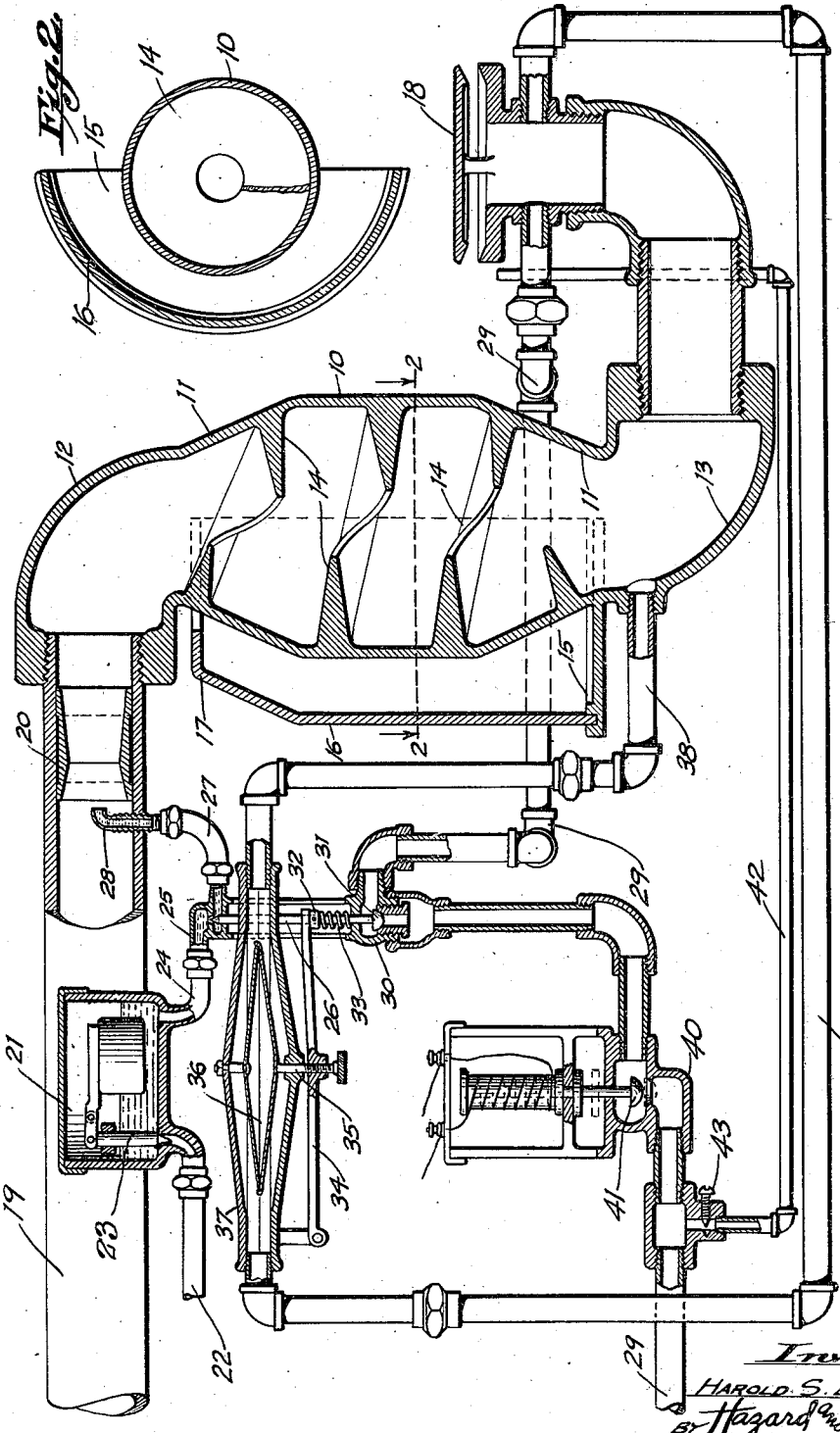
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H. S. LAMB

HOMOGENIZER

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UNITED STATES PATENT OFFICE.

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HOMOGENIZER.

