July 1, 1952 O. L. GARRETSON ET AL 2,601,895

WEED BURNER

Filed Dec. 12, 1946 2 SHEETS—SHEET 1

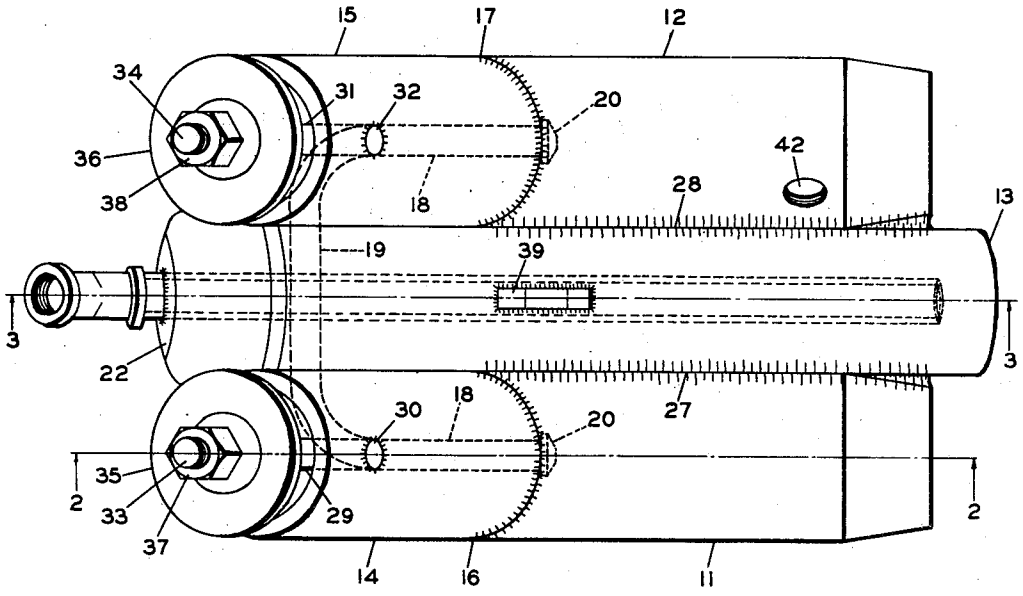


FIG. 1

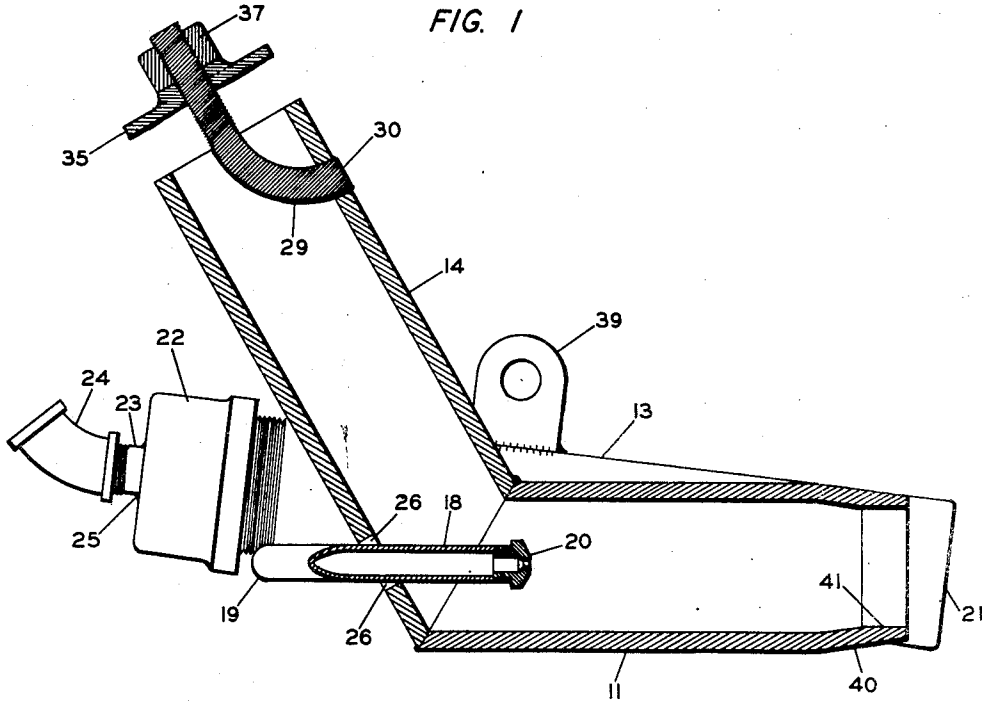


FIG. 2

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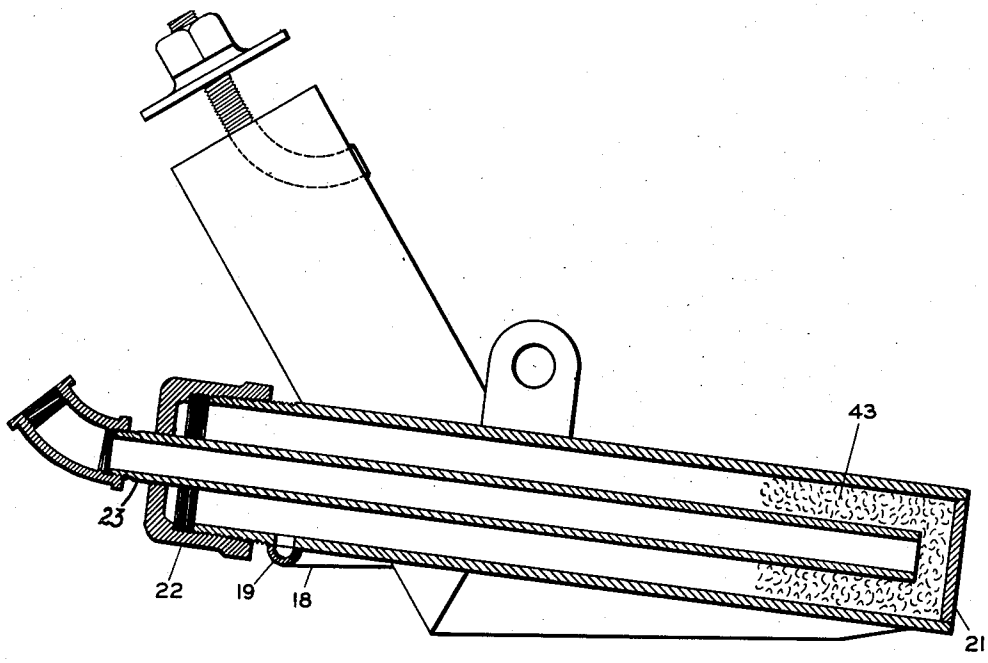


FIG. 3

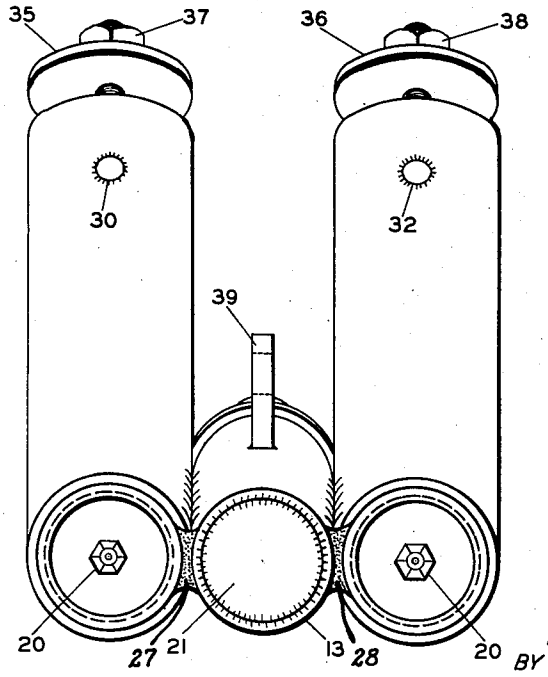


FIG. 4

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Patented July 1, 1952

2,601,895

UNITED STATES PATENT OFFICE

2,601,895

WEED BURNER

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Application December 12, 1946, Serial No. 715,848

8 Claims. (Cl. 158—71)

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This invention relates to weed burners. In one of its more specific aspects it relates to weed burners adapted to operate on liquid fuel or liquefied petroleum gas as fuel. In a still more specific aspect it relates to a vaporizing burner adapted for the use of liquid fuel or liquefied petroleum gas as fuel and adapted for use in conjunction with horse-drawn or motor propelled weed burner assemblies.

