

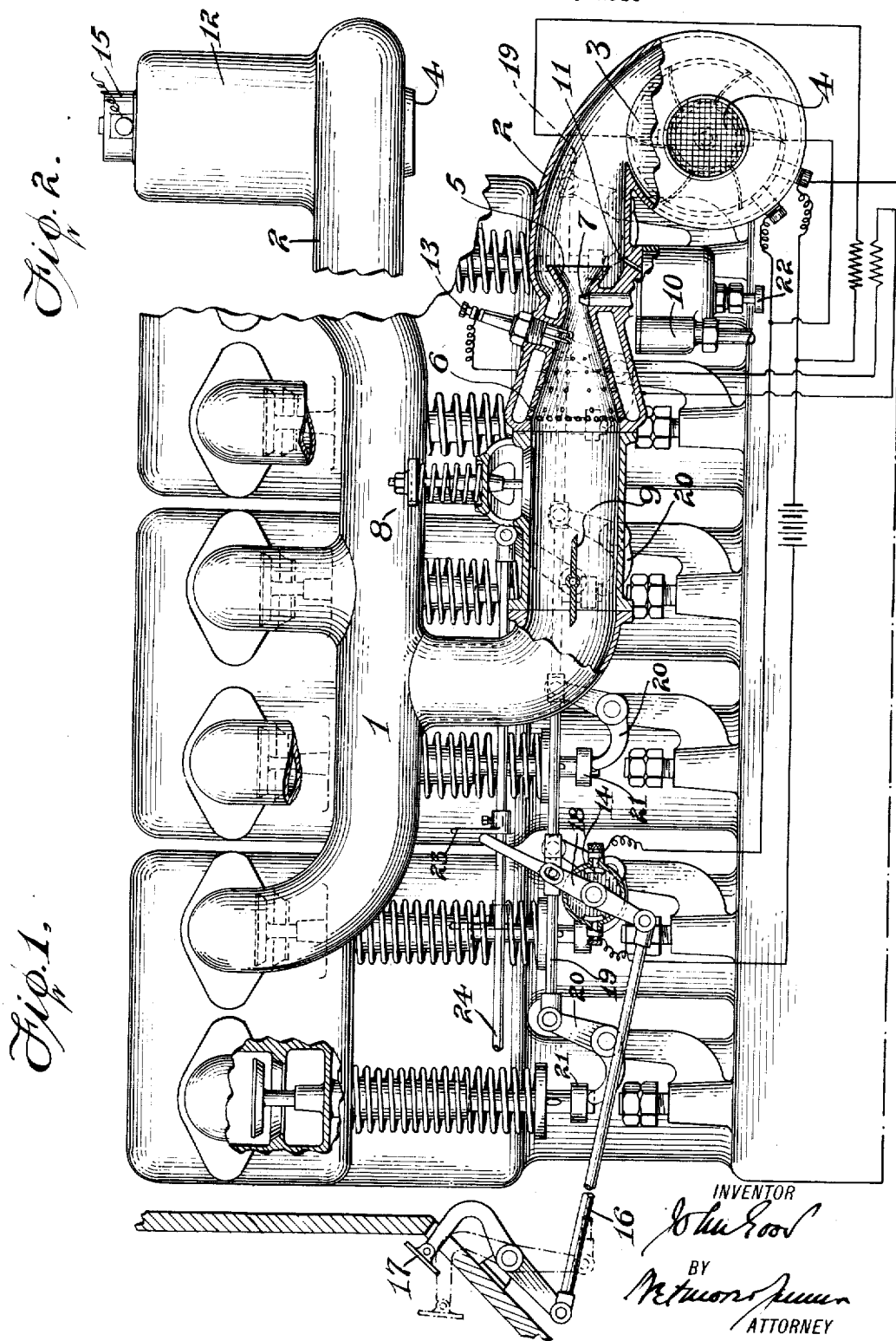
May 29, 1923.

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ENGINE PREHEATER

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UNITED STATES PATENT OFFICE.

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NEW YORK, N. Y., A CORPORATION OF NEW YORK.

ENGINE PREHEATER.

Application filed February 14, 1918, Serial No. 217,066. Renewed July 20, 1921. Serial No. 486,188.

To all whom it may concern:

Be it known that I, JOHN GOOD, United States citizen, residing in Garden City, Long Island, N. Y., have invented the following described Improvements in Engine Preheaters.

