July 18, 1933. D. L. COVYEOW 1,918,898

INTERNAL COMBUSTION ENGINE

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Fig. 1.

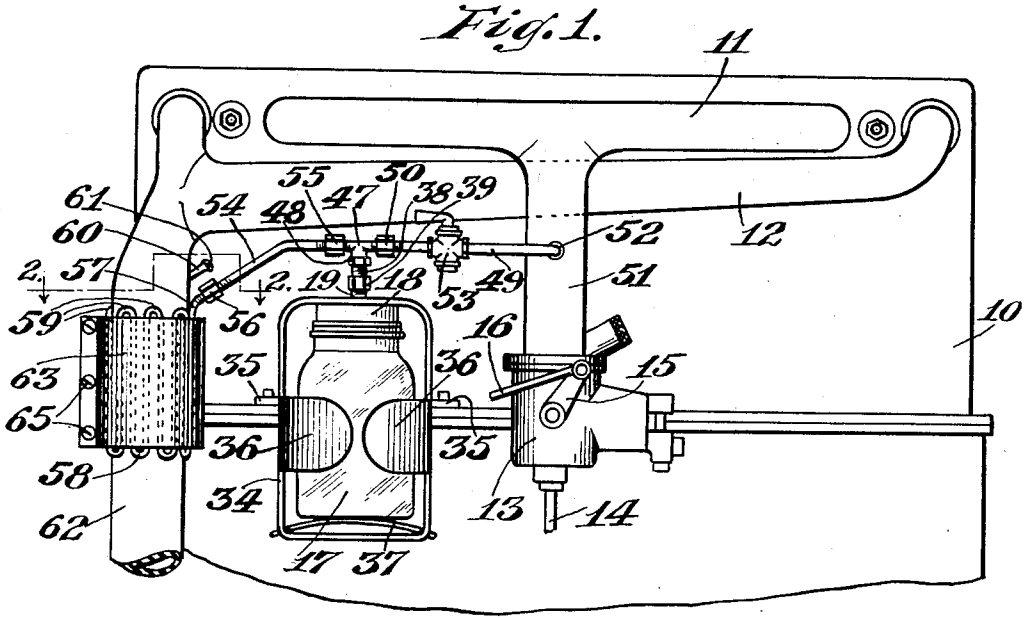


Fig. 2.

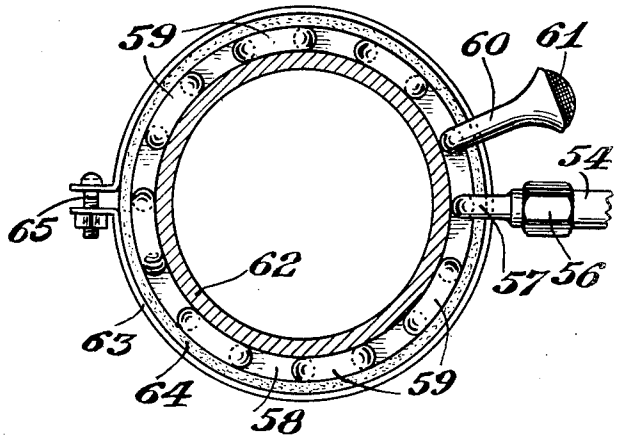
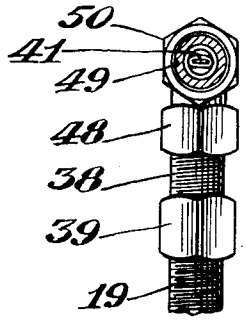


Fig. 5.



Witnesses:
C. E. Wessels
Harriett Reynolds

Inventor:
Daniel L. Covyeow;
By Joshua R. H. Potts
his Attorney.

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Fig. 3.

