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Wentworth, Jr.

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[54] FUEL CATALYZER

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[52] **U.S. Cl.** ..... **431/4**, 261/18 A, 431/126

[51] **Int. Cl.** **F23j 7/00**

[58] **Field of Search** ..... 431/4, 126, 190; 261/18 A; 123/25 R

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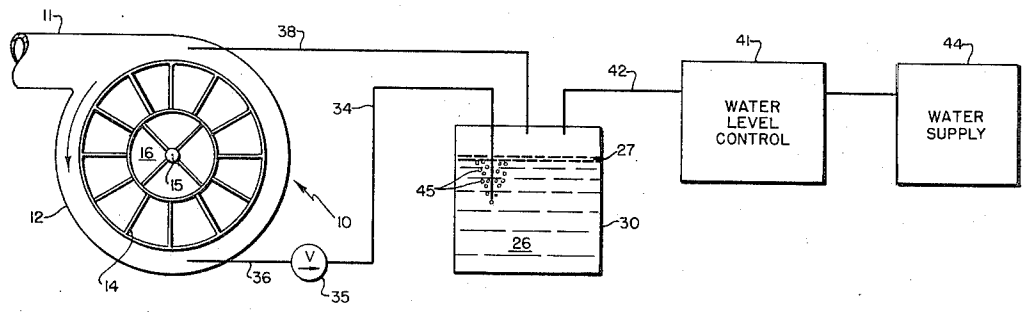
[57] **ABSTRACT**

The energy output of a fossil fuel combustion system is increased by adding minute amounts of highly vaporized water and oil to the combustion air. In an oil gun such as used in home heating plants air pressure and vacuum is tapped off the gun compressor to bubble air through a sealed tank of water covered with an oil film and draw it back to mix with the combustion air flow.

