

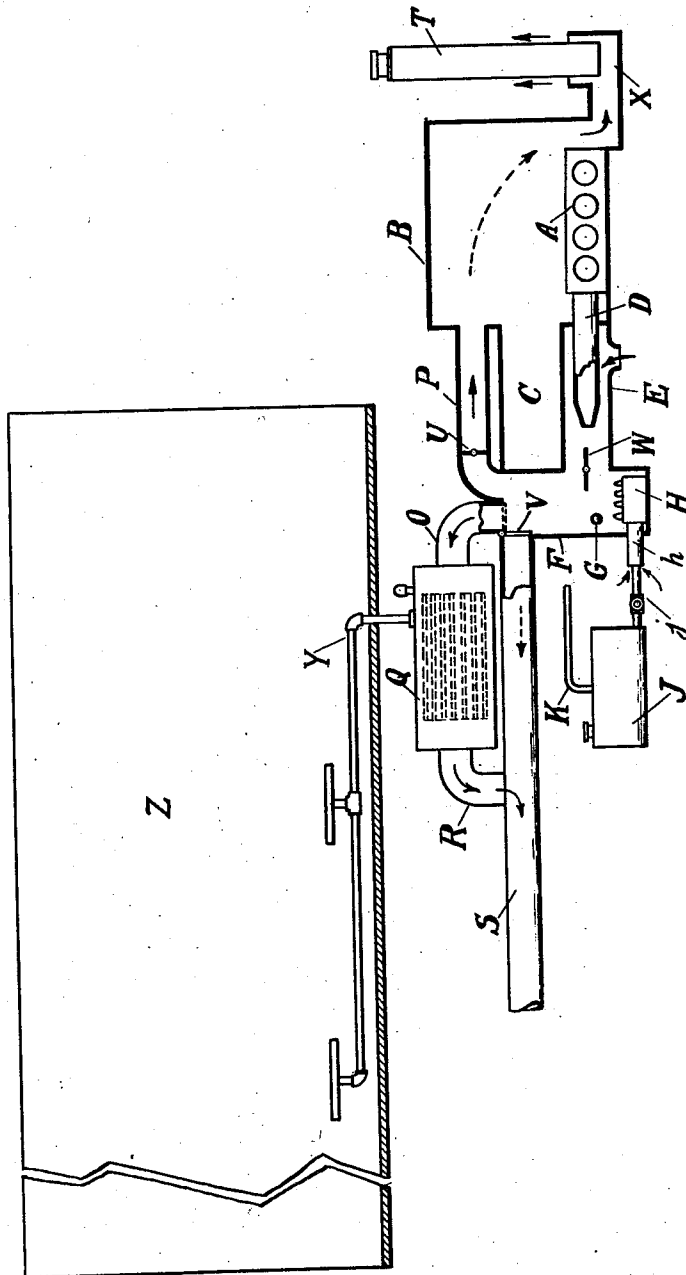
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L. P. HYNES

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BUS HEATING SYSTEM

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Inventor
LEE P. HYNES

By his Attorney
E. M. Bentley

UNITED STATES PATENT OFFICE

LEE P. HYNES, OF ALBANY, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO CONSOLIDATED CAR-HEATING COMPANY, INC., OF ALBANY, NEW YORK, A CORPORATION OF NEW YORK

BUS HEATING SYSTEM

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For a detailed description of the present form of my invention, reference may be had to the following specification and to the accompanying drawing forming a part thereof.

My invention relates to the heating of busses or other vehicles equipped with a hydrocarbon engine, the heat being derived from the re-combustion of the contents of the engine exhaust. In the present case I provide a supplementary heater so arranged as to serve alternately with the said re-combustion to provide heat for the body and also for engine and radiator when the engine is not running.

Referring to the drawing, Z is the body of the vehicle; A represents the exhaust manifold of the engine, which is contained in a suitable enclosure B, and C is the enclosure for the transmission gearing and other attachments. D is the exhaust tube leading from manifold A through a mixing chamber E, shown as drawing in air through an opening on its under side, said tube terminating at its left end in a nozzle that gives velocity to the outflow therefrom. F is a combustion chamber wherein the re-combustion takes place, the exhaust gases emerging from tube D and mingled with air drawn in through tube E being delivered into said combustion chamber and ignited by a spark-plug G, or by the supplementary burner H. The said supplementary burner is located in the bottom of casing F and is supplied with fuel, such as gasoline, from tank J, wherein air pressure is maintained by an air pipe K. From the top of casing F three pipes extend. The pipe P, controlled by a damper U, leads to engine casing B and thence, by pipe X, to the lower end of radiator T against which the heated products are finally delivered. The pipe O, controlled by two-way damper, leads to the boiler Q and the products of combustion, after passing through the boiler tubes, pass by pipe R to the final exhaust pipe S, which constitutes the third pipe extending from the top of casing F and is also controlled by two-way damper V, by which the outflow from the

casing may be diverted, either partly or completely, into the pipes O and S alternately. From boiler Q a supply pipe Y leads to suitable radiators in the vehicle body Z. So long as the engine is running, damper W being open and dampers V and U closing pipes S and P respectively, the exhaust gases will be re-burned in the re-burner formed by casing F, and the heated products of the re-combustion will pass through the boiler Q, giving up their heat to the water therein and emerge into the atmosphere through pipes R and S. If the damper U is opened, other conditions remaining the same, a part of the heated products will pass into pipe P and thence go to the engine and radiator, so as to raise the temperature thereof to improve operating conditions in cold weather. Or, if damper V is turned to close pipe O and open pipe S, damper U being closed, all of the products will pass directly to the atmosphere through pipe S. Dampers U and V may be set to any desired intermediate positions for partial results. There are, however, occasions when it is not feasible to keep the engine running, as when the bus is left overnight in the open or in a cold garage, or when it might be stalled in a snow storm with little or no engine gasoline in its tank. For such occasions the said burner H is provided, in the bottom of casing F. It has a separate fuel tank J controlled by a cock j. When this cock is opened the fuel, which may be gasoline or other suitable liquid hydrocarbon, will flow under tank air pressure into heater H and air will be drawn in with it through the sleeve h. The heater being lighted and the damper W being closed, the heat from burner H may be directed by the dampers U and V in the manner above described. By this means I am able to meet all of the various conditions encountered in the proper heating of a bus, boat or other vehicle.