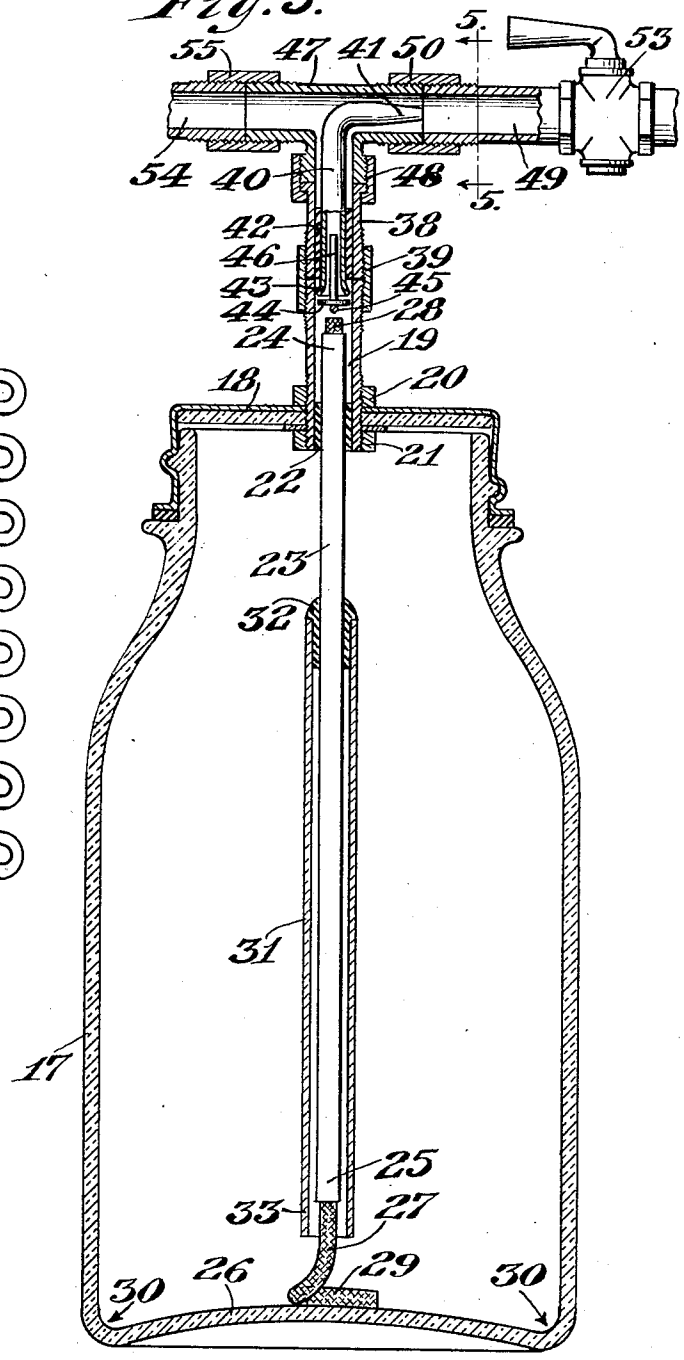
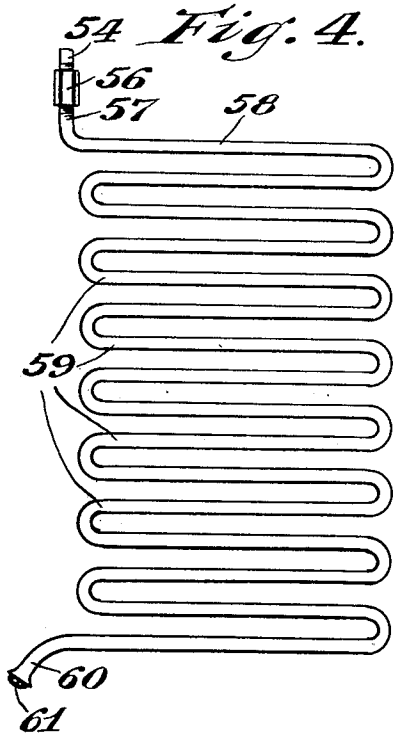


Fig. 4.



Witnesses:
C. E. Wessels
Harriett Reynolds

Inventor:
Daniel L. Covyeow;
By Joshua R. H. Potts
his Attorney.

