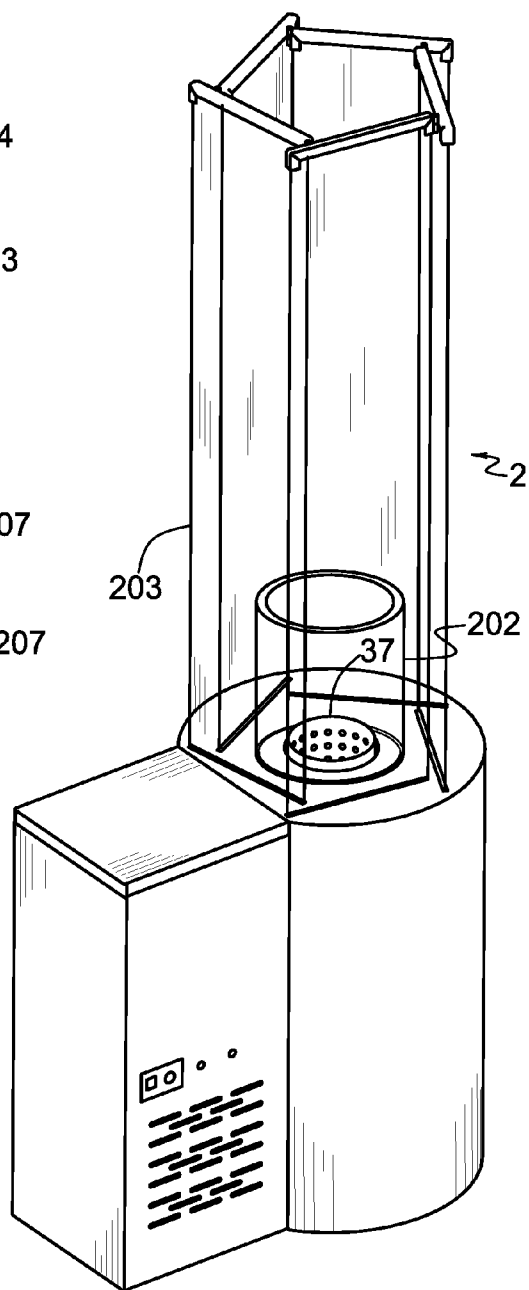


Fig. 12



BONFIRE OVEN**CROSS-REFERENCE TO RELATED APPLICATIONS**

[0001] Not Applicable

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

[0002] Not Applicable

INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC

[0003] Not Applicable

BACKGROUND OF THE INVENTION

[0004] 1. Field of the Invention

[0005] The invention relates to a bonfire oven, and more particularly, to a bonfire oven for use with biomass fuel which is safe to use and easy to control fire.

[0006] 2. Description of Related Art

[0007] Setting bonfire is an ancient tradition and beloved by many people of vicarious countries. Until now, the way of setting a bonfire is basically putting a pile of wood, charcoal, or carbon on the ground or in a basin and then igniting. This traditional way of bonfire setting brings following main problems. First, safety. Sparkles and flame of the bonfire fly in wind and will be liable to ignite other objects or scald people or animals. Situation becomes more dangerous when natural wood or carbon explodes in burning. Second, flame control. In this way of bonfire setting, both ignition and extinguishing usually take a long time. Wood and carbon are not liable to be ignited directly with ordinary lighting utilities such as a gas lighter and a firing gun. And a general way of extinguishing is only be natural burn out or water dampening. Water dampening needs adequate water source and natural burn out usually requires a guardian. Both ways have a low efficiency of flame control. Furthermore, since flame is totally affected by wind, when wind, especially gust, is high, bonfire will be completely infeasible. Third, circumstance issues. In the traditional way of bonfire setting, thick smoke will be generated in a very long period from start to full burning, which will negatively affect circumstance and health of surrounding people. And ash, wreckage, and stain on the ground left by burning are hard to clean. Situations become even worse when the flame is put out with water. Fourth, a height of flame. Traditional bonfire only has a flame of limited height. It is not easy for a traditional bonfire to form a splendid scene of blazing fire. Fifth, the bonfire is not able to be transported.

BRIEF SUMMARY OF THE INVENTION

[0008] The main object of the invention is to provide a bonfire oven having a greater safety. The bonfire oven will not produce flying sparkles, and a flame thereof will not sway in wind in a range of a height of surrounding people.

