Nov. 30, 1937. H. A. KELTY 2,100,511

CHARGE FORMING DEVICE

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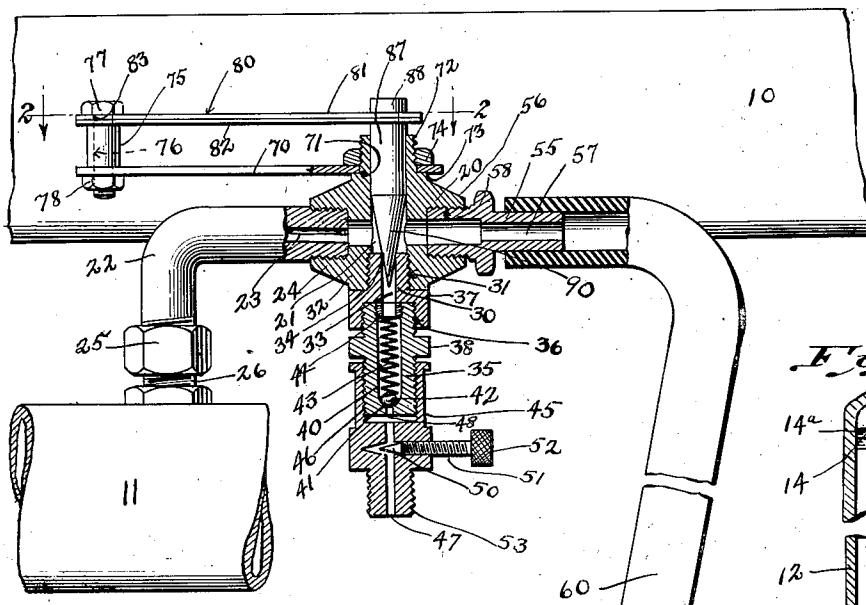


Fig. 1.

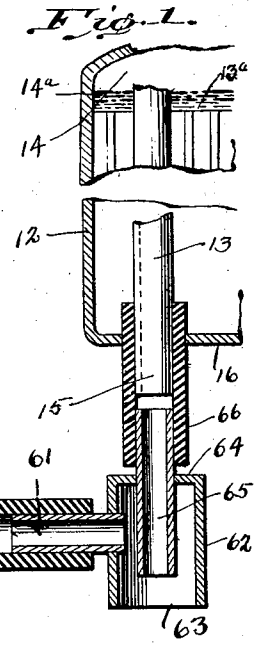


Fig. 3.

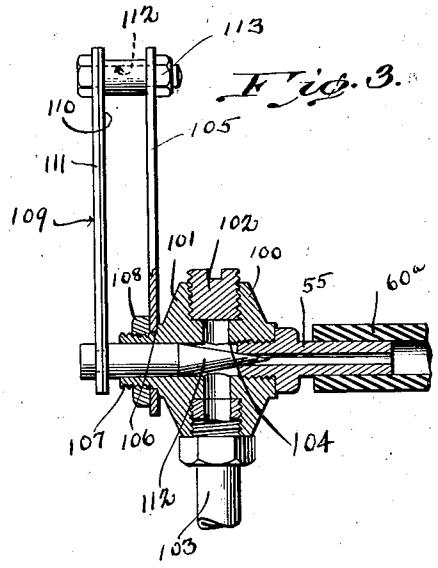
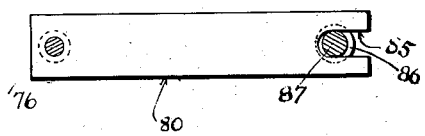


Fig. 2.



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CHARGE FORMING DEVICE

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Application February 27, 1935, Serial No. 8,540

3 Claims. (Cl. 123—25)

This invention relates to a device for supplying additional fluids to the intake manifold of an internal combustion engine.

An object of the invention is the provision of a device which will supply an additional quantity of air in connection with vapors from the radiator connected with the cooling system of an engine, the vapors being derived from water, alcohol, and kerosene or a combination of any two of the vapors.

Another object of the invention is the provision of a device for supplying additional fluids to an intake manifold of an internal combustion engine with a thermostat movably mounted for controlling the flow of some of the fluids to the manifold, the movable mounting of the thermostat providing for an adjustment of the thermostat towards or away from the exhaust manifold of the engine.

A further object of the invention is the provision of a device for supplying additional fluid to an internal combustion engine and including a valve casing in communication with the intake manifold and also in communication with a source of fluid, a valve being mounted for movement in the casing and controlling the flow of fluid through the casing to the manifold, a thermostat being swingably mounted on the casing with means for securing the thermostat in proper position when moved to a predetermined position towards or away from the exhaust manifold.

A still further object of the invention is the provision of a device for controlling the flow of an additional fluid to the intake manifold of an internal combustion engine and including a valve casing in communication with the intake manifold and also in communication with a source of fluid, a thermostatic strip being swingably carried by a support swingably mounted on the valve casing for adjustment towards or away from the exhaust manifold, the thermostatic strip having a swivel connection with a valve movable in the casing and controlling the flow of fluid through the casing.

