C. O. THORNBERRY & C. G. WOLGAMOTT.

ENGINE ATTACHMENT.

APPLICATION FILED DEC. 21, 1917.

1,295,387.

Patented Feb. 25, 1919.

2 SHEETS—SHEET 1.

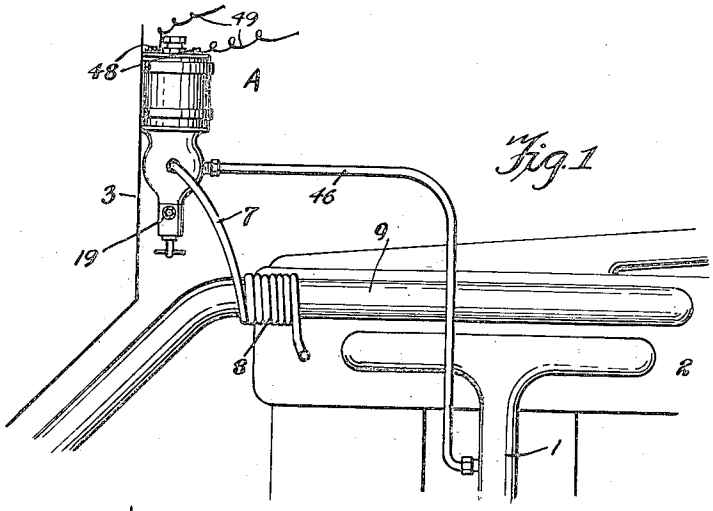


Fig. 1

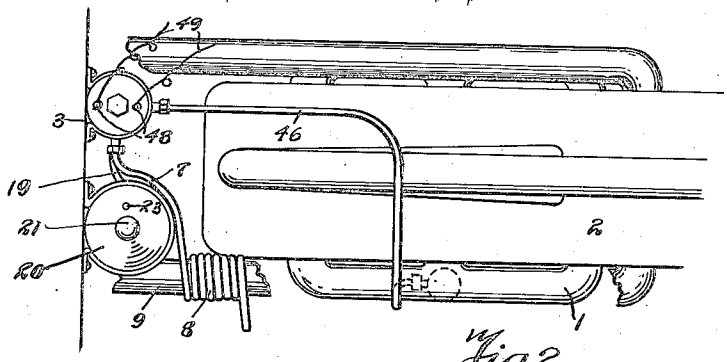


Fig. 2

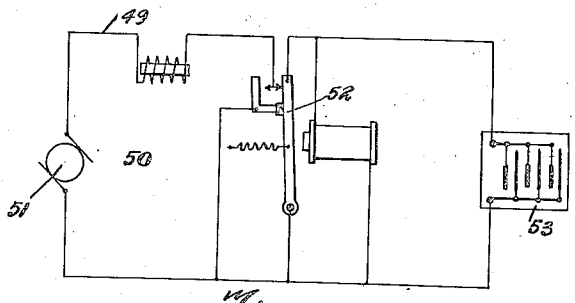


Fig. 6

Witnesses
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2 SHEETS—SHEET 2.