[0009] Another object of the invention is to provide a bonfire oven which is able to be ignited or extinguished by pressing a button and a flame thereof is able to be generated or put out in a very short time period.

[0010] Yet another object of the invention is to provide a bonfire oven which is able to be used in continuous wind or a relatively high gust.

[0011] Still another object of the invention is to provide a bonfire oven which is able to produce little smoke and ash and leaves no stain on the ground which is hard to clean.

[0012] Another object of the invention is to provide a bonfire oven which is able to produce a flame of a height greater than surrounding people and form a splendid scene of bonfire.

[0013] Another object of the invention is to provide a bonfire oven which is able to be transported easily. The bonfire oven is suitable either for long or short distance transportation.

[0014] In order to accomplish the above objects, the present invention provides a bonfire oven for use with biomass fuel having a body which is able to be placed on the ground. The body has a combustion cabinet and an auxiliary equipment cabinet. The combustion cabinet has a bottom which is able to be placed on the ground levelly, a side extending upward from a peripheral of the bottom, and a top in communication with an upper peripheral of the side and opposite to the bottom. A door is provided in the side. The combustion cabinet has a burner received therein. The burner has a fire grate, a side plate extending upward from a peripheral of the fire grate, a top plate on the side plate and opposite to the fire grate, a blowing space beneath the fire grate, and a hearth defined by the fire grate and the surrounding side plate. A blowing hole is defined in the blowing space facing the auxiliary equipment cabinet. A front opening is defined in the blowing space opposite to the blowing hole. A plurality of air vents are defined in the fire grate. A flame tube is in communication with the hearth being formed in the top plate above the hearth. A plurality of air holes are defined in a wall of the flame tube. The auxiliary equipment cabinet has a fuel supply mechanism and an electrical equipment received therein. The fuel supply mechanism has a hopper, a fuel tube having one end in communication with the hopper and a free end extending into the hearth, and a rotary vane feeder rotatably contained in the fuel tube. The electrical equipment has an air blower in communication with the blowing hole, a feeding motor driving the rotary vane feeder, a power supply, and a switch. The bonfire oven further has a flame portion on the top of the body. The flame portion is a flame roaring space formed by at least one piece of high temperature resistant glass surrounding the flame tube.

[0015] The bonfire oven of the invention has following beneficial effects. First, since the main process of burning is in the burner and the burning sufficiency becomes much increased with air supply, sparkles of burning tiny carbon granule become much less liable to fly out of outside circumstance through a long flame portion. At that same time, leaping flames in the flame portion will no longer vulnerable to environmental wind. Therefore, safety is much improved than the use of nature bonfire. Second, after a user turns on the bonfire oven, the hot-red ignition bar and the air blower are able to quickly make a fully burning, generating desirable flames. And when the user turns off the bonfire oven, the air blower is able to be set to work for an additional time period, making the fuel in the burner burn out quickly. Thus, an efficiency of generating and extinguishing of a bonfire is much improved. Third, the bonfire oven uses biomass fuel granule. Biomass fuel is more inflammable, and has less smoke and ash. The fuel of granule makes the time for ignition, smoke and ash even less, especially at a beginning and an end of the combustion. Fourth, the ash is centralized in the burner and is easy to collect and clean through the door. No stain which is hard to clean will left on the ground. Fifth,

outside air is able to enter the flame tube through the air holes in the flame tube and rapidly flows within the flame portion, stretching flames to a height which is much greater than that of a traditional bonfire. A splendid blazing bonfire is thus able to be generated. Sixth, compared with traditional bonfire, the bonfire oven is easy to be transported. The oven is able to be short distance moved by people, or long distance moved by a transportation vehicle.

[0016] These and other objectives, features, and advantages of the present invention will become apparent from the following detailed description, the accompanying drawings, and the appended claims.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0017] FIG. 1 is a schematic perspective view of the preferred embodiment of the bonfire oven of the invention when a bonfire is set.

[0018] FIG. 2 is a schematic perspective exploded view of the bonfire oven shown in FIG. 1.

[0019] FIG. 3 is a schematic side plan view of the bonfire oven shown in FIG. 1.

[0020] FIG. 4 is a schematic cross-sectional view along line A-A in FIG. 3.