In the drawing:

Figure 1 is a fragmentary view in elevation and partly in section of an internal combustion engine showing my device connected between the intake manifold and the radiator of an engine, and

Figure 2 is a horizontal section taken along the line 2—2 of Figure 1, and

Figure 3 is a vertical section of a modified form of the device.

Referring more particularly to the drawing, 10 designates an exhaust manifold of an internal combustion engine while 11 designates an intake manifold.

The radiator, generally designated by the numeral 12, is connected with the cooling system of an engine and is provided with the usual overflow pipe 13 extending from a space 14 at the top of the radiator to a point as indicated at 15 slightly below the bottom of the radiator.

A valve casing 20 has an internal chamber 21 which is placed in communication with the intake manifold by means of a pipe 22. This pipe has one end threaded at 23 into a nipple 24 of the casing. The other end of the pipe is connected by a union 25 with a threaded nipple 26 in the manifold 11.

A sleeve 30 is threaded at 31 into a nipple 32 at the lower end of the casing. The sleeve is provided with a central passage 33 and a valve seat 34 at its upper end. A tubular member 35 is threaded at 36 into an enlarged end 37 of the sleeve 30 and is provided with a hexagonal portion 38 whereby the tubular member may be rotated.

The central portion of the tubular member is provided with a passage 40 having a valve seat 41 on which is mounted a check valve 42. A spring 43 has one end in engagement with a check valve 42 while the other end engages a collar 44 threaded into the upper end of the passage 40.

A nipple 45 has an internally threaded pocket 46 to receive the threaded lower end of the tubular member 35. The nipple is provided with a central passage 47 adapted to align with the port 48 in the tubular member 35 and below the valve seat 41.

A valve 50 has a threaded stem 51 disposed at right angles to the longitudinal axis of the nipple and is adapted to control the flow of fluid through the passage 47. The stem is provided with a manipulating member 52.

The reduced end 53 of the nipple is adapted to be connected with a source of fuel such as gasoline. A tubular connection 55 is threaded into a hollow boss 56 on the casing 20 and this tubular member has a passage 57 connected with the chamber 21 of the casing. The member 55 is threaded at 58 into the boss.

A flexible tube 60, such as rubber, connects the tubular member 55 with a pipe 61 which extends into a housing 62. The pipe 61 is in communication with the interior of the housing 62 intermediate the opposite ends of the housing. This

housing is open, as shown at 63, while the opposite end 64 is closed.

A pipe 65 projects into the housing 62 and extends below the inner end of the pipe 61 and terminates short of the bottom 63 of the housing. This pipe extends above the closed end of the housing and is connected by a flexible tube 66 with the lower end 15 of the overflow pipe of the radiator.

A support in the form of a bar, as shown at 70, has an opening 71 adapted to be received by a threaded boss 72 on the upper end of the casing 20. The bar rests upon a shoulder 73 of the casing and is held in an adjusted position by means of a nut 74 threaded onto the boss 72.

The outer end of the bar 70 carries a sleeve 75 which receives a bolt 76 secured in place by means of a head 77 and a nut 78.

A thermostatic strip, generally designated by the numeral 80, is formed of two sections, one section being of brass, as indicated at 81, and the other section, as indicated at 82, is formed of steel. These two strips are secured together in the usual manner. The strip rests upon the sleeve 75 and is provided with a passage 83 through which the bolt 76 passes with the head 77 resting upon the strip 80.

The opposite end of the strip is provided with a slot 85 which is adapted to be received by an annular groove 86 formed in a valve stem 87 which is inserted in a passage 88 in the boss 72.

A conically-shaped valve 90 on the end of the valve stem engages the seat 34 in the sleeve 30.

The operation of the device shown in Figs. 1 and 2 is as follows: When the engine is cold the thermostatic strip 80 is bowed outwardly and upwardly from the valve casing 20, thereby raising the valve 90 from its seat 34. Thus when the engine is started gasoline will be drawn through the passage 47, past the check valve 42 and thence through the casing 20, the tube 22, to the intake manifold 11. As soon as the thermostatic strip has been affected by the heat of the exhaust manifold 10, the strip will move inwardly towards the bar 70 and cause the valve 90 to close the passage 33 and thus cut off the supply of gasoline to the intake manifold.

It will be appreciated, however, that the chamber 21 of the casing 20 is always open to the air and to the vapors from the radiator 12. When the water in the radiator is sufficiently heated, vapors will pass through the overflow tube 13 into the housing 62 and will be drawn through the tube 60, past the valve 90, and into the intake manifold 11.

It will be appreciated that during the winter months when the radiator has been supplied with the necessary alcohol, the alcoholic vapors will be drawn through the tube 60 into the intake manifold and will not only supply additional fuel but will aid in reducing the carbon and will also aid in loosening the carbon which has already formed on the piston head and the combustion chambers of each of the cylinders.

A quantity of kerosene is supplied to the radiator and will float upon the water and as the water in the radiator is heated vapors of kerosene will also be carried into the intake manifold and will also aid in not only removing the carbon deposited on the walls of the combustion chambers but will prevent further depositing of carbon on the walls of the chambers. Thus it will be seen that the incursion of the vapors of the water, the alcohol and the kerosene will prevent "knocks" in the cylinders.