8 Claims, 4 Drawing Figures



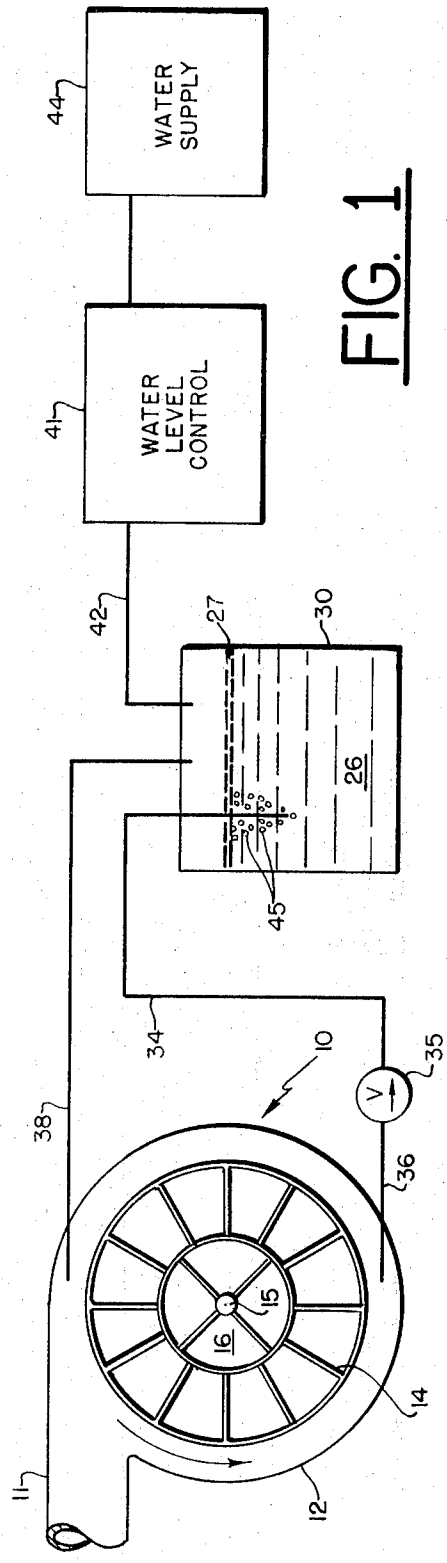

WATER SUPPLY
WATER LEVEL CONTROL
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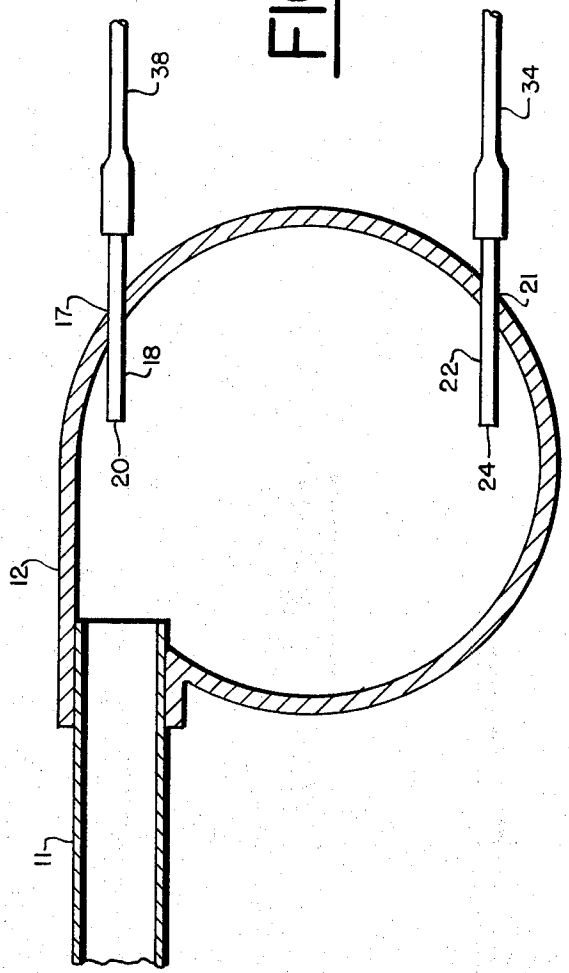
FIG. 1

FIG. 4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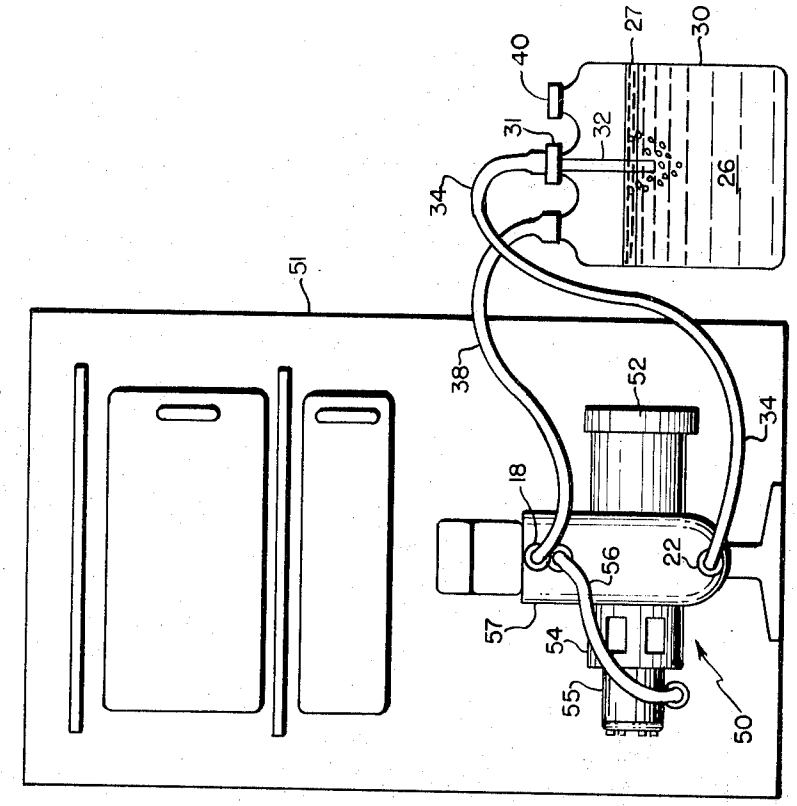
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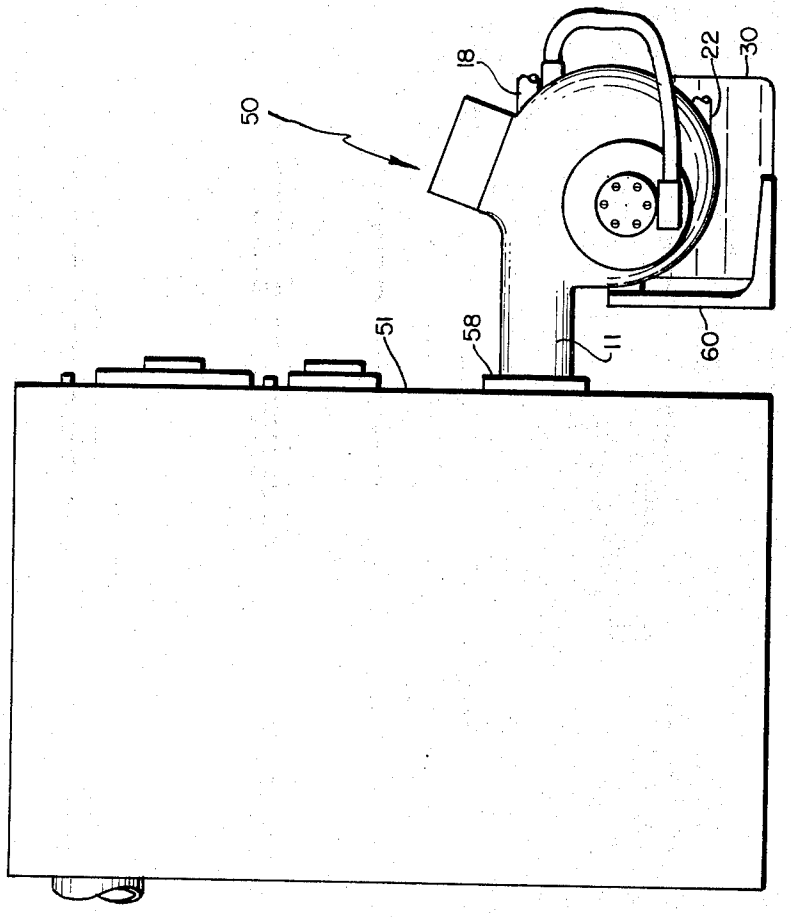
FIG. 2