What I claim as new and desire to secure by Letters Patent is:

1. Means for heating an automotive vehicle equipped with an internal combustion engine and the radiator of said engine, com-

prising a combustion chamber external of said engine, a mixing chamber in communication with said combustion chamber and having an air inlet, means for discharging exhaust gases from said engine through said mixing chamber so as to induce an inflow of air through said air inlet, and to discharge the mixed air and gases into said combustion chamber, an ignition device within said combustion chamber, a fuel burner in said combustion chamber, means for supplying fuel to said burner, and means for causing the heat produced by the reburning of said exhaust gases while the engine is operating, or the heated air from the fuel burner while the engine is idle to be transferred to said vehicle or to the radiator of said engine.

2. Means for heating a vehicle equipped with an internal combustion engine, comprising a combustion chamber, a mixing chamber in communication with said combustion chamber and having an air inlet, means for discharging exhaust gases through said mixing chamber, so as to induce an inflow of air through said inlet and to discharge the mixed air and gases into the combustion chamber, an ignition device within said combustion chamber, a supplemental liquid fuel burner in said combustion chamber, a boiler having a heating chamber communicating with said combustion chamber, so that the boiler will be heated by the reburning of the exhaust gases, and radiating means connected with said boiler and located within the space to be heated.

3. Means for heating an automotive vehicle equipped with an internal combustion engine or the radiator of said engine, comprising a combustion chamber external of said engine, a mixing chamber in communication with said combustion chamber and having an air inlet, an exhaust gas pipe positioned to discharge exhaust gases from said engine through said mixing chamber so as to induce an inflow of air through said inlet and to discharge the mixed air and exhaust gases into said combustion chamber, and ignition device within said combustion chamber, a fuel burner in said combustion chamber, means for supplying fuel to said burner, a heating medium for the space to be heated, means for conveying the heat produced by the reburning of said exhaust gases while the engine is operating, or the heated air from said fuel burner while the engine is idle to said heating medium, separate means for conveying said heat of the reburned gases or heated air from said burner to the engine and its radiator, means for conveying said products of recombustion to the atmosphere, a damper for diverting said products of recombustion partly or completely to the heating medium or to the atmosphere, and a separate damper control-

ling the flow of products of combustion to the engine and radiator.

4. Means for heating an automotive vehicle equipped with an internal combustion engine and the radiator of said engine comprising a combustion chamber external of said engine, a mixing chamber in communication with said combustion chamber and having an air inlet, means for discharging exhaust gases from said engine through said mixing chamber so as to induce an inflow of air through said inlet and to discharge the mixed air and exhaust gases into said combustion chamber, a heating medium for the vehicle, means for conducting the heat produced by the reburning of said exhaust gases while the engine is operating or the heated air from said fuel burner while the engine is idle to said heating medium, and separate means for conducting said heat of the reburned gases or heated air from said burner forwardly to the engine and its radiator so as to raise the temperature thereof.

5. Means for heating an automotive vehicle equipped with an internal combustion engine and the radiator for said engine comprising a combustion chamber external of said engine, a mixing chamber in communication with said combustion chamber and having an air inlet, means for discharging exhaust gases from said engine through said mixing chamber so as to induce an inflow of air through said inlet and to discharge the mixed air and exhaust gases into said combustion chamber, a boiler, radiator means connected with said boiler and located in the vehicle body, means for conducting heat produced by reburning said exhaust gases while the engine is operating or heat produced by said burner while the engine is idle to the boiler so as to heat the same, a damper for diverting said heat partly or completely from the boiler to the atmosphere, and separate means for conveying said heat to the engine and its radiator.

6. Means for heating a vehicle equipped with a hydrocarbon engine comprising a casing provided with a combustion chamber and a mixing chamber, a burner located within said combustion chamber, means for supplying liquid fuel thereto, a conduit connecting said mixing chamber with the exhaust manifold of the engine, said mixing chamber having an air inlet adjacent to said conduit, a heat transfer device for heating the body of the vehicle, an outflow pipe for conveying products of re-combustion from said combustion chamber to said heat transfer device, and a damper for diverting heat from the heat transfer device to the external atmosphere.

7. Means for heating a vehicle equipped with a hydrocarbon engine comprising a casing provided with a combustion chamber and a mixing chamber, a burner located

within said combustion chamber, means for supplying liquid fuel thereto, a conduit connecting said mixing chamber with the exhaust manifold of the engine, said mixing chamber having an air inlet adjacent to said conduit, a boiler, radiator means connected with the boiler and located in the vehicle body, a pipe connecting said combustion chamber with said boiler so as to heat the same, a second pipe connecting said combustion chamber with the atmosphere, a damper for diverting the products of combustion from said boiler to the pipe discharging into the atmosphere, and a damper controlled conduit connecting said casing with an enclosure containing said engine.

Signed at Albany, county of Albany, State of New York, this 30th day of Jan., 1926.

LEE P. HYNES.

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