In recent years the use of flame methods for the killing of weeds has gained in favor as a substitute for hand labor or mechanical methods due in part to the general wartime man-power shortage and in part to the efficiency and economy of the operation.

Liquefied petroleum gases are now used as fuel in many gas burning appliances, for internal combustion engines as well as for fuel in weed burning operations. The use of this type of fuel as weed burner fuel presents few problems other than those presented by need for retaining the liquefied fuel under pressure and for vaporizing the liquid prior to mixing with air for burning. The rate of evaporation of liquefied petroleum gas is sufficient for many purposes, but for high heat output weed burners the latent heat of evaporation so chills the liquid as to retard the rate of evaporation to such an extent that the weed burners are not furnished sufficient gaseous fuel. The purpose of our invention is to provide a vaporizer-heavy duty burner assembly.

One object of our invention is to provide a liquefied petroleum gas vaporizer for use with weed burning equipment.

Another object of our invention is to provide a liquefied petroleum gas vaporizer-burner assembly for use with weed burning equipment whether tractor drawn, horse drawn or hand operated.

Still another object of our invention is to provide a liquefied petroleum gas vaporizer-burner unit, the operation of which is independent of any extraneous source of heat, or the liquid or vapor phase of the fuel.

A further object is to produce a superior burner; especially one giving a sharp high velocity flame.

Still other objects and advantages of our invention will be obvious to those skilled in the art from a careful study of the following description, which taken in conjunction with the attached drawing forms a part of this specification.

We have accomplished these and other objects in the design of a combination burner-vaporizer

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apparatus. For heavy duty or high B. t. u. output we have designed a two-burner assembly having a vaporizer unit between the two burners. Our apparatus may be utilized as a 1-burner-vaporizer assembly for lighter work.

In the drawing Figure 1 is a plan view of our 2-burner-vaporizer assembly. Figure 2 is a cross sectional view of the burner tube of the assembly taken on the line 2—2 of Figure 1. Figure 3 is a cross sectional view of the vaporizer taken on the line 3—3 of Figure 1. Figure 4 is an end view of our 2-burner-vaporizer unit looking toward the open ends of the burner tubes.

Referring to the drawing and specifically to Figure 1, the assembly is seen to consist in part of two burners 11 and 12 with a vaporizer 13 therebetween. The construction of the burners or burner tubes 11, 12 may be seen by reference to Figure 2. To the burner tube 11 is attached an air inlet tube 14 of similar diameter. This air inlet tube may be connected to the burner tube 11 at a 120° angle or other angle, if desired. A second air inlet tube 15 may be similarly positioned with respect to burner tube 12. The air inlet tube 14 and burner tube 11 are rigidly joined by a weld 16. Air inlet tube 15 and the burner tube 12 are likewise rigidly joined by a weld 17.

The vaporizing tube 13 may be of about the same diameter as the burner tubes, or may be a little smaller if desired. We have shown in the drawing this tube 13 as being somewhat smaller in diameter than the burner tubes, but we do not wish to be limited in this respect since the tube 13 may actually be greater in diameter. This tube 13 may preferably extend beyond the ends of the burner tubes 11 and 12 to such an extent as is found necessary to make certain that the liquid fuel becomes completely vaporized as will be fully explained hereinafter.

The vaporizer tube 13 should preferably slope upwards a few degrees from the burner tips as illustrated in Figure 2, the actual degree of this slope being more or less immaterial. A tube or manifold 19 (Figure 2) is attached to the under side of this vaporizer tube and extends as tubes 18 into both the burner tubes (Figures 1 and 2). An inspection of Figure 3 shows the manifold tube 19 connecting with the vapor space in the vaporizer 13. As shown, the fuel tubes are so disposed with respect to the burner tubes 11 and 12 that their longitudinal axes coincide for the purpose of directing the incoming fuel gas axially through the center of the burner tubes. This positioning of the tubes 18 more or less fixes the vertical position of the fuel manifold 19. A portion of the wall of the vaporizer 13

is cut away to fit with an open section of the manifold tube 19. The manifold tube is then welded to the walls of the prepared opening in the vaporizer. In the ends of the fuel tubes 18 are inserted threaded orifice tips 20. By this arrangement once fuel is vaporized in the central vaporizer 13 the fuel is then free to flow through both the fuel tubes 18 to the orifices 20.