Fig. 4

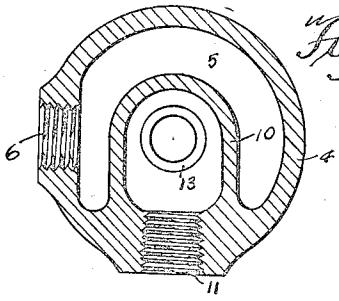


Fig. 5

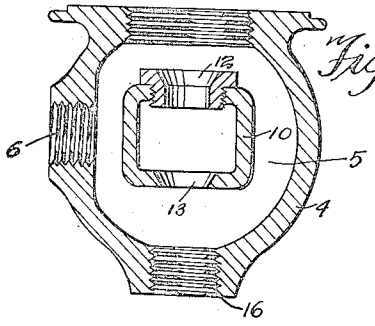


Fig. 3

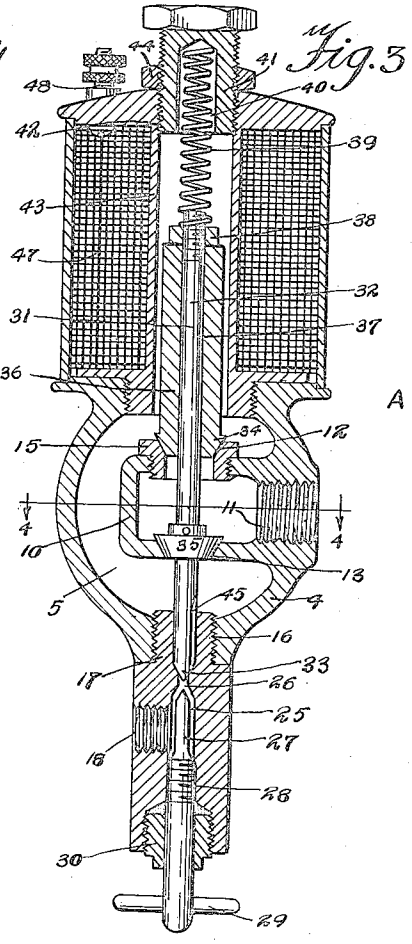
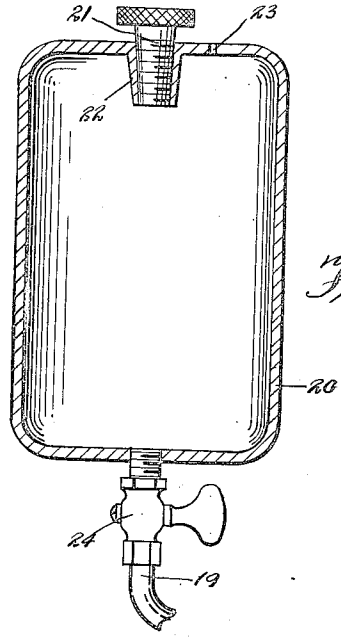


Fig. 7



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UNITED STATES PATENT OFFICE.

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ENGINE ATTACHMENT.

1,295,387. Specification of Letters Patent. Patented Feb. 25, 1919.

Application filed December 21, 1917. Serial No. 208,337.

To all whom it may concern:

Be it known that we, CHARLES O. THORNBERRY and CHARLES G. WOLGAMOTT, citizens of the United States, residing at Columbus, in the county of Franklin and State of Ohio, have invented certain new and useful Improvements in Engine Attachments, of which the following is a specification.

This invention relates to internal combustion engines, and has for an object to provide an auxiliary air inlet and humidifying attachment for association with the inlet manifolds of such engines, whereby through use of the attachment numerous advantages in engine operation and control are obtainable; for example, a reduction in the quantity of fuel consumption, or greater mileage per gallon of fuel; increased spontaneity in engine acceleration; the avoidance of carbureter adjustments, and in the elimination of carbon deposit in the cylinders of an engine.

Another object of the invention is to provide mechanism of the above character possessing automatic features of control and operation, and of an electro-responsive nature, the same serving to admit graduated quantities of air and liquid in a commingled state into an engine manifold, and in direct proportion to the speed of operation or the fuel demands of the associated engine.

Other objects will be in part obvious, and in part pointed out hereinafter.

For a further disclosure of the invention reference is to be had to the following description and to the accompanying drawings, forming a part of this specification, and in which similar characters of reference denote corresponding parts throughout the several views of the drawings.

In the drawings:

Figure 1 is a side elevation of the auxiliary air inlet and humidifying apparatus comprising the present invention, and illustrating the same attached to an internal combustion engine.

Fig. 2 is a top plan view of the structure shown in Fig. 1.

Fig. 3 is a vertical diametrical section taken through the valve structure of the invention.

Fig. 4 is a horizontal section taken along the line 4—4 of Fig. 3.

Fig. 5 is a sectional view, taken at right angles to the plane disclosed in Fig. 3, of the valve casing.

Fig. 6 is a diagrammatic view of the electrical apparatus and circuit in which the invention is situated.

