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H. L. ROSE ET AL

DECARBONIZING DEVICE FOR INTERNAL COMBUSTION ENGINES

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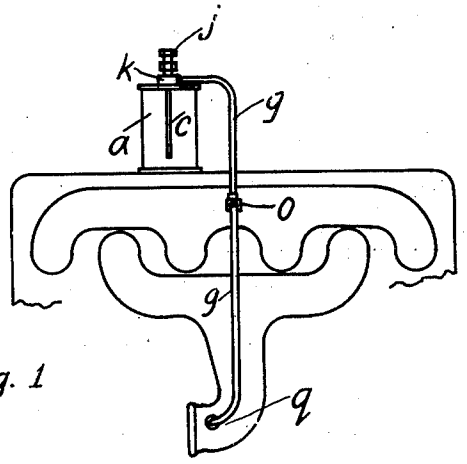


Fig. 1

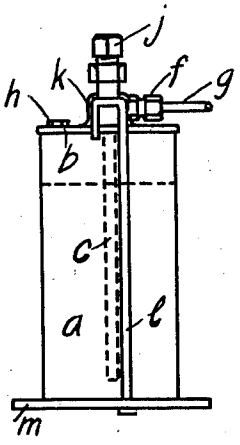


Fig. 2.

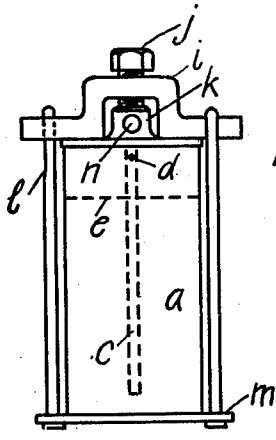


Fig. 3

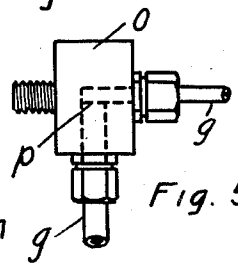


Fig. 5

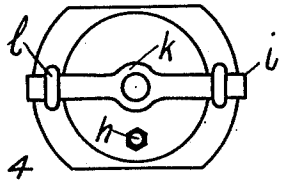


Fig. 4

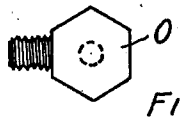


Fig. 6

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UNITED STATES PATENT OFFICE.

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DECARBONIZING DEVICE FOR INTERNAL-COMBUSTION ENGINES.

Application filed October 22, 1925, Serial No. 64,244, and in Canada March 20, 1925.

Our invention relates to devices for eliminating the troubles common in all internal combustion engines which follow from the presence of deposited carbon within and adjacent to the combustion chamber.

This deposition of carbon is clearly traceable to the fact that the throttle over a large part of its range is opened too suddenly for the carburetor to efficiently respond. The result of this being the admission to the cylinder of an excess of un-vaporized gasoline leading to the formation of carbon deposits.

The object of our invention is to provide by a simple apparatus means by which the varying factors concerned in the problem are utilized to correct the defects above referred to and in a manner that is entirely automatic.

Further results secured by the adoption of our invention consist in, the complete elimination of pre-ignition, and the improvement in the imperfect combustion caused by varying engine speeds.

It is readily provable by gauge that the state of partial vacuum in the intake manifold is inversely proportionate to the opening of the throttle. Even a slight opening movement of the throttle will cause a reduction of the vacuum by two or three inches on the gauge. Recognizing that the deposition of carbon always follows this condition —under ordinary arrangements—and having proved by experimentation that a small admission of steam to the manifold when the vacuum is suddenly reduced, is an efficient corrective, we make use of this varying condition of the vacuum to control and remedy it. The arrangement and deposition of the parts necessary to accomplish this effect constitute the seat of our invention.

In brief our arrangement is as follows:

A vacuum tank which may consist of a glass jar supported on any conveniently held bracket is sealed by a brass cap and gasket. The jar is filled to say within a quarter of its capacity with water, dipping to near the bottom of the jar is a small pipe opened at the bottom and secured to the cap thru which it is in air tight communication with another small pipe which opens into the manifold in the vicinity and on the engine side of the throttle. In the small pipe within the glass jar and immediately below the brass cap a small hole is made diametrically thru the pipe, thus communicating the cavity in the upper portion of the jar and the bore of the pipe secured to the brass cap. Intermediate of the ends of the pipe from the cap to the manifold, the pipe passes thru a heating block which is contiguous to the exhaust manifold, when the water passes thru it is flashed into steam.