[0021] FIG. 5 is a schematic perspective view of a fire grate of the bonfire oven shown in FIG. 1.

[0022] FIG. 6 is a circuit diagram of an electrical equipment of the bonfire oven shown in FIG. 1.

[0023] FIG. 7 is a schematic perspective view of a second preferred embodiment of the bonfire oven of the invention when a bonfire is set.

[0024] FIG. 8 is a schematic perspective exploded view of the bonfire oven shown in FIG. 7.

[0025] FIG. 9 is a partial perspective exploded view of the bonfire oven shown in FIG. 7 when a side wall of a burner is removed.

[0026] FIG. 10 is a schematic side plan view of the bonfire oven shown in FIG. 7.

[0027] FIG. 11 is a schematic cross-sectional view along line B-B in FIG. 9.

[0028] FIG. 12 is a schematic perspective view of a third preferred embodiment of the bonfire oven of the invention.

[0029] FIG. 13 is a partial cross-sectional plan view of glass panes of a flame portion of the bonfire oven shown in FIG. 12.

[0030] FIG. 14 is a schematic perspective view of a glass pane frame of the bonfire oven shown in FIG. 12.

[0031] FIG. 15 is a partial cross-sectional plan view of the glass panes of the flame portion of a fourth preferred embodiment of the invention. And,

[0032] FIG. 16 is a partial cross-sectional plan view of the glass panes of the flame portion of a fifth preferred embodiment of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0033] Shown in FIG. 1 is the preferred embodiment of a bonfire oven of the invention. The bonfire oven has a body 1 which is able to be placed on the ground. The body 1 has a combustion cabinet 10 and an auxiliary equipment cabinet 20.

[0034] With reference to FIGS. 2, 3 and 4, the combustion cabinet 10 has a bottom 11 which is able to be placed on the ground levelly, a side 12 extending upward from a peripheral of the bottom 11, and a top 13 in communication with an

upper peripheral of the side 12 and opposite to the bottom 11. An openable door 121 is provided in the side 12.

[0035] A burner 30 is contained in the combustion cabinet 10. The burner 30 has a fire grate 31, a side plate 32 extending upward from a peripheral of the fire grate 31, a top plate 33 on the side plate 32 and opposite to the fire grate 31, a blowing space 34 beneath the fire grate 31, and a hearth 35 defined by the fire grate 31 and the surrounding side plate 32. A blowing hole 341 is defined in the blowing space 34 facing the auxiliary equipment cabinet 20. A front opening 342 is defined in the blowing space 34 opposite to the blowing hole 341. A plurality of air vents 311 are defined in the fire grate 31. An ignition bar window 312 may be defined in the fire grate 31, too. An ignition bar 53 may be installed in the blowing space 34 and exposed to the hearth 35 through the ignition bar window 312. A flame tube 37 being in communication with the hearth 35 is formed in the top plate 33 above the hearth 35. A plurality of air holes 371 are defined in a wall of the flame tube 37. In this preferred embodiment, there are three rows of such air holes 371.

[0036] The auxiliary equipment cabinet 20 has a fuel supply mechanism 40 and an electrical equipment 50 received therein. The fuel supply mechanism 40 has a hopper 41, a fuel tube 42 having one end in communication with the hopper 41 and a free end extending into the hearth 35, and a rotary vane feeder 43 rotatably contained in the fuel tube 42. The electrical equipment 50, as shown in FIG. 6, has an air blower 51 in communication with the blowing hole 341 being able to supply air to the blowing space 34 of the burner 30 through the blowing hole 341, a feeding motor 52 driving the rotary vane feeder 43, the ignition bar 53, a power supply 54, a switch 55 and a power light 56. The power supply 54 may be an independent alternating current/direct current power supply 541, having or having not a storage battery 542 in parallel as auxiliary. Either the alternating current/direct current power supply 541 or the storage battery 542 is able to supply power independently. The switch 55 is installed on the auxiliary equipment cabinet 20 and able to control the power supply of whole circuit. The power light 56 is also installed on the auxiliary equipment cabinet 20 near the switch 55 and used to indict status of power supply.

[0037] A heat insulating layer 16 made up of fire proof materials such as asbestos or fire brick is provided between the side plate 32 of the burner 30 and the side 12 of the combustion cabinet 10.