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To all whom it may concern:

Be it known that I, HAROLD S. LAMB, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Homogenizers, of which the following is a specification.

My invention relates to new and useful improvements in homogenizers or mixers of the type that are utilized for vaporizing liquid hydrocarbon and the like and effecting a thorough mixture of the resulting vapor with air to produce a highly combustible mixture that may be burned for the production of heat or utilized as the gaseous fuel for the operation of internal combustion engines.

The principal objects of my invention are to generally improve upon and simplify the construction of the existing types of similar vaporizing and mixing devices, to provide a relatively simple and efficient structure wherein the mixture of vaporized liquid hydrocarbon and air is heated to a temperature greater than that required for the vaporization of the liquid hydrocarbon and less than the temperature at which the mixture is self-igniting; to provide for the admission of sufficient air to the mixture to insure complete combustion and maintain the temperature of said mixture below the point of self-ignition and consequently producing a combustible mixture that will burn readily with a high degree of heat in the open air or which can be effectively used as a gaseous fuel in an internal combustion engine.

Further objects of my invention are to provide, in a vaporizer and mixer, a conduit or vaporizing chamber having an intermediate portion that is enlarged with respect to its inlet and outlet, such construction being effective in reducing the velocity and the flow of air and vapor through the conduit, and further, to arrange within said conduit or chamber, means for changing the direction or course of flow of the air and vapor through said chamber and which means presents a continuous obstruction to the flow of air and vapor, and consequently effecting a very thorough and homogeneous mixture of the vapor and air and producing a gaseous fuel having a high degree of efficiency when burned for the production of heat or utilized as gaseous fuel in an internal combustion engine.

A still further and important object of my invention is the provision of relatively simple and efficient means for controlling the delivery of liquid hydrocarbon to the mixing chamber of the device and likewise for controlling the flow or delivery of gaseous fuel to the heating device or burner that is utilized in connection with the vaporizer and mixer especially in starting.

With the foregoing and other objects in view, my invention consists in certain novel features of construction and arrangement of parts that will be hereinafter more fully described and claimed, and illustrated in the accompanying drawings, in which—

Fig. 1 is a vertical section taken through a vaporizing and mixing device of my improved construction and showing said device associated with a gas or vapor burner.

Fig. 2 is a horizontal section taken on the line 2—2 of Fig. 1.

Referring by numerals to the accompanying drawings, which illustrate a practical embodiment of my invention, 10 designates the main body portion of the combined vaporizing and mixing chamber, the same being in the form of a relatively short hollow cylinder with tapered end portions 11, one of which is provided with a tubular extension 12, that serves as an inlet, and the other reduced end portion being provided with a tubular extension 13, that serves as an outlet.

The internal diameters of the inlet 12 and outlet 1 are substantially less than the internal diameter of the body portion 10 of the device, and formed integral with or fixed to the wall of the body portion 10 and the tapered end portions 11 of the device, is an inwardly presented spirally disposed flange 14 that serves to direct the flow of air and vapor through the device and presenting a continuous obstruction or baffle plate to said air and vapor in its passage through the enlarged chamber within the body portion 10.

Projecting outwardly from the lower portion of the body of the device, is a horizontally disposed arcuate plate 15, and posi-

tioned on the outer edge thereof is a vertically disposed semi-circular plate 16 that is spaced apart from the main body portion of the device and the upper portion of said plate being extended inwardly, as designated by 17, and terminating immediately adjacent to the tubular extension 12 of reduced diameter at the upper end of the device.

Where my improved vaporizer and mixer is associated with a gas or vapor burner 18, as shown in the accompanying drawing, said burner is directly connected to the tubular extension 13 of reduced diameter at the lower end of the vaporizing and mixing device, and leading to the tubular extension 12 at the upper end of the device, from a suitably located blower or air compressor (not shown), is an air supply pipe 19 within which, adjacent to the tubular extension 12, is arranged a venturi tube 20.