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UNITED STATES PATENT OFFICE

DANIEL L. COVYEOW, OF CHICAGO, ILLINOIS

INTERNAL COMBUSTION ENGINE

Application filed August 15, 1932. Serial No. 628,835.

This invention relates to internal combustion engines and more particularly to the treatment of the fuel charge, the principal object being to prevent the accumulation of carbon deposits within the combustion chambers and cylinders of the engine, and at the same time increase the power and efficiency of the engine.

Other particular objects and advantages to be attained will hereinafter more fully appear.

The invention consists in the parts and combinations of parts as hereinafter described and pointed out with particularity in the appended claims.

In the accompanying drawings illustrating a practical adaptation of the invention, and forming part of the specification,—

Fig. 1 is a fragmentary view, in side elevation, illustrating more or less diagrammatically, the external parts of an internal combustion engine for automobiles and the like, with the apparatus of the present invention applied thereto;

Fig. 2 is a cross-section, on an enlarged scale, taken substantially on the line 2—2 of Fig. 1, to show how the air heating coil of the apparatus is applied to the exhaust pipe of the engine;

Fig. 3 is a vertical section through the liquid supply receptacle of the apparatus and associated parts of the atomizing means;

Fig. 4 is a detailed view of the air heating coil detached; and

Fig. 5 is a cross-section taken substantially on the line 5—5 of Fig. 3.

Referring now to the drawings, the numeral 10 designates generally, the block or housing of an ordinary internal combustion engine of the type used on automobiles and the like.

As shown, the fuel intake manifold 11 and the exhaust manifold 12 are located on the same side of the engine block. In connection with the fuel intake manifold 11, an ordinary carburetor is illustrated conventionally, as at 13, said carburetor having attached thereto a pipe 14 leading from a source of hydro-carbon fuel supply (not shown) and being also provided with the usual throttle valve rocker arm 15 and operating rod 16, said rod 16 being shown foreshortened in the view, but obviously, in practice, extending to a place on the car within convenient reach of the driver.

As far as the present invention is concerned, the carburetor and other cooperating adjuncts are adjusted in the usual way for the proper operation of the engine, just as though the device of the present invention, which is supplementary in its application and utility, were not applied.

In the practical adaptation of the invention, as illustrated in the accompanying drawings, the apparatus comprises a liquid supply receptacle 17 which, for practical purposes, may be a grass jar of the ordinary commercial type and provided with a screw cap 18, the liquid contents of said jar being either plain water or a mixture of water and alcohol or other suitable liquid which may be atomized and sprayed into the fuel mixture entering the combustion chamber of the engine.

Fitted in a central opening in the screw cap 18 of the jar is a nipple member 19 which, as shown, is secured in place by opposed jam nuts 20 and 21, by which provision the nipple member may be readily adjusted lengthwise in the cap and removed and replaced, at will. Secured in the nipple member 19, as at 22, by a tight fitting bushing or annular body of solder, is a tube 23, the upper end portion 24 of which extends a short distance above the cap 18, the lower end portion 25 of said tube terminating a short distance above the bottom 26 of the jar 17.

Extending through the tube 23 is a wick 27 composed of any suitable absorbent material through which the liquid in the jar 17 is carried upwardly through said tube 23, by capillary attraction, the upper end portion 28 of the wick extending a slight distance above the adjacent end portion 24 of the tube, while the lower end portion 29 extends for a considerable distance below the lower end portion 25 of said tube 23 and is in contact with the bottom 26 of said jar 17.