[0038] With reference to FIGS. 1, 2, 3 and 4, the bonfire oven of the invention further has a flame portion 2 on the top 13 of the body 1. The flame portion 2 is a flame roaring space formed by at least one piece of high temperature resistant glass surrounding the flame tube 37. In this preferred embodiment, the flame portion 2 has a glass tube 201 on the top 13 and surrounding the flame tube 37. An inner glass tube 202 having a basically same diameter as the flame tube 37 and a height of 10-40 millimeter may be provided in the glass tube 201.

[0039] Fuel 70 is biomass fuel granule made by smashed and then briquetted straw, bits of wood, or crop stalks.

[0040] In use, a user is able to first place smooth the bonfire oven on the ground where is desirable and then load fuel 70 into the hopper 41. When the user turns on the switch 55, the power light 56 turns up, which means the circuit is closed and the bonfire oven starts to work. The feeding motor 52 starts to rotate, driving the rotary vane feeder 43 to send the fuel into the burner 30. Biomass fuel granule falls onto the fire grate 31

under the gravity. At this time, the ignition bar **53** has been electrified and turned red-hot and will ignite the fuel **70** on the fire grate **31** through the ignition bar window **312**. At this time too, the air blower **51** supplies air to the blowing space **34**. Air enters the hearth **35** through the air vents **311** in the fire grate **31** and provides oxygen for combustion of the fuel **70**. In a process of burning of the fuel **70**, methane gas is created. Being pushed by the air blower **51**, the methane gas flows along the flame tube **37** rapidly. At the same time, because of a temperature difference between an upper and a lower portions of the glass tube **201**, air outside of the flame tube **37** will enter the flame tube **37** and flow upward quickly in the flame roaring space of the flame portion **2**. Also at the same time, high temperature methane gas, meeting oxygen, starts to burn and is able to create blazing flames. The flame is stretched by an air flow generated by the temperature difference between the upper and the lower portions of the flame portion **2**, and forms a high and splendid flame in the whole flame portion **2**. Shown in FIG. **1** is the status of the bonfire flame. After the fuel **70** is able to burn sustainably, the circuit may turn off the ignition bar **53** to save electrical power.

[0041] When the burning is needed to be stopped, the user is able to turn off the switch **55**, and the power light **56** goes out, the feeding motor **52** stops to rotate, and the air blower **51** ceases. As there is no new supply of fuel **70**, the fuel in the hearth **35** will burn up in a very short time period. The user then is able to open the door **121** and collect ash in the hearth **35** through the front opening **342** of the burner **30**. Outer region of the fire grate **31** may be oblique upward in a certain degree in order to form a central depression **313**. The central depression **313** is useful to gather fuel **70** together to avoid black smoke caused by insufficient burning of the outer region fuel **70**.

[0042] Compared with the chunk charcoal and wood, the fuel **70** of small biomass granule is much liable to be ignited. Together with the high temperature red-hot ignition bar **53** and sufficient oxygen supply, the bonfire oven of the invention is able to form a splendid blazing bonfire in a very short time. Since the biomass fuel **70** is so easy to ignite, the bonfire oven of the invention is able to be ignited with a burning paper, a burning paper or a cotton ball soaped with alcohol or gasoline. In this situation, the ignition bar **53** in the circuit can be saved. As well, the ignition bar window **312** does not have to be defined. If the inner glass tube **202** is not provided in the glass tube **201**, a viscous flow zone will be formed in a lower portion of the glass tube **201** near the flame tube **37**. Since flow in the viscous flow zone is slow and combustion becomes insufficient, black smoke will be discharged and a black stain will be formed on an inner surface of the glass tube **201** by the micro carbon granule being generated from insufficient burning. Appearance of the bonfire will be negatively affected. The inner glass tube **202** having a diameter basically the same as the flame tube **37** is able to dismiss the viscous flow zone and help form a fast flow flame and prevent occurrence of the black stain. Even a slight amount of black stain comes up, occasionally, the fast flowing flame will be able to burn it up shortly after and make the black stain disappear quickly. The transparent inner glass tube **202** will not affect the appearance of the bonfire flame.