Fig. 7 is a sectional view of the tank structure.

Referring more particularly to the drawings, the auxiliary air inlet and humidifying apparatus A comprising the preferred form of the invention is adapted to be utilized in conjunction with the intake manifold 1 of an internal combustion engine 2, and is preferably mounted, when employed upon an automobile, along the engine side of the dash or cowl construction 3. The apparatus A consists of a substantially globular valve casing 4, and includes an internal chamber 5, the latter being in communication with an air inlet port 6. Extending from the port 6 is a copper or other tube 7, which tube has one extremity thereof coiled as at 8 around the exhaust manifold 9 of the engine 2, thus it will be seen that air drawn into the chamber 5, by engine suction, will be in a relatively heated condition. Integral walls 10 are formed with the casing 4 and are situated in the chamber 5, said walls serving to define a fluid discharge chamber 11, and formed in said walls are a plurality of vertically alined valved seats 12 and 13, the former being formed by threading a cap 15 into the upper surface of said wall.

Provided in the lower extremity of the casing 4 is a threaded opening 16, into which is threaded the upper reduced extremity of a needle valve casing 17, which latter being provided with an entrance port 18, into which is threaded one extremity of a moisture conveying pipe 19. The latter has the opposite extremity thereof connected with a water supplying tank 20, which tank is mounted upon the dash 3 and is located immediately adjacent to the apparatus A. A filling cap 21 is threaded into the upper curved end of said tank and terminates in inwardly extending tube 22, which protrudes a considerable distance into the tank 20. This construction is provided to regulate the amount of water which the tank can carry, and to prevent the latter from bursting or otherwise becoming damaged in the event of the water contained therein freezing. A vent opening 23 is provided in the end wall of the tank so as to prevent air from accumulating and compressing in the upper end of said tank when the same is

filled with water. A valve 24 is provided in the pipe 19 to govern the flow of water from said tank to the valve casing 17.

Formed in the casing 17 and communicating with the port 18 is a vertically disposed passage way 25 and which is formed to produce a nozzle 26, for controlling the flow of moisture from the port 18 through said passage way. To this end use is made of a needle valve 27, which is adapted to control the extent of opening of said nozzle 26, said valve 27 being threaded at as 28 into the passage way 25 and extends below the casing 17, so as to provide a manipulating portion 29. A packing nut 30 is threaded into the lower end of the casing 17 and surrounds the valve 27, so as to prevent undue escape of the moisture through the passage way 25 in which the valve 27 is situated. By rotating said needle valve, the flow of fluid through the passage way 25 may be accurately adjusted.

In order to admit the liquid and air into the chamber 11, and thence into the manifold 1, use is made of a valve structure 31, which comprises essentially a vertically disposed stem or core 32, the lower extremity of the latter terminating in a point 33, which is normally positioned so as to engage with the nozzle 26, whereby the flow of fluid through the passage way 25 will be normally blocked, also carried by the stem 32 are a plurality of valves 34 and 35, which latter being normally positioned in the valve seats 12 and 13 respectively. The valve 34, in this instance, is integrally formed with a core member 36, the latter being provided with a vertically disposed bore 37 for the reception of the upper extremity of the valve stem 32, said bore being threaded so as to be adjustably carried by said valve stem, and a lock nut 38 is also carried by said threaded portion of said valve stem to retain the core member in its adjusted or proper position upon said valve stem.

In order to normally maintain the valves in coöperation with their respective seats, use is made of a coil spring 39, which is seated at one end upon the nut 38 so as to force the valve structure downwardly. The upper extremity of said spring is positioned within a bore 40, formed in an adjustable nut 41, the latter being threaded into the upper end of a tubular opening 42 formed in a solenoid spool 43. It will be seen that by adjusting the nut 41 that the resiliency or compression of the spring 39 may be conveniently adjusted. A lock nut 44 is threaded upon the exterior threaded surface of a nut 41 and engages with the upper end of the spool 43, so that said nut 41 may be effectively retained in its several adjusted positions.