This arrangement of the fuel tube manifold 19, and fuel tubes 18 more or less determines the angle of slope of the vaporizer tube. As mentioned hereinbefore the exact slope of this tube as regards the vaporizing of the liquefied gas is not critical, but we do prefer some slope so that on occasions when liquid fuel enters and remains momentarily in the vaporizer tube it will remain until vaporized in the lower end of the vaporizer tube and liquid will not issue through the burner orifices 20.

The burner or tip end of the vaporizer tube 13 is closed, and such closure may be by welding a circular piece of metal 21 into the end of the tube, as may be observed best in Figures 3 and 4.

The upper or rear end of the vaporizer tube may be threaded to take a cap 22. Through the end of the cap 22 is a pipe 23, one end of which is threaded to take an L 24 and the other end adapted to extend into the vaporizer tube 13 and terminate a short distance from the end plate 21. This tube or pipe 23 may be fixed rigidly to the cap 22, as shown, by a weld 25.

A hole 26 is drilled into each of the air tubes 14 and 15 sufficiently large to accommodate the gas tubes 18 as shown in Figure 2.

To assemble the unit the air inlet tube 14 and the burner tube 11 are welded together making approximately a 120° angle. The hole 26 is drilled in the air tube section. The air inlet tube 15 and its corresponding burner tube 12 are welded together, at a 120° angle, and a hole 26 drilled in the air tube section.

The gas manifold tube 19 is welded to the vaporizer tube 13 as hereinbefore described. The end plate 21 may now be welded into tube 13.

The burner orifices 20 are removed from the ends of the gas tubes 18. The gas tubes are then inserted through the openings 26 in the air inlet tubes 14 and 15. With these three units properly positioned with respect to one another, welds 27 and 28 are made. The welds are made with considerable contacting surface so that an appreciable cross sectional area will be available to conduct heat from each of the two burner tubes into the central vaporizer tube.

The cap 22 may be drilled to accommodate the liquid fuel inlet pipe 23 and this pipe welded to the cap by weld 25. The cap 22 may be screwed into place on the threaded end of the vaporizer tube. The L may then be added to the threaded end of pipe 23.

A bent rod 29, has one end 30 welded into a previously drilled hole in the upper portion of the air inlet tube 14. A corresponding bent rod 31 is welded into the other air inlet tube 15 at weld 32. The other end 33 of the bent rod 29 is threaded to take an air shutter 35 while the corresponding end 34 of bent rod 31 is threaded to take an air shutter 36 also. Each air shutter may be locked in position with respect to the end of its air inlet pipe by lock nuts 37, 38.

The threaded burner tips 20 may be inserted into the threaded ends of the tubes 18. A bracket 39 may be welded on the vaporizer tube as shown, or if desired other supporting means may be attached to the vaporizer tube or to the burner or air inlet tubes.

In the assembly of the vaporizer portion of the apparatus, we may wrap a quantity of copper turnings or mesh 43 around the end of the liquid fuel pipe 23. These turnings are intended to contact the inner surface of the vaporizer tube 13 and the outer surface of the tube 23 for the more efficient transfer of heat from the burner tubes to the space within the vaporizer in which actual vaporization occurs, and to prevent solid foreign matter from reaching the burner orifice.

In some cases the closed end of the vaporizer tube may terminate in the plane of the ends of the burner tubes 11 and 12. When more heat for fuel vaporization is required the end of the vaporizer may extend some distance, say one inch, beyond the ends of the burner tubes. Under any consideration the end of the vaporizer tube need not protrude far beyond the burner ends since the flame just beyond the ends of the burner tubes is very hot.

Near the end of one burner tube, for example tube 12, may be provided a threaded opening 42 of size to accommodate a spark plug, in case it is desired to use spark plug ignition for lighting the burners. The apparatus needed for spark plug ignition involves a battery, wire, a high tension vibrator coil, a spark plug and a switch, all of which apparatus is not shown on the drawing since it in reality is not a part of the burner.

We have found that the use of common matches for lighting our burners is an efficient lighting means. The burner flames are not easily extinguished by wind, hence, automatic ignition means is not ordinarily necessary.

Any type of supporting means, as a rod, or tube, carrying a clamp, may be used for supporting our vaporizer-burner units. The supports should be of such construction that the burners may be tipped at any angle around the bracket 39 as a pivot. In this manner, the flame may be directed parallel to the ground surface or may be directed at an angle to the ground, dependent upon the weed burning problem at hand.