[0043] Shown in FIGS. **7-11** is a second preferred embodiment of the bonfire oven of the invention. In this embodiment, an upper peripheral of the side plate **32** is in communication with the top plate **33**, and the fuel tube **42** extends into the

hearth **35** through an opening **321** defined in the side plate **32** facing the auxiliary equipment cabinet **20**.

[0044] Besides the glass tube **201**, the flame portion **2** is able to be formed with at least three identical glass panes **203**, either being closely side by side or leaving an aperture with each other. Each glass pane **203** is able to be either flat or arcane. Shown in FIG. **12** is a third preferred embodiment of the invention. The body **1** in this embodiment is the same as the above mentioned embodiments. The difference is that the flame portion **2** is a regular pentagon made up of five identical glass panes **203**. FIG. **13** is a partial top plan view of the flame portion **2** shown in FIG. **12**. Each glass pane **203** has an aperture **204** with a neighboring glass pane **203**, instead of being closed side by side. As shown in FIG. **14**, a glass pane frame **205** may be provided installing on free ends of all glass panes **203** in order for preventing break or topple of the glass panes **203**. The glass pane frame **205** has five beams **206** each being covering the free end of one glass pane **203** and being linked by a hinge **207**. The beams **206** are made of fire resistant materials such as metal or stone.

[0045] In the fourth preferred embodiment shown in FIG. **15**, the flame portion **2** is a regular hexagon made up of six identical glass panes **203**. Each glass pane **203** has an aperture **204** with a neighboring glass pane **203**, instead of being closed side by side. In the fifth preferred embodiment shown in FIG. **16**, the flame portion **2** has three identical arcane glass panes **203**. Each glass pane **203** has an aperture **204** with a neighboring glass pane **203**, instead of being closed side by side.

[0046] From above description, it is seen that the objects of the present invention have been fully and effectively accomplished. Embodiment of the invention has been shown and described for the purposes of illustrating the functional and structural principles of the present invention and is subject to change without departure from the invention's principles. Therefore, this invention includes all modifications encompassed within the spirit and scope of the following claims.

1. A bonfire oven for use with biomass fuel comprising:
 - a body which is able to be placed on the ground, said body having a combustion cabinet and an auxiliary equipment cabinet,
 - said combustion cabinet having a bottom which is able to be placed on the ground levelly, a side extending upward from a peripheral of said bottom, and a top in communication with an upper peripheral of said side and opposite to said bottom, a door being provided in said side,
 - said combustion cabinet having a burner received therein, said burner having a fire grate, a side plate extending upward from a peripheral of said fire grate, a top plate on said side plate and opposite to said fire grate, a blowing space beneath said fire grate, and a hearth defined by said fire grate and said surrounding side plate, a blowing hole defined in said blowing space facing said auxiliary equipment cabinet, a front opening defined in said blowing space opposite to said blowing hole, a plurality of air vents being defined in said fire grate, a flame tube being in communication with said hearth being formed in said top plate above said hearth, a plurality of air holes being defined in a wall of said flame tube,
 - said auxiliary equipment cabinet having a fuel supply mechanism and an electrical equipment received therein,
 - said fuel supply mechanism having a hopper, a fuel tube having one end in communication with said hopper and

a free end extending into said hearth, and a rotary vane feeder rotatably contained in said fuel tube,
said electrical equipment having an air blower in communication with said blowing hole, a feeding motor driving said rotary vane feeder, a power supply, and a switch, and,
a flame portion on said top of said body, said flame portion being a flame roaring space formed by at least one piece of high temperature resistant glass surrounding said flame tube.

2. The bonfire oven as claimed in claim 1, wherein said flame portion is a glass tube.

3. The bonfire oven as claimed in claim 2, wherein an inner glass tube having a basically same diameter as said flame tube and a height of 10-40 millimeter is provided in said glass tube.

4. The bonfire oven as claimed in claim 1, wherein said flame portion is formed with at least three identical glass panes.

5. The bonfire oven as claimed in claim 4, wherein each glass pane has an aperture with a neighboring glass pane.

6. The bonfire oven as claimed in claim 1, wherein an ignition bar window is defined in said fire grate, and said electrical equipment further has an ignition bar being installed in said blowing space, said ignition bar being exposed to said hearth through said ignition bar window and powered by said power supply.

7. The bonfire oven as claimed in claim 1, wherein outer region of said fire grate is oblique upward forming a central depression.

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