In the drawings which form part of this application Fig. 1 is a general view of the apparatus in position on an ordinary automobile engine. Figs. 2, 3, and 4 show details of the tank and fittings in connection, Figs. 5 and 6 are views of the heating block with pipe connecting same.

Referring to the drawings in detail, "*a*" is a glass jar, "*b*" is a brass cap having a groove and gasket therein, "*c*" a small pipe secured to the cap "*b*" and having two lateral orifices "*d*" near the top, the top water level is shown at "*e*", "*f*" is a union connection for the pipe "*g*", "*h*" a filler cap, "*i*" a bridge piece pierced by a set screw "*j*" which engages the boss "*k*" on the centre of the cap "*b*".

Tension bolts "*l*" are secured to the foot brackets "*m*" and hook over the arms of the bridge "*i*". A hole within the cap "*b*" is marked "*n*" and connects the two pipes "*c*" and "*g*". The heating block is shown at "*o*" with a clearway "*p*" thru it connecting the pipe orifices to the jar and to the manifold "*q*".

The operation of the device is as follows:

Water is poured into the glass tank "*a*" up to about 80% of its capacity and the cap "*b*" and the pipe connections "*c*" and "*g*" made air-tight. When the engine is running steadily a condition of equilibrium is maintained between the cavity in the tank above the water level "*e*" and the pressure within the manifold, and no water is taken from the tank. But immediately on any sudden opening of the throttle an unstable condition obtains, the partial vacuum in the manifold is decreased and the excess of pressure causes a flow of manifold gases thru the pipe "*g*" and the heating block "*o*" to the tank "*a*". This gas flow enters the tank direct into the cavity thru the small orifices "*d*", but these being insuficient in area it also flows from the end of the larger pipe up through the water, until another condition of unstable equilibrium is quickly reached when the pressure within the cavity above the water line "*e*" is higher than the pressure

in the intake manifold "*q*" owing to the engine having increased in speed. This action which in practice takes place very rapidly causes a flow of water thru the larger pipe "*c*" and thru the heating block to the manifold "*q*". The small orifices "*d*" afford means for the permanent calibration of this vacuum balance effect. Thus an intermittent supply of superheated steam is admitted to the engine precisely at the moment needed to augment the vaporization of the fuel, and this in a manner which is entirely automatic.

A disturbance of the vacuum condition in the manifold invariably follows any sudden opening of the throttle, and this creates a corresponding disturbance of the vacuum conditions within the cavity above the water level in the tank, which is made use of to admit steam at that moment to the cylinders.

It is well recognized that in the calibration of a carburetter prime attention must be given to the extreme conditions, that is to say when the engine is "idling" and when under heavy load, the calibration of the intermediate portion of the range being always more or less faulty. It is this latter condition which our invention meets and remedies.

We claim:

1. An engine humidifying device attached to or made integral with the internal combustion engine of an automotive vehicle having an intake manifold for automatically and intermittently forcing hot steam free from admixture with atmospheric air into the intake manifold on the engine side of the carburetter controlled by the opening of the throttle in response to the fluctuations of pressure within the said manifold, and comprising a water container, a pipe extending through the container into the water and connecting the said container and the said manifold, the path of the said pipe being contiguous to the exhaust manifold of the said engine, all substantially as and for the purpose described.

2. In an engine humidifying device the combination including the intake and exhaust manifolds of the engine, an auxiliary enclosed tank partially filled with water, a pipe connecting said enclosed tank with the intake manifold of the engine, said pipe having one orifice within the water in said tank and another outlet of smaller area above the water in said tank, a heating block contiguous to the engine exhaust manifold secured to and intermediate the ends of said pipe thru which the contents of said pipe pass.

3. In an engine humidifying device the combination including the intake and exhaust manifolds of the engine, an auxiliary enclosed tank partially filled with water and having a visible water level, a removable cap securing a gasket for sealing said tank, a hole thru said cap communicating with the extremities of two pipes one of which is within the tank and terminates near the bottom of the water the other being external to the tank and terminating at and being secured to a metal block, said metal block being contiguous to the engine exhaust manifold and having a passage thru it communicating with a pipe having its extremity in communication with and secured to the engine intake manifold, the said pipe within the said tank having two outlets within the said tank one said outlet being below the water level in said tank and one said outlet being above the said water level.

Signed at the city of Victoria, this 14th day of October, 1925.

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