Suitably located adjacent to the device is a housing 21, to which leads a liquid hydrocarbon supply pipe 22, and arranged within said housing, is a fluid control valve 23 the operation of which controls the flow of liquid hydrocarbon from supply pipe 22 maintaining the level of liquid hydrocarbon just below the nozzle opening 28 and communicating with said nozzle through pipe 24, valve 25 and pipe 27.

This pipe 24 is connected to a valve 25, the opening or port in which is adapted to be closed by the upper end of a vertically disposed stem 26, and leading from said valve, below the port or opening therein to air tube 19 immediately to the rear of the venturi tube 20, is a pipe or conduit 27, the same being provided with a jet nozzle 28 that is axially disposed within tube 19 immediately to the rear of said venturi tube.

Leading to burner 18 is a gas supply pipe 29, in which is located a valve housing 30 and the port or opening through which latter is controlled by a valve 31 that is carried by the lower end of stem 26.

Fixed on stem 26 is a collar 32 beneath which is arranged a compression spring 33, and bearing on top of said collar 32 is the free end of a fulcrumed lever 34.

Bearing on top of the central portion of said lever 34 is a stem 35 that is carried by the central portion of a thermostatic member 36, preferably of hollow disc form and which is arranged within a suitable chamber 37.

Leading from one side of this chamber, to the tubular extension 13 at the lower end of the vaporizing and mixing chamber, is a tubular connection 38, and, leading from the opposite side of said chamber 37 to the burner 18, is a tubular member 39.

Located in tube 29, below valve 30, is a valve housing 40 the opening in which is controlled by an electrically operated valve 41, and which latter is connected in series with the motor that operates the compressor or blower that is connected to air supply pipe 19.

Leading from tubular member 29, at a point adjacent to burner 18, is a pilot light supply pipe 42 that is provided with a suitable regulating valve, preferably, a screw 43.

When my improved vaporizer and mixer is not in service, thermostatic member 36 is not expanded, thereby maintaining pin or stem 35 in elevated position and permitting spring 33 to expand and retain stem 26 in elevated position, thereby closing the passageway through valve housing 25 and opening the port or passageway through valve housing 30.

With the circuit in which electrically operated valve 41 is located open, said valve will rest upon its seat within housing 40.

When the circuit in which the motor associated with the blower or air compressor is closed, valve 41 will be elevated, thereby permitting gas to pass through pipe 29 and through open valve 31, and said gas is delivered to burner 18, where it is ignited and burns with a horizontally disposed circular flame.

A portion of this flame impinges directly against the body portion 10 of the mixing device, thereby heating the same, and likewise portions of the flame enter the chamber 15 between the body of the device and the semi-circular wall 16, with the result that the entire body portion 10 and the tapered end portions 11 of the device are uniformly heated.

As soon as sufficient heat has been developed within the burner and the lower portion of the mixing device, a circulation of heated air will be established through tubular members 38 and 39 and housing 37, with the result that thermostatic member 36 will expand, thereby forcing pin or stem 35 and lever 34 downwardly and which action will compress spring 33 and consequently close valve 31 and withdraw the upper end of stem 26 from the opening through valve housing 25.

With the parts so positioned, the flow of gas through tubular member 29 to the burner is cut off, and liquid hydrocarbon from the supply within float chamber 21 is permitted to flow through tubular members 24 and 27 and discharge from the jet nozzle 28 and the air supply pipe 19 immediately to the rear of the venturi tube 20.

The air forced through pipe 19 by the compressor or blower will carry the liquid hydrocarbon thus discharged into said pipe through the venturi tube and from thence into and through the mixing device, and, by virtue of the enlarged chamber in the

intermediate portion of said device, the flow of air and liquid hydrocarbon will be materially retarded, so that the liquid hydrocarbon will be vaporized under heat and effectively mixed with the air, thereby producing a highly combustible mixture that will burn readily when discharged from the jet opening of the burner 18.

The spirally disposed member 14 within the mixing device imparts a whirling movement to the air and vapor passing through the enlarged chamber in the device, and, in this connection it will be understood that, where a whirling or spiral movement is imparted to air and liquid hydrocarbon, any globules of unvaporized liquid will be thrown outwardly against the wall of the chamber through which said liquid and air is passing, and where the wall of the chamber is heated, such globules of liquid hydrocarbon will be very quickly and effectively vaporized and in such condition, will mix readily with the air.