18
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51
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11
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FIG. 3

FUEL CATALYZER

BACKGROUND OF THE INVENTION:

1. Field of the Invention:

The present invention relates to energy boosters for fossil fuel combustion systems and in particular to such boosters providing additional water vapor.

2. Description of the Prior Art:

It is well known that high humidity can improve the performance of an internal combustion engine. Various water injectors have been marketed with allegations of improved economy and performance for automobile engines. Commercial oil burners have long utilized steam to atomize oil for improved combustion.

In all of these arrangements, any additional energy produced must be due either to energy conversion from the additional mass provided or energy due to a more efficient or complete conversion of the fossil fuel. With water as the agent, either of these is possible and some combination is probable in most cases. Mostly, substantial quantities of moisture addition have been used. In automotive engines this has usually resulted in short engine life, burned valves and other difficulties. The cost of accessory equipment has apparently been a deterrent in home heating service.

It is also known that water vapor can act as a catalyzer for combustion. See Van Nostrand's Scientific Encyclopedia, fourth edition, page 1501. Useful implementation of this phenomenon is strangely lacking in most commercial production of combustion devices.

SUMMARY OF THE INVENTION

In accordance with the invention a method of utilizing water vapor as a catalyst to increase combustion efficiency of fossil fuel is provided. The vapor is produced by bubbling air, using preexisting intake pressure, through water and a supernatant oil layer. The same intake pressure carries the vapor on to the combustion zone. Apparatus, provided for use with an oil burner gun, taps into the compressor housing both to obtain pressure for bubbling and to obtain a low pressure for carrying the vapor on into the gun. The two tapes are connected to an otherwise closed tank carrying water and oil. This apparatus for utilizing the invention is extremely economical.

Thus it is an object of the invention to provide a method of metering water vapor into combustion air as a catalyzer for improved combustion;

It is a further object of the invention to provide water vapor to a combustion mixture by bubbling a portion of intake air through water;

It is a further object of the invention to provide water vaporizer for combustion mixtures in which a water reservoir, through which combustion intake air is bubbled, carries a supernatant layer of oil;

It is a further object of the invention to provide an economical device for adding water vapor to the combustion air of an oil heating unit.

Further objects and features of the invention will become apparent upon reading the following description together with the drawing.

BRIEF DESCRIPTION OF THE DRAWING:

FIG. 1 is a diagrammatic illustration of an air intake compressor for a combustion unit with a water vapor device connected in accordance with the invention.

FIG. 2 is a front elevation of an oil furnace with the inventive vaporizer attached.

FIG. 3 is a side elevation of FIG. 1.

FIG. 4 is a detail drawing showing connection of the inventive vaporizer to the blower housing of an oil burner.

DESCRIPTION OF THE PREFERRED EMBODIMENT:

The catalyzer system of the present invention is useful with virtually every type of combustion apparatus. It has particular advantage in low humidity environments such as is commonly the condition for operation of central heating units during cold weather. Thus a particular preferred embodiment to be described is an oil-fired central heating plant.