In the operation of our high B. t. u. output burner, liquefied petroleum gas, for example liquid propane or liquid butane, or mixtures of these, from a source, not shown, passes through a pressure reducing means, also not shown, and a fuel pipe and associated connections to the liquid inlet tube 23. Liquid emerges from the open end of this tube into contact with the copper turnings in the vaporizing chamber. Upon vaporization of some propane in this chamber, gas passes through the manifold 19, the tubes 18 and through the burner tips or orifices. The gas may then be lit. As the metal of the burner becomes hot, heat is conducted through the metal welds 27, 28 and through the vaporizer chamber walls whence more liquid fuel is vaporized. In the short time of several minutes the burner is well heated and delivering its full flame.

The burner tubes, we have found, operate to produce a sharper and more concentrated flame, if the tips 40 are constricted a slight amount to give a slight jet effect to the issuing gases and flame. The actual burner outlets 41 should preferably be fully streamlined to assist in producing a streamlined flame.

The air shutters 35, 36 may be adjusted with respect to the ends of the tubes 14, 15 by merely turning the shutters on their threaded supports until correctly positioned as regards burner op-

eration, then tightening the locknuts **37** and **38** against their respective air shutters, or dampers **35, 36.**

These air shutters **35, 36** serve an additional purpose as baffles for keeping dirt, weed leaves, sticks and other objects out of the burners.

Any size of fuel orifice in the burner tips **20** may be used, as desired, to give a flame of desirable properties along with good combustion. An assortment of tips having different sizes of orifices may be used to give flames for any weed burning service as desired.

By the use of the burner tubes as herein described, the flames possess a sharp and well defined outline, and do not flare. A non-flaring flame is very intense and very quickly burns weed leaves sufficient for killing of the plant.

It it is desired to use our burner on very light work, such as burning young and tender weeds, one orifice tip may be removed and a plug inserted in its place, and then the single burner tube used. This operation saves fuel.

The use of the screw cap **22**-tube **23** assembly makes cleaning of the vaporizing chamber very easy. It is necessary merely to remove the cap and tube, pull out the copper turnings, blow or brush out any foreign matter and reassemble.

The use of our individual vaporizer-burner assemblies simplifies the installation of such weed burning equipment on, for example, tractors. Since each burner has its own vaporizer, no master vaporizer need be used in conjunction with the tractor exhaust manifold or muffler, or with the cooling system to furnish heat for vaporization of the liquefied fuel. Our burners and necessary auxiliary equipment may even be installed on horse drawn carts or wagons since no extraneous source of heat for fuel vaporization need be provided.

If the fuel provided is merely a compressed gas, our burner will still function properly, but of course, the vaporizer tube will serve no particular purpose.

Having disclosed our invention, we claim:

1. A self vaporizing gas fueled burner adapted to operate on liquefied petroleum gas comprising a pair of burner tubes having one end of each tube open and having fixed therebetween an elongated and closed liquefied fuel vaporizing tube, a metallic heat conducting means between and in contact with said elongated fuel vaporizing tube and each tube of said pair of burner tubes, said vaporizing tube adapted to be in fluid communication with a source of liquefied fuel, tubular means connecting the vaporizing tube to each burner tube and an air inlet means for each burner.

2. A self vaporizing gas fueled burner adapted to operate on liquefied petroleum gas comprising a pair of burner tubes having one end of each tube open and having fixed therebetween an elongated and closed liquefied fuel vaporizing tube, a metallic heat conducting means between and in welded metal to metal contact connecting said elongated fuel vaporizing tube with each tube of said pair of burner tubes, and said vaporizing tube adapted to be in fluid communication with a source of liquefied fuel, tubular means connecting the vaporizing tube to each burner tube and an air inlet means for each burner tube.

3. A self vaporizing gas fueled burner adapted to operate on liquefied petroleum gas comprising a pair of burner tubes having one end of each tube open and having fixed therebetween an elongated and closed liquefied fuel vaporization tube, heat conducting means connecting said vaporization tube to said burner tubes to permit conduction of heat from the burner tubes to the vaporizing tube, said vaporizing tube adapted to be in fluid communication with a source of liquefied gas fuel, tubular means connecting the vaporizing tube to each burner tube and an air inlet means for each burner tube.