It will be manifest that by raising the valve structure, that the seats 12 and 13 will be uncovered, and likewise the pointed extremity 33 of the stem 32 will be lifted out of engagement with the restricted portions of the passage way 25. This operation permits heated air, drawn into the casing 4 by way of the tube 7, to pass through the ports 12 and 13 and into the discharge chamber 11. Also by uncovering the nozzle structure 26, water in a vaporized state will pass into the chamber 5 through the provision of an attenuated recess 45, formed in the lower end of the stem 32. Due to the restricted construction of the means described for admitting water into the chamber 5, such liquid will be introduced into the discharge chamber 11 in such finely vaporized condition as to permit the same to be readily commingled with the heated air also drawn into the chamber 11. It will be understood that the suction created by the reciprocating pistons (not shown) of the engine will, when the valve structure is open, effect the withdrawal of fluid from the discharge chamber and will eject the same into the intake manifold 1. A section of copper tubing 46 is employed to effect the passage of the fluid described from the apparatus A to said intake manifold.

In order to automatically control the operation of the valve structure, so that such auxiliary fuel may be introduced into the engine 1 at proper periods, and in correct proportions, the valve casing 4 is formed to carry the solenoid spool 43, and which is adapted to carry the usual windings 47 and associated terminal posts 48. Connected with the terminals 48 are the wires 49 of a generator circuit 50, said wires 49 leading to a generator 51 driven by the engine 2, said generator being preferably of the type commonly found upon the majority of motor driven vehicles, and is employed, normally, to supply a storage battery 53 with current. The solenoid structure is situated in series within the circuit 50 and is positioned between the generator and an automatic cutout device 52, utilized for governing the charging of the battery 53. It will thus be apparent that the solenoid structure will directly respond to the speed of the engine 2, that is when the engine is running at full speed, the generator 50 driven thereby will be furnishing its maximum capacity of current, which therefore results in the complete energizing of the solenoid structure. This results in the upward movement of the core member 36 and its associated valve stem 32, against the pressure exerted by the spring 39, and thereby effecting the opening of the valves 33, 34 and 35, so that air and liquid, from sources above described will be permitted to flow into the intake manifold 1.

It will be noted that the extent of opening of the valve structure is directly proportioned to the speed of operation and the con-

sequent fuel demands of the engine 2, this being due to the fact that the generator 50 is driven by the engine 2, so that when the engine is running at low speed, the energizing of the solenoid structure will not be sufficient to elevate the valve structure against the pressure of the spring 39, and that said valve structure will be gradually opened as the engine accelerates its speed. Thus mechanism has been provided for supplying the engine 2 with this reserve fluid in direct proportion to the fuel needs of the engine. This feature is particularly essential, in that the reserve fluid should only be admitted when the engine is running at a fair rate of speed, as when the engine is running slowly, or when laboring under strain the fuel mixture supplied thereto should be relatively "rich", in order that the engine will produce its most efficient results. Devices of the prior art, similar to the present invention have recognized this fact, but have mainly relied upon engine compression or suction to introduce this reserve fluid at proper periods, however, in view of the fact that such devices are dependent upon the throttle valve of the carbureter, it will be seen that when such valve is opened to permit of a greater flow of fuel into the engine cylinders, the suction in the manifold will be correspondingly decreased so that the spring governed mechanism thereof will not permit of the desired inrush of air when the latter is required.

From the foregoing it will be manifest that there is provided mechanism whereby the objects of the invention have been achieved, and that all of the advantageous features above mentioned are, among others, present. The apparatus A is adapted, through the mechanism set forth, to supply an engine automatically with the proper amount of auxiliary fluid, and being automatic in operation it, therefore, does not rely upon manual adjustments or control. The supply of reserve fluid afforded by the apparatus has been found by actual test to reduce the fuel consumption of an engine at least 25%, and another desirable feature of the invention resides in the humidifying features of the same, which eliminate the collection of carbon in the engine cylinders. Moreover, by use of the apparatus carbureter adjustments are rendered unnecessary, as a carbureter may be adjusted to produce a rich mixture and the latter will be automatically thinned at proper periods necessary by the action of the said apparatus. It will, of course, be appreciated that numerous structural changes may be made in the construction of the apparatus from that specifically described above and illustrated in the drawings, and that such changes will fall within the ambit of the invention, providing, of course, that such modifications will fall within the scope of the following claims.