The thermostatic strip 80 may be swung towards or away from the exhaust manifold 10 by loosening the nuts 74 sufficiently to swing the bar 70 on its pivot so that the strip may be nicely adjusted towards or away from the exhaust manifold in order to properly time the closing of the valve 90 as will be desired during the varying conditions of the seasons throughout the year. In other words when the thermostatic strip is moved to a predetermined position adjacent the exhaust manifold 10, the thermostatic strip will come into action more rapidly for closing the gasoline supply as would be necessary during the warm months. During the winter months the thermostatic strip will be adjusted at a greater distance from the exhaust manifold in order to delay the closing of the valve 90 to permit the engine to operate under sufficient power until the engine is sufficiently warmed to require no additional fuel for the purpose.

It will be noted that the thermostatic strip 80 may be readily removed from its position by removing the nuts 78 and then the bolts 76. If it be desired at any time to cause the valve to be closed when the thermostatic strip is heated, the thermostatic strip may be turned over and reversed from its position shown in Fig. 1 so that the brass strip 81 will be adjacent the bar 70 instead of away from it. Thus it will be seen that this particular form of thermostat may be used not only for varying the time of closing of the valve due to its swinging motion but it may be readily converted for operating the valve in the opposite direction.

In the device shown in Fig. 3 the thermally-operated valve is adapted to control the supply of vapors to the intake manifold.

In this case the internally threaded boss 100 of the casing 101 is provided with a plug 102.

A pipe 103 is adapted to connect the casing with the intake manifold 11 and for supporting the casing above the intake manifold. The pipe 103 is in communication with a chamber 104 in the casing.

A bar 105 is rotatably mounted at 106 on a threaded boss 107 of the valve casing. A nut 108 secures the bar 105 in position. A thermostatic strip in this case, indicated by the numeral 109, has the brass strip 110 adjacent the bar 105 while the steel strip 111 is located outwardly. A bolt 112 and a nut 113 secures the strip 109 to the bar 105. The construction of the valve 112 and the thermostat are identical with the construction shown in Fig. 1 except that the thermostatic strip is reversed in position as has been previously explained.

A flexible tube 60a connects the casing 100 with the housing 62 by means of the pipe 55.

By this construction the valve 112 is normally opened when the exhaust manifold supplies sufficient heat to the thermostat to move the valve outwardly from its seat and vapors as has been previously explained from the radiator are supplied to the intake manifold.

In the radiator 12 the space 14 above the usual tubes, is shown at 13a as being supplied with a cooling fluid which may be water or a mixture of water and alcohol. On top of the water and alcohol is a blanket of kerosene or a light grade of lubricating oil shown at 14a.

When the engine is started some suction affects the top of the radiator and some vapor from the radiator together with air is drawn into the manifold 11.

As the engine heats, the mixture of air and

alcohol in the radiator is heated and an intimate mixture of aqueous and alcoholic vapors are formed. The vapors are drawn through the blanket of oil and some of the oil is vaporized and the oil vapors are carried along with the other vapors through the pipe 13 to the housing 62 where the vapors are mixed with the proper proportions of air and the air and the vapors are intimately drawn into the intake manifold 11 of the engine.

By such a method for operating an engine not only is carbon prevented by perfect combustion but the production of carbon monoxide is eliminated.

In some cases it may be preferable to dilute the light lubricating oil with kerosene.

It is to be borne in mind that where the wood oil is used in the specification and claims it is intended to comprehend kerosene, a light lubricating oil, or lubricating oil diluted with kerosene.

I claim:

1. In an internal combustion engine having an intake manifold and an exhaust manifold, a device for supplying an additional fluid to the intake manifold comprising a valve casing, a valve in the casing, means for placing the casing in communication with the intake manifold, a thermostat having one end pivoted on the casing and swingable towards or away from the exhaust manifold, and means for adjustably retaining the thermostat in various positions, said thermostat being connected with the valve for operating the valve to open position when said thermostat is set in operation by the heat of the exhaust manifold.

2. In an internal combustion engine having an intake manifold and an exhaust manifold, a device for supplying an additional fluid to the intake manifold comprising a valve for controlling the flow of the fluid to the manifold, a bar pivotally mounted on a fixed support, and swingable towards or away from the exhaust manifold, means for adjustably retaining the bar in various positions, and a strip responsive to temperature changes secured to the bar and swingable therewith, one end of the strip being free and connected to the valve for causing opening of the valve when the strip is thermostatically operated.

3. In an internal combustion engine having an intake manifold and an exhaust manifold, a device for supplying an additional fluid to the intake manifold comprising a valve casing in communication with the intake manifold, a valve in the casing for controlling the flow of fluid, a strip responsive to temperature changes and having a free end connected with the valve, means pivotally mounted on the casing and supporting the other end of the strip whereby the strip may be swung towards or away from the exhaust manifold, and means for adjustably retaining said supporting means in various positions between the casing and the exhaust manifold for varying the position of the strip with respect to the exhaust manifold.

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