As shown, the bottom 26 of the jar 17 is crowned or raised at its center so that any

sediment which might be precipitated in the liquid contents of the jar will settle in the annular channel 30 adjacent the cylindrical side wall portion of the jar. To further prevent detrimental accumulation of a sedimentary deposit in the region closely about the wick 27, a tubular member 31, of slightly greater diameter than the tube 23, is sleeved concentrically about said tube, the upper end portion of said tubular member 31 being secured to the tube 23 by a tight fitting bushing or annular body of solder 32 or other suitable means of fastening which will afford a support for the tubular member 31 and at the same time seal the upper end of said member. The lower end portion 33 of the tubular member is detached entirely from the tube 23 and extends some distance below the adjacent end portion 25 of the tube. The function of said tubular member 31 is to prevent an accumulation of sedimentary deposit on the wick 27, said tube being subject to some vibratory motion due to the motion of the vehicle, and the relative proportionate diameters of said tube 23 and the concentrically spaced tubular member or sleeve 31 being of further advantage in the agitation of the liquid contents of the jar in the region of the lower portion of the wick 27 which projects from the lower end of the tube 23, in that upper end of the tubular member 31 is sealed by the supporting bushing or body of solder 32, and, obviously, air is pocketed in the upper portion of the tubular member 31 so that the liquid in the jar rises only part way in the tubular member 31 and the reactive effect of the body of air which is compressed in the upper portion of said tubular member 31 is to force the liquid which has risen in the tubular member 31 downwardly, thereby augmenting such agitation of the liquid which has been set up in the region of the lower end portion of the tubular member by the vibration of the tube 23 and sleeve member 31 caused by the movement of the vehicle.

The jar 17 may be supported at any convenient location and by any suitable means. As shown in Fig. 1 of the drawings, the jar is supported by a bracket element, the body portion 34 of which is in the form of a rectangular yoke provided with lugs or extensions 35 which are bolted to the flange or shoulder portion of the engine block. The yoke-like body portion of the bracket 34 is provided with wing members 36 which straddle the side portions of the jar, while at the bottom of the bracket is a spring element 37 on which the bottom of the jar rests with cushioning effect. However, the particular means of support for the jar enters into the present invention only in a general way.

At the upper end of the nipple member 19 is a supplemental nipple member 38 which is detachably secured by a suitable coupling member 39. Secured within said supplemental nipple member 38 is a nozzle member 40 whose discharge end portion 41 is contracted and turned angularly as best shown in Fig. 3 of the drawings. As shown, said nozzle member 40 is secured in the supplemental nipple member 38 by a tight fitting bushing or annular body of solder as at 42, and the extreme lower end portion of said nozzle member is flared, as at 43. Cooperating with the flared end portion 43 of said nozzle member 40 is a gravitating valve member 44 which is normally supported by cross pin 45 or other suitable transverse extension or projection within the first mentioned nipple member 19. Preferably, the valve member 44 has a plain disc-like head and a central stem portion 46 which fits loosely in the bore of the nozzle member 40 so that said valve member 44 is freely slidable and yet a very restricted space is afforded between said stem portion 46 and the surrounding wall of the nozzle member 40. So, too, said valve member 44 and the adjacent flared end portion 43 of the nozzle member 40 are not formed with exact nicety for a perfectly fitted seating engagement, but, rather, they are somewhat roughly formed so that when the valve member 44 is seated against the flared end portion of the nozzle member 40 there is no complete stoppage of the passageway through the nozzle member but only restricted checking of the flow is afforded, as will be presently more fully described.

The nozzle member 40 is extended into a T-member 47 whose shank portion is attached to the supplemental nipple member by coupling member 48. The T-member 47 is attached at one end to a pipe 49 by coupling member 50, said pipe 49 being tapped into the fuel intake manifold 11 of the engine at some convenient point, preferably centrally of the manifold and between the carburetor and the places where the manifold communicates with the combustion chambers of the engine. As shown, the pipe 49 is attached to the stem portion 51 of the manifold, as at 52. Preferably, a pet-cock or other suitable cut-off valve 53 is provided in the pipe 49 between the nozzle member 40 and the place of connection with the fuel intake manifold 11. This pet-cock or cut-off valve is normally open and is only closed when it may be desired to dispense with the use of the apparatus of the present invention and when making adjustments of the carburetor and other adjuncts for the particular fuel mixture desired in the operation of the engine, which, as hereinbefore stated, is done regardless of the application and use of the present invention.