To achieve best results, it is desirable that the temperature of the mixing device be at an intermediate point between the temperature required for vaporization and the temperature at which the resulting mixture will ignite spontaneously. This desired temperature is maintained by the regulation of air that enters and passes through the device, and such regulation is necessary for the vaporization of the liquid hydrocarbon, absorbs a certain amount of heat and tends to cool the resulting mixture.

Where my improved device is utilized for the production of gaseous fuel that is to be burned for the production of heat, it is arranged immediately adjacent to the burner, as shown.

Instead of constructing the device as herein shown and described, it may take several different forms.

A mixing and vibrating device of my improved construction is comparatively simple, may be easily and cheaply produced and is very effective in performing its intended functions.

I claim as my invention:

1. The combination with a mixing device, and a burner associated therewith, of means for delivering air and liquid hydrocarbon to said mixing device, means for delivering gaseous fuel to the burner, and temperature controlled means for controlling the flow of liquid hydrocarbon to said device and for controlling the flow of gas to the burner.

2. The combination with a mixing device and a burner associated therewith, of means for delivering air and liquid hydrocarbon to said mixing device, means for delivering gaseous fuel to the burner, temperature controlled means for controlling the flow of liquid hydrocarbon to said device and for controlling the flow of gas to the burner, and auxiliary means for controlling the flow of gas to the burner when the first mentioned means is out of service.

3. The combination with a mixing device, of a burner connected to the outlet end of said device, means for delivering air and liquid hydrocarbon to the inlet end of said mixing device, means for delivering gaseous fuel to said burner, and temperature controlled means for controlling the flow of liquid hydrocarbon to said device and for controlling the flow of gaseous fuel to said burner.

4. The combination with a mixing device, of a burner connected to the outlet end of said device, means for delivering air and liquid hydrocarbon to the inlet end of said mixing device, means for delivering gaseous fuel to said burner, temperature controlled means for controlling the flow of liquid hydrocarbon to said device and for controlling the flow of gaseous fuel to said burner, and auxiliary means for controlling the flow of gaseous fuel to said burner.

5. The combination with a mixing device and a heating device associated therewith, of means for delivering air and liquid hydrocarbon to said mixing device, means for delivering gaseous fuel to said heating device, and means controlled by the heat generated by said heating device for controlling the flow of liquid hyrocarbon to said mixing device and the flow of gaseous fuel to said heating device.

6. The combination with a mixing device and a heating device associated therewith, of means for delivering air and liquid hydrocarbon to said mixing device, means for delivering gaseous fuel to said heating device, means controlled by the heat generated by said heating device for controlling the flow of liquid hydrocarbon to said mixing device and the flow of gaseous fuel to said heating device, and means for cutting off the flow of gaseous fuel to said heating device when the delivery of air and liquid hydrocarbon to the mixing device is cut off.

7. The combination with a mixing device and a burner associated therewith, of means for delivering air and liquid hydrocarbon to the inlet end of said mixing device, means for delivering gaseous fuel to said burner, and means controlled by the heat generated by said burner for cutting off the flow of gaseous fuel to said burner and simultaneously opening the passageway through which the liquid hydrocarbon is admitted to said mixing device.

8. The combination with a mixing device and a burner associated therewith, of means for delivering air and liquid hydrocarbon to the inlet end of said mixing device, means for delivering gaseous fuel to said burner, means controlled by the heat generated by said burner for cutting off the flow of gaseous

fuel to said burner and simultaneously opening the passageway through which the liquid hydrocarbon is admitted to said mixing device, and auxiliary means for controlling the flow of gaseous fuel to said burner.

9. The combination with a mixing device and a burner associated therewith, of means for delivering gaseous fuel to said burner, temperature controlled means for controlling the flow of gaseous fuel to said burner, and electro-magnetically operated valve for controlling the flow of gaseous fuel to said burner when the temperature controlled means is out of service.

In testimony whereof I have signed my name to this specification.

HAROLD S. LAMB.