4. A self vaporizing gas fueled burner assembly adapted to operate on liquefied petroleum gas comprising a pair of burner tubes having fixed therebetween an elongated cylindrical liquefied fuel vaporizing tube having closed ends, said vaporizing tube having a liquefied fuel inlet tube extending through one end to a point near the other end, said fuel inlet tube at the one end of said vaporizing tube being adapted for connection to a source of liquefied petroleum gas, means fixing the vaporizing tube to said burner tubes so as to permit conduction of heat from the burner tubes to the vaporizing tube, a tube means providing fluid communication from the vaporizing tube to each burner tube, and an air inlet means for each burner tube.

5. A burner assembly comprising in combination a cylindrical body member having one end open and adapted to exhaust flame and combustion products therethrough, a gasified fuel supply tube disposed axially within said body member and adapted to project gaseous fuel toward the open end of said body member, an elongated cylindrical fuel vaporizer tube closed at one end and adapted to receive liquefied fuel at the other end, said vaporizer tube being fixed rigidly against the cylindrical body member so that heat may be transferred by conduction from said body member to said vaporizer tube, the closed end of said vaporizer tube being disposed adjacent the open end of said body member and the other end of said vaporizer tube disposed adjacent the other end of said body member, tubular means communicating from the interior of said vaporizer tube to said gasified fuel supply tube, an elongated cylindrical air inlet tube with one end in fluid communication with the end of said body member opposite its open end, the axis of said air inlet tube forming an obtuse angle with the axis of said body member, and a damper overhanging the other end of said air inlet tube, said damper being movable axially with respect to the air inlet tube to control the air flow thereinto.

6. A burner assembly comprising in combination a cylindrical body member having one end open and adapted to exhaust flame and combustion products therethrough, a gasified fuel supply tube disposed axially within said body member and adapted to project gaseous fuel toward the open end of said body member, an elongated cylindrical fuel vaporizer tube closed at one end and adapted to receive liquefied fuel at the other end, said vaporizer tube being fixed rigidly against the cylindrical body member so that heat may be transferred by conduction from said body member to said vaporizer tube, the closed end of said vaporizer tube being disposed adjacent the open end of said body member and the other end of said vaporizer tube disposed adjacent the other end of said body member, tubular means communicating from the interior of said vaporizer tube to said gasified fuel supply tube, and an elongated cylindrical air inlet tube with one end in fluid communication with the end of said body member opposite its open end, the axis of said air inlet tube forming an obtuse angle with the axis of said body member.

7. A burner assembly comprising in combination a cylindrical body member having one end open and adapted to exhaust flame and combustion products therethrough, a gasified fuel supply tube disposed axially within said body member and adapted to project gaseous fuel toward the open end of said body member, means for supplying gaseous fuel to said gasified fuel supply tube, an elongated cylindrical air inlet tube with one end in fluid communication with the end of said body member opposite its open end, the axis of said air inlet tube forming an obtuse angle with the axis of said body member, and a damper overhanging the other end of said air inlet tube, said damper being movable axially with respect to the air inlet tube to control the air flow thereinto.

8. A burner assembly comprising in combination a pair of parallel cylindrical body members each having one end open and adapted to exhaust flame and combustion products therethrough, a gasified fuel supply tube disposed axially within each body member and adapted to project gaseous fuel toward the open ends of said body members, an elongated cylindrical fuel vaporizer tube closed at one end and adapted to receive liquefied fuel at the other end, said vaporizer tube being disposed between and in rigid contact with said parallel body members so that heat may be transferred by conduction from said body members to said vaporizer tube, the closed end of said vaporizer tube being positioned between the open ends of said body members and the other end of said vaporizer tube disposed between the other ends of said body members, tubular means communicating from the interior of said vaporizer tube to said gasified fuel supply tubes, a pair of elongated cylindrical air inlet tubes, one air inlet tube of said pair of air inlet tubes being in fluid communication with the end of one body member opposite its open end and the other air inlet tube of said pair of inlet tubes being in fluid communication with the end of the other body member opposite its open end, the axis of each air inlet tube forming an obtuse angle with the axis of its corresponding body member and a damper overhanging the other end of each of said air inlet tubes, said damper being movable axially with respect to the air inlet tubes to control the air flow thereinto.

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