FIG. 1 depicts compressor **10** of a high pressure oil gun. Centrifugal blower element **14** is mounted on motor shaft **15** for rotation within housing **12.** With blower element **14** spinning counterclockwise, air is brought in at center opening **16** of element **14,** is forced out at the outer perimeter of element **14** and through barrel **11.**

In accordance with the invention, hole **17** (see FIG. **4**) is drilled in housing **12** near the top and aligned substantially with barrel **11.** Pipe **18** is depicted as press-fit into hole **17.** Open end **20** of pipe **18** inside housing **12** faces away from the motion of air provided by element **14** resulting in below atmospheric pressure at open end **20.** Second hole **21** drilled near the bottom of housing **12** has fitted a second pipe **22.** Open end **24** of pipe **22** inside housing **12** faces against the motion of air provided by element **14** resulting in above atmospheric pressure in pipe **22.**

The location of pipes **18** and **22** will change with different types of oil guns or other combustion devices. For example the gun barrel may be at the bottom of the blower instead of the top as depicted in which case the blower rotation and the positions of pipes **18** and **22** would be reversed. Pipes **18** and **22** may be a screw-in type or may be mounted by other suitable means. The basic requirement is to provide a pressure differential between the two pipes sufficient to produce bubbling in container **30** as will be described. It is also essential that outlet opening **20** of pipe **18** be in the combustion intake air flow. It is preferred that the pressure differential between pipes **18** and **22** vary with combustion intake air flow.

Container **30,** depicted in FIG. **2** as a translucent plastic container, has three exterior connections. Main cap **31** is a screw-on cap with an integral pipe **32** extending from outside the cap down approximately one inch below the liquid surface in container **30.** The usable depth of pipe **32** does not appear critical, however, at greater depths a greater pressure differential is necessary and may not be available. The outside portion of pipe **32** is connected to a hose **34** which is force fed over the end of the pipe. The other end of hose **34** is force fed over pipe **22.** Second connection **37** from container **30** is connected by hose **38** to pipe **18.** Connection **37** is an opening extending from the top of container **30.** Third capped connection **40** at the top of container **30** is for the purpose of connecting a continuous water supply. For oil guns in most home oil burners, the size of hoses **34** and **38** is desirably in the range of ⅜ to ½ inch interior diameter. With large commercial oil guns and different types of combustion applica-

tions, the hoses would be varied to suit the purpose. It has been found desirable to make hose **34** approximately of 50 percent greater inside diameter relative to hose **38** and install valve **35** as depicted in FIG. **1** to control metering. Container **30** is filled with water up to a level approximately at the center of rotation of blower element **14.** A layer of oil is poured over the surface of the water in container **30.** This layer of oil should be a complete interface barrier between the water and the air space above it. The thickness of the oil layer is not critical and layers of approximately 1/16 inch have been used. Nor is the type of oil critical. Various lubricating and motor oils have been utilized. Petroleum based motor oils with SAE viscosity indexes in the range of five to forty have all been used succesfully. Other types of oil such as vegetable oil would also be operative. Where the combustion intake will come in contact with moving metallic parts, it is considered preferable to use lubricating oils since some of the oil vaporizes and enters the combustion stream helping to lubricate and prevent corrosion of the various moving parts.

The arrangement of pipes **18** and **22** shown is only exemplary as these pipes may be positioned any place in the combustion air intake stream that will provide the necessary below and above atmospheric pressure conditions. It is necessary that the pressure differential between the two pipes be sufficient to produce a steady stream of bubbles leaving the bottom of pipe **32** passing out through the water within container **30.**

In most systems, valve **35** is unnecessary, but in some cases, especially where a kit is provided applicable for different sizes of burners, valve **35** has been found desirable in order to control the rate of bubbling through the water in container **30.** While there is no known critical reason for the level of water in container **30** to be at a level with the rotational axis of the blower element, it has been found easy to produce the desired amount of bubbling at this level, and it has been used as a general rule of thumb. It has also been found that different water levels in container **30** change the pressure differential requirements for the desired bubbling and it is considered very desirable to maintain the water level as constant as possible. While there are many ways of maintaining a liquid level constant, one of the ways in which this is done satisfactorily is by installing a float in container **30** operating a needle valve in a connector attached to connector **40.** Water pressure is then provided to the needle valve by connection from a house water main. FIG. **1** depicts water level control **41** connected by hose **42** to container **30.** Water pressure to level control **41** is provided by water supply **44** such as a household water main.

