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PRIMER FOR INTERNAL COMBUSTION ENGINES

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Fig. 1.

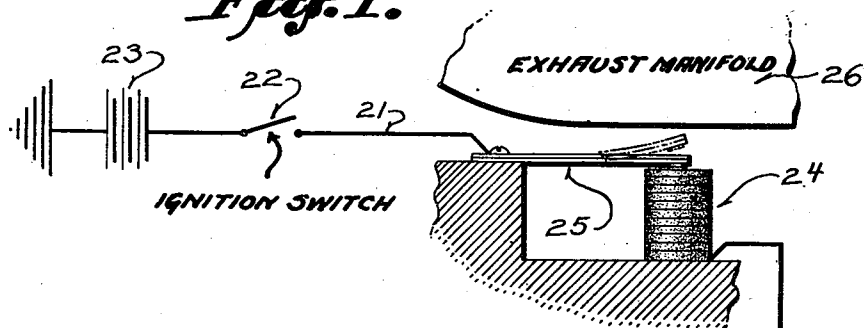
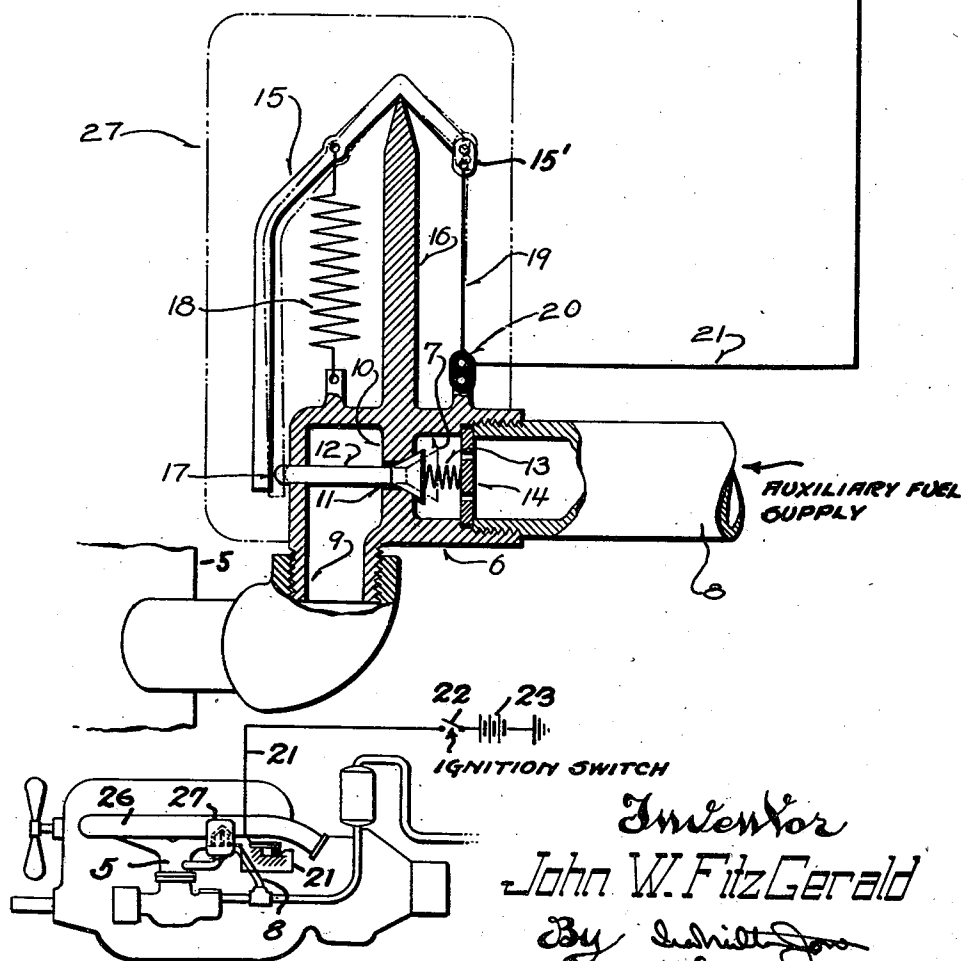


Fig. 2.

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PRIMER FOR INTERNAL COMBUSTION
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9 Claims. (Cl. 123—187.5)

This invention relates to certain new and useful improvements in engine starting systems and refers more particularly to an automatic primer adapted to inject raw fuel directly into the intake manifold of an internal combustion engine during the starting cycle.

