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ATTACHMENT FOR INTERNAL COMBUSTION ENGINES

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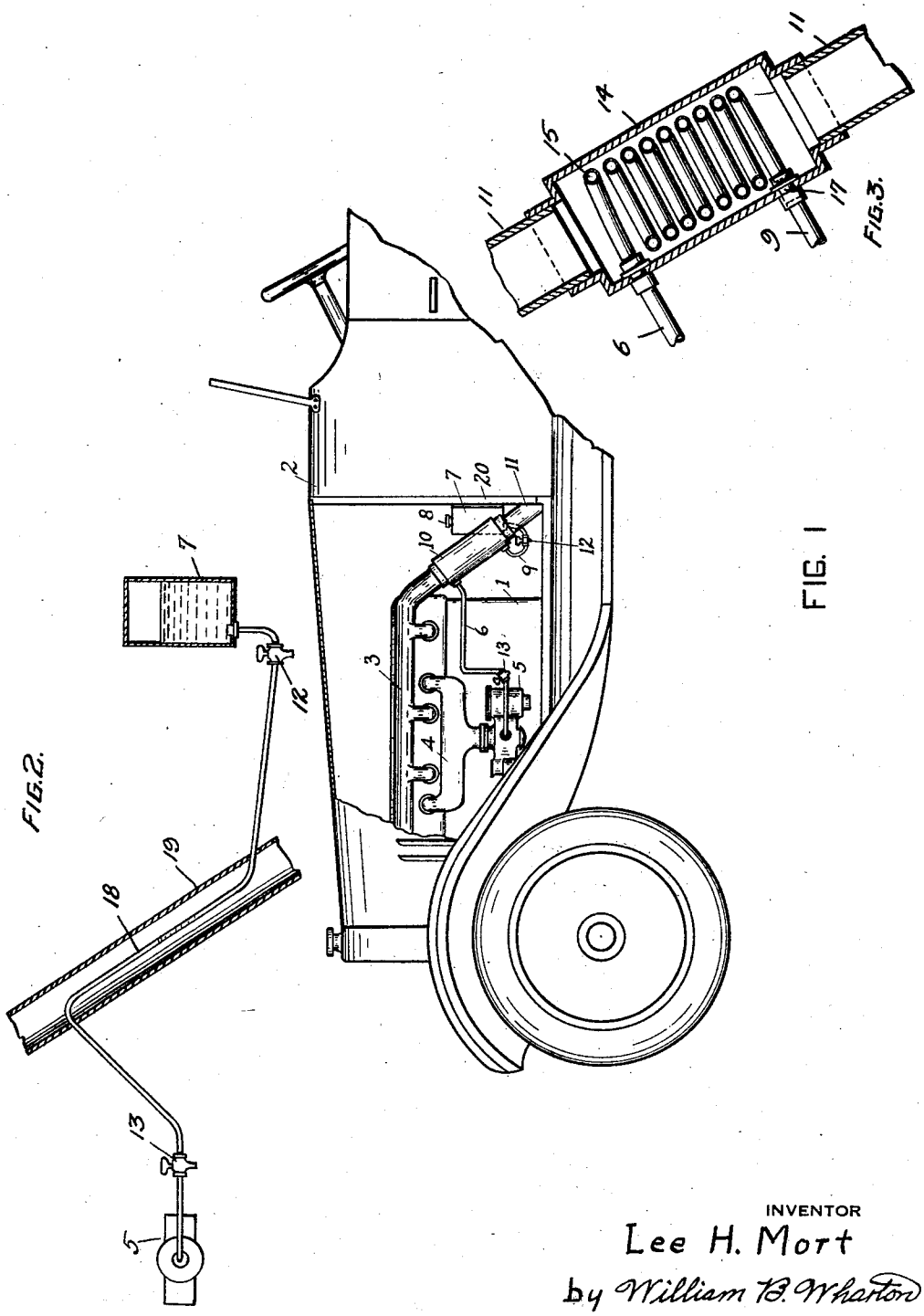

FIG. 3.

FIG. 1

FIG. 2.

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ATTACHMENT FOR INTERNAL-COMBUSTION ENGINES

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This invention relates to means for introducing super-heated steam into the carbureter of an internal combustion engine. The purpose of the invention is to obtain fuel economy, and reduce the carbon monoxide in the products of combustion, and to eliminate the depositions of carbon on the cylinder walls and piston heads of the engine. While the general idea of introducing steam into the firing mixture of a combustion engine is not new, the proportion of steam admitted is very important, and the amount of steam must, of course, vary with the speed of the engine in order to maintain the proper proportion in the firing mixture; therefore, the successful application of the general idea depends on the simplicity and effectiveness of the steam generating and controlling means.

The object of this invention is to provide means to generate and superheat steam, such means being arranged with a water supply and the heating source in such a manner that the necessary variation in the quantity of steam injected into the carbureter is automatically regulated.

Another object of the invention is to provide means to generate and superheat steam wherein gravity maintains the water in the boiler portion of the device.

A further object of the invention is to provide in a system for injecting steam into the carbureters of internal combustion engines, means for quickly clearing the steam generating means of all water, this is for the reason that in winter the apparatus might be ruined if the water was left in the device while the machine was idle.