At the end of the T-member 47 opposite to the end at which the pipe 49 is attached, is coupled a pipe 54, as by coupling member 55, said pipe 54 being in turn attached, as by coupling member 56 to the delivery end

portion 57 of an air heating element 58. Preferably, the air heating element comprises an elongated length of pipe which is looped and re-looped successively in a multiplicity of flights 59 and the receiving end portion 60 of said air heating element being provided with a suitable air filter 61 of wire gauze or other suitable means of filtration and air flow checking qualities. The peculiar manner of looping the air heating element is an important feature of the invention in that the device may be looped in an original flatwise arrangement as shown in Fig. 4 of the drawings, whereby the unit may be readily applied to the exhaust pipe 62 from the exhaust manifold 12 at any convenient location, by merely folding the heating unit about said exhaust pipe and clamping it securely thereto by a split clamping sleeve 63, as best shown in Figs. 1 and 2 of the drawings. As shown, it is preferable to have the split clamping sleeve of a width substantially the same as the width of the heating element, and interposed between said clamping sleeve 63 and the heating element is an insulating material such as sheet asbestos or the like 64. The clamping sleeve 63 may be secured by suitable bolts 65 as shown. By this arrangement the heating element which is rolled in intimate contact with the exhaust pipe 62 is maintained in heated condition whereby the air which is drawn in through the filtering end portion 61 of the device is instantly heated and carried in a highly heated condition to the nozzle member 40, so that, due to the vacuum in the pipe 49 created by the suction of the engine in operation, the liquid which is brought up into the nipple member 19 by the capillary attraction of the wick 27 in the tube 23, is taken off in small particles and drawn into the tube 49 and converted into a heated vapor in said tube 49, and the aerated vapor is eventually carried into the combustion chambers of the engine commingled with the fuel mixture from the carburetor in the intake manifold.

By the use of the apparatus of the present invention in the operation of the engine the explosive fuel mixture is humidified to such an extent that not only is the accumulation of carbon deposit within the combustion chambers and engine cylinders greatly minimized and, in most cases, entirely prevented, but there is a greater economical effect in the fuel consumption and greater power and higher efficiency is attained in the operation of the engine.

It is to be understood that the particular construction and arrangement shown in the drawings is for the purpose only of illustrating a practical adaptation of the invention and that the structure may be modified in many respects within the spirit and scope of the appended claims. The invention, therefore, is not limited to the specific forms and arrangements shown in the drawings.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In combination, an internal combustion engine, and including the fuel supply intake and the exhaust pipe, of a liquid container, means for raising the liquid from said container in small particles, an air heating element in contact with the exhaust pipe of the engine, a pipe connection between said air heating element and said fuel supply intake of the engine, and an atomizer tube having a vertical intake portion in restricted communication at its lower end with said liquid raising means and a contracted discharge portion at its upper end extending into said pipe connection in the direction of the fuel intake of the engine.

2. In combination, an internal combustion engine, and including the fuel supply intake and the exhaust pipe, of a liquid container, means for raising the liquid from said container in small particles, an air heating element in contact with the exhaust pipe of the engine, a pipe connection between said air heating element and said fuel supply intake of the engine, and a check valve restricted atomizer tube communicating with said liquid raising means and extending into said pipe connection.

3. In combination, an internal combustion engine, and including the fuel supply intake and the exhaust pipe, of a liquid container, means for raising the liquid from said container in small particles, an air heating element in contact with the exhaust pipe of the engine, a pipe connection between said air heating element and said fuel supply intake of the engine, and a gravitating check valve restricted atomizer tube communicating with said liquid raising means and extending into said pipe connection.

4. In an apparatus of the character described, a liquid supply receptacle, a nipple extension on said receptacle having an atomizer discharge tube, a capillary tube secured communicably at its upper end in said nipple extension and depending therefrom in said liquid supply receptacle, said capillary tube having a wick therein, and a supplemental tubular member sleeved on said capillary tube in spaced concentric relation thereto, said supplemental tubular member being closed at its upper end portion and there supported on said capillary tube, the lower end portion of said supplemental tubular member being open and extended beyond the lower end of said capillary tube.