The invention consists in an organization of means for pre-heating internal combustion engines, particularly those used for automotive purposes and consists in the combination therewith of burner mechanism and suitable control gear whereby a blast of flame or hot gases may be caused to pass into or through the intake or interior passages of the engine for the purpose of pre-heating them and thereby putting the engine in a condition to operate with its normal efficiency.

In the accompanying drawing:

Fig. 1 represents partly in section and partly in diagram a preferred exemplification of the invention; and

Fig. 2 is a detail plan.

The header and intake pipe 1 shown on the engine outlined in the drawing may be assumed for the purposes of this description to be the normal inlet for the carburetted mixture of fuel and air, although within this invention it might be an inlet for air only. It is connected to the casing 2 of a structure which may function both as a carburetor and a burner and which comprises a fan 3 adapted to take air from atmosphere through an inlet 4 and deliver it to the intake, partly through a choke or Venturi tube 5 and partly through the air-distributing holes 6. When the structure functions as a carburetor the fan is or may be stationary and the engine suction draws air through it into the intake. That part of the air which passes through the tube 5 serves to aspirate liquid fuel from the nozzle 7 and that part which passes around the choke and through the holes 6 mixes with the other making therewith an explosive mixture to go to the engine. Additional air may be admitted to this mixture from the auxiliary spring-loaded air valve 8 which opens by the increased suction effect as customary in carburetor action. A throttle 9 operated by a throttle control rod 10 serves to control the total flow and hence to regulate the speed of the engine. It will be apparent that with proper relative proportions of the air and fuel passages just

referred to the structure will function properly and efficiently as a carburetor or charge-forming device and that it may have any of the usual appurtenances common to carburetors. The fuel nozzle 7 derives its liquid fuel from a chamber 10 which is controlled by a float valve or otherwise to keep the liquid at a constant level and the surface of the liquid is kept at a pressure equal to that in the blower casing 2 through the pressure connection indicated at 11.

The fan is driven by an electric motor 12 connected in the circuit of a battery which may be the usual starting battery of an automobile, and when set in operation forces air through the passages 5 and 6 into the intake. The part passing through the tube 5 takes up a spray of fuel liquid as before producing a mixture of such proportions and condition as to be ignitable by the spark plug 13 screwed into the wall of the tube, while the air passing through the holes 6 mixes with the burning spray and is suitable in amount, by reason of the size and number of said holes, to support and complete the combustion without additional air and according to the principles explained in my prior application Serial No. 195506. The motor switch 14 which closes the motor circuit to start the motor and blower in action, also closes the primary circuit of a spark coil which includes the usual interrupter 15 mounted on the motor shaft in the present case. The secondary of this coil is connected to the spark plug as indicated in the diagram. The said switch 14, which will be understood from the conventional representation on the drawing, is arranged to be operated by a lever or pedal 17 which may be assumed to be mounted on the dash or footboard of an automobile and which is connected to the switch arm by a link 16. Through the switch arm 18 and the connecting rod 19, the switch operates each of a series of bell cranks 20 engaged with the steps 21 of the valve stems and acting to lift the valves of the engine to an open position when the switch is closed. It will be understood that there is a bell crank lifter 20 for each valve of the engine (although only two are shown in the drawing) so that the closing of the switch not only sets the blower in operation but also opens a clear path from the intake through the engine cylinders and out through their exhaust ports. The com-

bustion automatically set up by the simultaneous operation of the fan and the igniting spark plug, proceeds in intensity according to the capacity and speed of the blower fan and the flame and combustion products follow the path opened through the engine, being entirely enclosed and confined thereto and thereby the flame serves to heat the engine in a most effective manner. Although more than a single spark may not be necessary for the spark plug it is herein shown as operating continuously with the motor. The fuel nozzle is shown with an adjustable valve needle 22 which serves the purpose of regulation of the mixture for carburetor purposes and it is found that the same adjustment also serves well for the burner function provided the total area of the air passages is properly related to the size of the fuel orifice and its elevation above the liquid level. The location of the spark between the spray and the zone of holes 6 avoids any tendency toward explosive effects. The tube 5 constitutes in effect a burner chamber and is desirably of the shape indicated although other shapes are also possible.