It is an object of this invention to provide a primer for the purpose described wherein electro-thermal means controls the functioning of the primer.

Another object of this invention is to provide priming means to facilitate the starting of an engine without necessitating the use of the conventional choke valve and wherein rapid response is assured by controlling the operation of the device from the expansion and contraction of a thermal element effected by the passage of an electric current therethrough.

Another object of this invention is to provide means for controlling the functioning of an engine primer wherein electro-thermal means operates to open and close the primer valve as regulated by a control responsive to the temperature of an engine part.

With the above and other objects in view, which will appear as the description proceeds, my invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

In the accompanying drawing, I have illustrated one complete example of the physical embodiment of my invention constructed according to the best mode I have so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a diagrammatic illustration showing one embodiment of this invention;

Figure 2 is a diagrammatic view illustrating an internal combustion engine equipped with this invention.

Referring now more particularly to the accompanying drawing, the numeral 5 designates part of the intake manifold of an internal combustion engine, or some unit such as the carburetor, connected thereto. Mounted on the manifold or carburetor part is a valve body 6 having an inlet 7 connected with a source of fuel supply (not shown) through a tube 8 and an outlet 9 opening to the interior of the manifold or carburetor. A partition wall 10 divides the inlet and outlet ends of the valve body except

for a valve port 11 therein which is adapted to be closed by a valve 12.

A spring 13, confined between the valve and a perforated wall 14 and held in place by the tube 8, yieldably urges the valve to its closed position, and a bell crank lever 15 fulcrummed to pivot about a support 16, has its long arm bearing against the projecting end 17 of the valve stem and adapted to open the valve. A tensioned spring 18, of greater strength than the spring 13, at all times tends to swing the lever 15 about its fulcrum to push the valve 12 open.

The action of the spring 18 is opposed by an electro-thermal element in the form of a wire 19 stretched between a block 15' carried by the end of the short arm of the lever 15 and a fixed insulated support 20. This wire 19 is of such length that when in its normal condition, it holds the lever 15 in its position depicted in full lines, permitting the valve 12 to be closed.

Electrically connected to the end of the wire attached to the fixed insulated support 20 is a conductor 21 which is electrically connected to the battery 23 of the engine through the ignition switch 22 so that upon closing of the said ignition switch, a complete circuit will be established from the battery through the wire 19.

Interposed in the conductor 21 is a thermostatic rheostat 24 which in the present instance comprises a stack of carbon discs normally maintained in a predetermined state of compression by a pressure arm 25 mounted on a fixed support. The arm 25 is of bimetallic construction and is in close proximity to an engine part, as for instance, part of the exhaust manifold 26, to be thermally influenced thereby. The disposition of the metals in the bimetallic bar 25, is such that, upon an increase in temperature, the bar flexes outwardly to decrease the pressure on the stack of discs and consequently increase the electrical resistance thereof, and upon sufficient flexure entirely opens the circuit leading to the wire 19.

The valve actuating mechanism is of simple construction and may be encased in a protecting housing 27 as indicated in dotted lines.

The operation of the primer is as follows:

Upon closing of the ignition switch 22, current flows through the wire 19, heating it and causing it to expand. The expansion of the wire 19 enables the spring 18 to move the lever 15 and open the valve.

A charge of fuel is thus injected directly into the intake manifold or the carburetor as the case may be, and as the engine has been started and approaches its normal operating temperature, the

thermostatic rheostat 24 gradually increases the resistance in the circuit leading to the wire 19 and thus causes it to cool and contract, thereby permitting the valve 12 to be closed by the spring 13.

The contraction of the wire 19 continues until at the time the engine reaches its normal operating temperature, the circuit to the wire will be opened and thereafter no current will flow in the wire.

From the foregoing description taken in connection with the accompanying drawing, it will be readily apparent to those skilled in the art to which this invention appertains, that a novel primer for facilitating the starting of internal combustion engines has been provided; and that inasmuch as the thermal element is employed as the prime mover and as a substantial force is exerted thereby, there is no necessity for delicate parts.

What I claim as my invention is:

1. A primer for internal combustion engines having an intake manifold and provided with a source of fuel supply, comprising a valve body connected with the source of fuel supply and the intake manifold, a valve in said valve body for controlling the passage of fuel from said source of supply to the manifold, means for opening the valve, and an electro-thermal element working in opposition to said last named means for controlling the operation thereof.