5. In an apparatus of the character described, a liquid supply receptacle having a nipple extension, a capillary tube secured communicably at its upper end in said nipple extension, the opposite end of said capillary

tube terminating in proximity to the bottom of said receptacle, a wick in said capillary tube extending at its upper end above the upper end of said capillary tube, the opposite end portion of said wick extending below the lower end of said capillary tube and being in contact with the bottom of said receptacle, a nozzle tube secured with its lower end portion communicably in said nipple extension and having a contracted upper discharge end portion, a gravitating valve member interposed between the lower end portion of said nozzle tube and the upper end of said capillary tube whereby to restrict the entrance of said nozzle tube, and a supplemental tubular member sleeved on said capillary tube in spaced concentric relation thereto, said supplemental tubular member being closed at its upper end portion and there supported on said capillary tube, the lower end portion of said supplemental tubular member being open and extended beyond the lower end of said capillary tube.

6. In an apparatus of the character described, in combination with a pipe connection between a source of air supply and the fuel intake of an engine, a liquid supply receptacle having a nipple extension at the top thereof, a vertically disposed capillary tube in said receptacle, said tube being supported axially in said nipple extension and in sealed relation annularly thereof, the upper end portion of said tube communicating with said nipple above the support and seal, and the lower end of said capillary tube terminating in proximity to the bottom of said receptacle, a wick in said capillary tube extending a short distance above the top of the tube and also extending below the bottom of the tube and being in contact with the bottom of said receptacle, a nozzle tube having its discharge end portion located axially in said pipe connection between the source of air supply and fuel intake of the engine and being disposed in the direction of flow towards said fuel intake, the receiving end portion of said nozzle tube being flared and extending into said nipple extension of said liquid supply receptacle and being annularly supported intermediate its ends with sealing effect, and a valve element interposed between the receiving end of said nozzle tube and said adjacent end of said capillary tube whereby to restrictively control the entrance of said tube and the flow through the tube.

7. In an apparatus of the character described, in combination with a pipe connection leading to the fuel intake of an internal combustion engine, a liquid supply receptacle having a pipe connection with said first mentioned pipe connection and including a nozzle tube having its discharge end located in said first mentioned pipe connection and disposed in the direction of flow towards the fuel intake of the engine, the receiving end of the nozzle tube extending into a nipple extension of said liquid supply receptacle and in opposed relation to the upper end of a capillary tube projected into said nipple extension, the opposite end of said capillary tube terminating in proximity to the bottom of said receptacle, and a heating element comprising a length of pipe connected at one end to said first mentioned pipe connection leading to the fuel intake of the engine, the opposite end of said heating element pipe having a restrictively screened entrance, said heating element pipe being looped alternately back and forth between its ends and wrapped around the exhaust pipe of the engine in close relation thereto.

8. In an apparatus of the character described, in combination with a pipe connection leading to the fuel intake of an internal combustion engine, a liquid supply receptacle having a pipe connection with said first mentioned pipe connection and including a nozzle tube having its discharge end located in said first mentioned pipe connection and disposed in the direction of flow towards the fuel intake of the engine, the receiving end of the nozzle tube extending into a nipple extension of said liquid supply receptacle and in opposed relation to the upper end of a capillary tube projected into said nipple extension, the opposite end of said capillary tube terminating in proximity to the bottom of said receptacle, and a heating element comprising a length of pipe connected at one end to said first mentioned pipe connection leading to the fuel intake of the engine, the opposite end of said heating element pipe having a restrictively screened entrance, said heating element pipe being looped alternately back and forth between its ends and wrapped around the exhaust pipe of the engine in close relation thereto, said heating element pipe being clamped to the exhaust pipe by sleeve with an interposed lining of insulating material.

DANIEL L. COVYEOW.