In operation, it will be seen that with blower element **14** rotating, air is forced through open end **24** into pipe **22** through hoses **38** and **34** and down below the water surface in container **30.** This air then produces bubbles **45** which bubble up through the water in container **30** passing through the oil interface and into the air space at the top of the container. Air bubbles **45** passing through container **30** pick up small quantities of water vapor. It is believed that tiny particles of water vapor up in this manner each become coated with a very thin layer of the oil interface. This water vapor, along with the air carrying it, passes out through hose **38** and through pipe **18** into the combustion intake air passing from blower **10** into gun barrel **11** and on to the combustion point.

FIG. **2** depicts a complete system with an oil gun **50** connected to a furnace **51.** The oil gun includes a motor **52,** an air intake **54** and oil pump **55.** Oil from a supply tank is piped to oil pump **55** by a supply line (not shown), and pipe **56** connects from oil pump **55** through compression housing **57** to a nozzle (not shown) at the end of the gun barrel inside the furnace.

FIG. **3** depicts the furnace and oil burner of FIG. **2,** in side elevation showing barrel **11** of the oil gun connected to furnace **51** by means of a flange **58.** The oil gun is also supported on a stand **60.** While container **30** is shown as a translucent plastic and the connections from it are shown as flexible hoses **34** and **38,** container **30** may be opaque and may be metal, and the hoses **34** and **38** can be metal pipes. Similarly, the exterior connection to container **30** may all be made through a separable cap such as connection **31** or any other arrangement usual for connecting a fluid line to a container. Neither the amount of water in the container **30** nor the air space in the container over the liquid has been found critical. However, it is preferred that pressure pipe **32** be immersed to a depth of approximately one inch to insure bubbling. A pint of water filling container **30** two thirds full has been found satisfactory.

The bubling should be controlled so as to provide a steady stream of bubbles without disturbing the surface of the water to a point where there is spraying or spattering of water droplets into the space above the liquid surface.

The system described in detail operates well with any types of combustion system utilizing an intake blower. The water covered with a supernatant layer of oil, according to the present invention, may be utilized with other types of combustion systems with proper adaptation. For example, in an internal combustion engine, engine vacuum can be used to draw atmospheric air through the liquid. For use with natural gas burners having no intake blowers, a small blower is readily provided to operate the vapor system. When the vaporizing system of the invention is to be used at below freezing temperatures, sufficient alcohol may be added to the water to prevent freezing. While it can be expected that the addition of alcohol has some definite effect on the operation of the system, the effect has proven too small to show any substantial statistical difference in the operation of the combustion devices tested. Thus it will be understood that while the invention has been described with respect to a specific embodiment, it is contemplated for use in other types of combustion systems and it is intended to cover the invention within the full scope of the appended claims.

I claim:

1. A method of adding water vapor to the fuel mixture in combustion apparatus having a forced air intake comprising:

a. Placing a liquid comprising water in a container;

b. covering said liquid with a nonmiscible layer of oil; and,

c. bypassing a relatively small portion of the forced intake air through the liquid in said container and back to a downstream location in said air intake, whereby water vapor is entrained in metered quantity in said intake air as a combustion catalyst.

2. A method of adding water vapor according to claim **1** wherein said bypassing comprises bubbling said

small portion of the forced intake air through said liquid in a steady stream of bubbles.

3. A method of adding water vapor according to claim 2 further comprising maintaining said liquid at a constant level whereby controlled metering is obtained.

4. Apparatus for adding water vapor to a fossil fuel combustion system having an intake air blower comprising:

a. A container for liquid;

b. a first connecting line connected to the top of said container and connected to said intake air blower;

c. a second connecting line connected to said container and to said intake air blower, the connection to said container opening into a location below the intended liquid level of said container, said first connecting line and said second connecting line being connected to said air blower in a manner to provide a pressure differential position in said second line relative to said first line.

5. Apparatus according to claim 4 wherein said combustion system comprises an oil burner connected to a central heating unit.

6. Apparatus according to claim 4 wherein said blower is a centrifugal blower with both said first connecting line and said second connecting line connected proximate the periphery of the centrifugal element by devices for providing said pressure differential.

7. Apparatus according to claim 6 wherein said container contains water with a level substantially at the rotational axis of said centrifugal element.

8. Apparatus according to claim 7 wherein the water in said container is less than one-half gallon and has a supernatant layer of oil.

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