As a precaution against the possibility of the engine throttle 9 being closed when the blower is operating, the control gear includes an automatic throttle opener operated by the same movement that closes the switch and opens the engine valve, and represented in the present case by the engagement of the switch arm 18 with an abutment collar 23 on the throttle rod 24. It will be seen that when the pedal 17 is pressed to close the switch, the arm 18 will engage the collar and push the throttle to a wide open position and keep it so as long as the combustion continues. The springs of the several valves acting through their bell crank lifters and the connecting rod 19 serve to restore the lifters when the pressure on the pedal 17 has been released and any attempt to close the throttle will manifestly restore the switch and pedal. After the switch has been restored the arm 18 will offer no obstruction to throttle manipulation.

In the operation of the system above described, the engine is prepared for running on its normal cycle by pressing down the pedal 17 and thereby forcing a strong current of burning gases through the intake pipe and the combustion space or spaces of the engine as above described. The pedal is held depressed for such period of time as will suffice to raise the engine temperature the desired amount whereupon the pedal is released and the engine turned over by the starting motor not shown or by hand. The cessation of the blower operation stops the forced combustion but leaves the structure which is now to function as a carburetor in a thoroughly heated condition thus adapted

to give a well vaporized mixture on the first inspiration by the engine.

For convenience of illustration the several parts of the system are shown as though arranged in close proximity and all on the same side of the engine but it will be apparent that they will necessarily have to be adapted to various engine designs and for this reason the elements of the control gear as above described are to be taken only as representative of a mechanical relation which can be carried out in many different ways.

Claims.

1. The combination with an internal combustion engine of means for coincidentally opening its exhaust and intake valves and means for forcing a heating medium through the path through the engine thereby provided.
2. The combination with an internal combustion engine having an intake and means for coincidentally opening its intake and exhaust valves and means connected to said intake adapted to establish forced combustion through the same and the combustion spaces of the engine.
3. The combination in an internal combustion engine of a throttled engine intake, means for forcing flame into the same and automatic controlling gear for said means adapted to open the throttle when establishing combustion in said means.
4. The combination in an internal combustion engine of an engine intake, means for opening the engine valve, automatically igniting means for forcing burning fuel or hot combustion gases into said intake and controlling gear adapted to establish such when the valve is open.
5. The combination of an internal combustion engine having an intake, a structure connected thereto adapted to function alternately as an engine carburetor and as a forced draft burner and including a blower, a spark plug, a motor to drive the blower and a source of current for operating the spark plug and motor.
6. The combination of an engine intake, of means for opening a passage through the same and an organization of parts including a source of fluid pressure, connected with said intake and adapted to function alternately as an engine carburetor and a forced draft burner for internally heating said intake.
7. In apparatus for the purpose described, an air and fuel mixing space, a source of air pressure and a fuel receptacle connected thereto, having a vent alternately adapted to communicate the pressure of said air source and the pressure of atmosphere to the liquid fuel in said receptacle.
8. The combination in an internal combustion engine having a suction intake, of a

device connected thereto adapted alternately to serve as suction-operated means for mixing fuel and air for combustion in the engine and for running the engine and as a
5 burner operated by air pressure for burning fuel within itself for starting the engine and means whereby said device may be caused to operate in either capacity.

9. The combination in an internal combustion engine having a suction intake, of
10 a device connected thereto adapted to serve either as a suction-operated source of unburned fuel, or as a pressure-operated liquid fuel burner and means for supplying operating air pressure to said device to cause
15 it to develop heat when starting the engine.

10. The combination in an internal combustion engine having a suction intake, of

a device connected thereto adapted to serve either as a suction-operated source of un- 20 burned fuel, or as a pressure-operated liquid fuel burner and including an igniter, means for supplying operating pressure to said device to cause it to function as a burner and means for coincidently energizing the ig- 25 niter.

11. In an internal combustion engine, the combination of an intake passage, means for normally supplying the same with an un- burned operating mixture of fuel and air, 30 and means for forcing flame or hot flame products through the same and toward the engine.

In testimony whereof, I have signed this specification.

JOHN GOOD.

Certificate of Correction.

It is hereby certified that in Letters Patent No. 1,456,980, granted May 29, 1923, upon the application of John Good, of Garden City, New York, for an improvement in "Engine Preheaters," an error appears in the printed specification requiring correction as follows: Page 2, line 104, claim 4, after the word "such" insert the word *combustion*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 26th day of June, A. D., 1923.

[SEAL.]

KARL FENNING,
Acting Commissioner of Patents.