A still further object of the invention is to provide an apparatus for the purposes aforesaid, in which the piping and surfaces of the apparatus exposed to the cool air around the engine block are minimized, and as a result of this feature, in conjunction with the superheating of the steam, no condensation of steam occurs and no water is drawn into the carbureter.

In the drawings Figure 1 is a partial side elevation of a motor car with the hood cut away to show the attachment of the apparatus of the present invention; Figure 2 is a vertical sectional view through a schematic arrangement of the device; and Figure 3 is a vertical sectional view through the boiler portion of the apparatus.

The reference numeral 1 designates the engine block of an automobile 2. In this particular car the exhaust manifold 3 is on the same side of the car as the intake manifold 4 and the carbureter 5. In some makes of motor cars the exhaust manifold is not on the same side of the motor block as the intake manifold, but this feature is not of importance in the application of this invention since the steam feed pipe 6 may be led over the block to the carbureter, if the carbureter is mounted on the opposite side of the motor block.

In general, the device consists of a water supply tank 7 with a filling aperture covered by cap 8. From beneath tank 7 a small pipe line 9 leads into the boiler 10 which is mounted in the exhaust pipe 11. The steam is led to the carbureter 5 by means of pipe line 6 and is introduced into the carbureter through the air inlet. It is not necessary to limit the injection of the steam through the air inlet, but it has been found that better mixing of the fuel occurs when the air and steam are admitted together. A small pet-cock 12 in the pipe 9 may be opened to drain the boiler 10 and the tank 7 in case it is desirable to remove the water. Pet-cock 13 may be opened to allow the steam condensate to escape, as some of the steam condenses before the motor temperature rises sufficiently to superheat the steam.

As shown in Figure 3, the boiler element 10 of the device consists of an outer casing 14 which may be suitably interposed in the exhaust line 11. The pipe coil 15 is positioned substantially as shown in the casing 14, and the pipe lines 6 and 9 are coupled to the ends of the boiler coil 15 at 16 and 17 respectively. It will be noticed that the inner diameter of the boiler coil is approximately equal to the inside diameter of the exhaust pipe 11. This arrangement maintains a uniform area in the exhaust line, and serves to prevent an appreciable increase in

the resistance to the flow of the exhaust gases from the engine.

In Figure 2 the apparatus is shown in diagrammatic section. The arrangement of the pipe 18 in the exhaust pipe 19, as shown, is found practical for some motors; that is, enough steam may be generated in pipe 18 for small motors, and said pipe 18 in such case corresponds to the coiled pipe 15 in boiler 10. In any arrangement of the apparatus, however, the water supply tank 7 is fixed to the backboard 20, or to any convenient part of the car, where it is possible to have the water approximately fill half of the boiler piping within the exhaust pipe. The placing of the supply tank in this relative position with the boiler pipe eliminates any controlling or water feeding means, since the level of the water in the supply tank 7 determines the level of the water in the boiler pipe. The supply tank 7 is of relatively small depth and of proportionately great length. The tank is thus constructed so that the water level will vary only a few inches in the boiler pipe, as the tank is filled or emptied during the operation of the car.

Since no gauging or feeding device is necessary to introduce water into the boiler the structure is greatly simplified and the cost of an installation is materially reduced. The level of the water is maintained approximately at the longitudinal mid-point of the boiler pipe, as explained above, and for this reason the quantity of steam generated at a given temperature is practically constant. When the engine speeds up it heats faster, and in throwing out more products of combustion it creates a higher temperature in the exhaust pipe which results in the necessary greater generation of steam.

Another novel and very important feature of the invention is the location of the boiler pipe. It will be noted that the said boiler piping is not necessarily positioned in the exhaust manifold proper, but the boiler may be, indeed, it is shown located in the sloping exhaust pipe wherein it is easier to apply the principle of having the water seek its own level as a means of feeding the water to the boiler. Another important feature is the location of the place where the water enters the manifold. As shown, the water does not enter the boiler pipe from above, but enters at the lowest point thereof. This allows the cold water to come in contact with the cooler exhaust gases, and the hotter gases, or those nearer the exhaust manifold, contact first the portion of the boiler tube in which the steam is rising and superheats it, then pass along the boiler tube to transfer heat to the water. The steam in this manner gets the highest degree of superheating possible under prevailing conditions.

Since there is no valve regulation there must be a special boiler for each type of motor car. A four cylinder car with a given combustion volume would need less steam than a six cylinder car with the same cylinder dimensions. The manner of adapting the apparatus for various types of cars is by changing either the length or the diameter of the boiler pipe, and in this manner the steam generation may be made suitable.

What I claim is:

1. In an internal combustion engine, the combination of a carbureter, an exhaust passage, and means for supplying steam to the carbureter, such means comprising a water supply tank, piping arranged within the exhaust passage and in communication with the water supply tank, said piping being of such length and the piping and tank being mutually so arranged that the water rises a relatively short distance in the piping with a relatively great length of the latter above the water level therein and lying within the exhaust passage.

2. In an attachment to reduce the carbon monoxide in the products of combustion of an internal combustion engine having boiler piping in the exhaust passage thereof, the combination of a water supply tank connected to said piping and so positioned relatively thereto that water is maintained without the use of valving means at a level equal with the water in said supply tank, at least fifty per cent of the boiler piping extending above said water level to superheat steam generated therein, and connections from said boiler piping to convey steam to the fuel mixing means of the engine.

In witness whereof, I hereunto set my hand.

LEE H. MORT.