2. A priming device for internal combustion engines having an intake manifold and provided with a source of fuel supply, comprising a valve body connected with the source of supply and the intake manifold, a valve in said body for controlling the passage of fuel therethrough, mechanical means tending at all times to open the valve, and a hot wire arranged to oppose the action of said mechanical means and to control the same by expansion and contraction of said wire.

3. A priming device for internal combustion engines having an intake manifold and provided with a source of fuel supply and an ignition switch, comprising a valve body connected with the source of fuel supply and the intake manifold, a valve within the body for controlling the passage of fuel therethrough, mechanical means at all times tending to move the valve to one position, an electro-thermal element connected with said mechanical means and acting in opposition thereto and tending to move the valve in the other direction, and electric circuit means controlled by the ignition switch for passing current through said electro-thermal means and thereby cause it to expand, the expansion and contraction of said electro-thermal means controlling the functioning of the mechanical means.

4. A priming device for internal combustion engines having an intake manifold and provided with a source of fuel supply, comprising a valve body connected to the source of fuel supply and the intake manifold, a valve in said body for controlling the passage of fuel therethrough, means for opening the valve, a wire connected with said means and adapted when in its normal thermal condition to hold said valve actuating means in a closed position, the expansion of said wire enabling said valve actuating means to open the valve, and means for passing an electric current through said wire to cause it to expand, said wire being of such cross sectional area as to respond quickly to the flow of electric current therethrough and insure quick opening of the valve.

5. A priming device for internal combustion

engines having an intake manifold and an exhaust manifold and provided with a source of fuel supply, comprising a valve body connected with the source of fuel supply and the intake manifold, a valve in the body, means for opening the valve, a wire connected with said means and adapted when in a normal thermal condition to hold said valve actuating means in an inoperative position, the expansion of said wire enabling said valve actuating means to operate, means for passing an electric current through said wire to cause it to expand, and thermal current regulating means influenced by the temperature of the exhaust manifold for regulating the flow of current through said wire.

6. A priming device for internal combustion engines having an intake manifold and an exhaust manifold, and equipped with a source of fuel supply, comprising a valve body connected with the source of fuel supply and the intake manifold, a valve in said body for controlling the passage of fuel therethrough, means for opening the valve, a wire connected with said means and adapted when in its normal thermal condition to hold said valve actuating means in an inoperative position, the expansion of said wire enabling said valve actuating means to operate, means for passing an electric current through said wire to cause it to expand, and means responsive to the heat of the exhaust manifold to interrupt the flow of current through said wire.

7. A priming device for internal combustion engines having an intake manifold and provided with a source of fuel supply, comprising a valve body connected with the source of fuel supply and the intake manifold, a valve in said body for controlling the passage of fuel therethrough, a movable member adapted upon movement in one direction to open the valve, a spring tending to move said member in said direction, a wire connected with said member and holding the same against actuation by its spring and adapted when in its normal thermal condition to hold the same in a position in which the valve is closed, and means for passing an electric current through said wire to cause the same to heat and expand and permit the spring to move said member to open the valve.

8. A priming device for facilitating starting of an internal combustion engine having an intake manifold, an exhaust manifold, an ignition switch and provided with a source of fuel supply, comprising a valve body connected to the source of fuel supply and the intake manifold, a valve biased to closed position in said body for controlling the passage of fuel therethrough, a member movably mounted on the exterior of the valve body and connected with the valve for opening the same upon movement of said member in one direction, a spring yieldably urging said member in said direction of movement, an expansible wire connected to a fixed support and to said member and adapted when in its normal thermal condition to hold the member against actuation by its spring in a position permitting the valve to close, an electric circuit controlled by the ignition switch for passing an electric current through said expansible wire and causing it to heat upon closure of the ignition switch, whereupon said wire expands and allows the valve to be opened by said spring, and means responsive to the heat of the exhaust manifold for opening said electric circuit.

9. A priming device of the character described comprising a valve body, a valve in said body

biased to closed position and having a part projecting exteriorly of the valve body, a lever pivotally mounted on the exterior of the valve body and arranged to bear against said valve part and open the same upon movement of said lever in one direction, a spring tending to move the lever in said direction, and an expansible wire connected with the lever and holding the same against movement by said spring, the expansion of said wire freeing the lever for movement by said spring to open the valve to a degree determined by the expansion of the wire.

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