Having described the invention what is claimed is:

1. In combination with an internal combustion engine, a valve structure comprising a casing having fluid inlet and outlet chambers formed therein, a nozzle structure, a slidably mounted balanced valve positioned within said casing and situated to govern the operation of said nozzle structure and to permit of the flow of fluid from said inlet to said outlet chambers, a coil spring normally serving to maintain said valve in a closed position, an engine driven generator and a solenoid situated to surround the upper end of said valve and adapted when energized by said generator to cause said valve to assume variated open positions, against the influence of said spring and in substantially direct proportion to the speed of operation of said engine.

2. In combination with an internal combustion engine, a valve structure comprising a casing having a fluid inlet and an outlet chamber formed therein, a nozzle structure, a slidably mounted balanced valve positioned within said casing and situated to govern the operation of said nozzle structure and to permit of the flow of fluid from said inlet to said outlet chambers, resilient means normally serving to maintain said valve in a closed position, an engine driven generator, a solenoid situated to surround the upper end of said valve and adapted when energized by said generator to cause said valve to assume an open position, and means for governing the responsiveness of said valve with regard to the magnetic attraction of said solenoid.

3. In mechanism for introducing commingled air and aqueous vapor into the fuel intake structure of an internal combustion engine, comprising a casing having fluid inlet and outlet chambers formed therein, a nozzle structure in communication with said inlet chamber, a source of liquid supply cooperative with said nozzle structure, a slidably mounted balanced valve positioned within said casing and normally serving to obstruct the flow of fluid from said inlet to said outlet chamber, spring means tending to maintain said valve in said normal position, an engine driven generator and a solenoid coöperative with said valve and generator to effect variated opening movements of the latter, whereby the extent of such opening movements will be substantially in direct proportion to the speed of operation of said engine.

4. In mechanism for introducing commingled air and aqueous vapor into the fuel intake structure of an internal combustion engine, comprising a casing having spaced fluid inlet and outlet chambers formed

therein, means for admitting aqueous vapor into said inlet chamber, the wall of the latter being provided with an air inlet opening, a slidably mounted valve normally situated to cover ports establishing communication between said chambers, spring means coacting with said valve to maintain the latter in its port covering positions, a core extension forming a part of said valve, an engine driven generator, a solenoid situated to receive said core extension, whereby upon the energizing of said solenoid by said generator said valve will be raised to variated open positions to permit of the flow of said fluids from the inlet to the outlet chambers, the extent of elevation of said valve being substantially in proportion to the speed of operation of said engine, and means for conveying the fluid from the outlet chamber to said intake structure.

5. In mechanism for introducing commingled air and aqueous vapor into the fuel intake structure of an internal combustion engine, comprising a casing having spaced fluid inlet and outlet chambers formed therein, means for admitting aqueous vapor into said inlet chamber, the wall of the latter being provided with an air inlet opening, a slidably mounted valve normally situated to cover ports establishing communication between said chambers, spring means coacting with said valve to maintain the latter in its port covering positions, a core extension forming a part of said valve, an engine driven generator, a solenoid situated to receive said core extension, whereby upon the energizing of said solenoid by said generator said valve will be raised to variated open positions to permit of the flow of said fluids from the inlet to the outlet chambers, the extent of elevation of said valve being substantially in proportion to the speed of operation of said engine, means for conveying the fluid from the outlet chamber to said intake structure, and threaded means coöperative with said spring means for governing the responsiveness of said valve with respect to the magnetic attraction of said solenoid.

In testimony whereof we affix our signatures in presence of a witness.

CHARLES O. THORNBERRY.
CHARLES G. WOLGAMOTT.

Witness:
W. S. McDOWELL.