

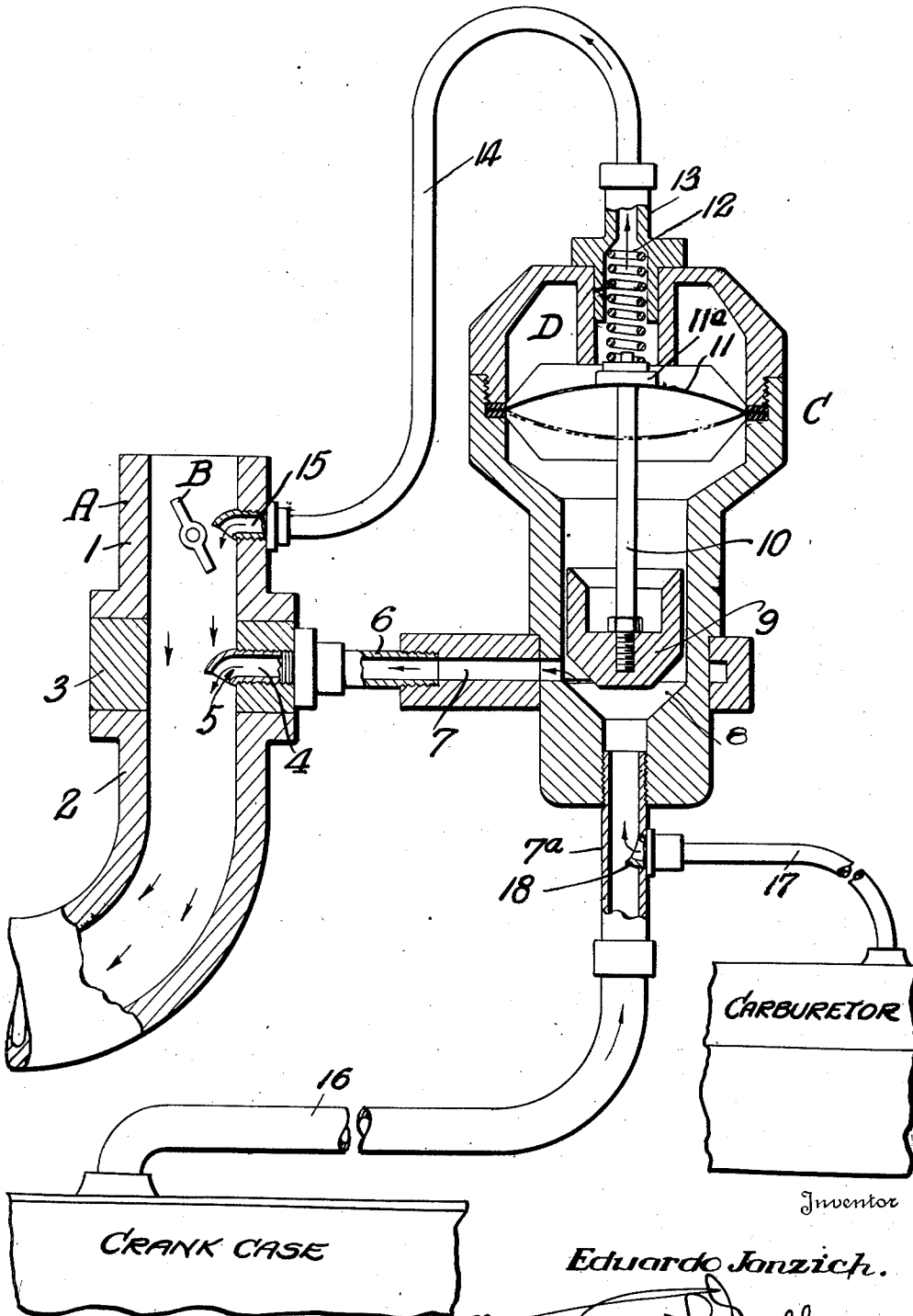
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FUEL ECONOMIZER

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FUEL ECONOMIZER

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3 Claims. (Cl. 123-119)

This invention relates to an improvement in fuel economizers for internal combustion engines and is intended to supplement fuel supplied through the carburetor by introducing gases from the crank case as well as from the top of the carburetor into the air stream of the throttle controlled air duct leading to the intake manifold of the engine.

One of the objects of the invention is to provide a device in the nature of an accessory which is entirely automatically controlled in accordance with speed or load demands of the engine while at the same time not interfering with the usual functioning of the carburetor. In that connection, a distinctive feature of the invention resides in the provision of a primary aspirating nozzle disposed in the air intake conduit and having its open end located down stream of the throttle valve, while said throttle valve is coordinated with a control nozzle in such a way that the movement of the said valve, to admit more or less air into the air inlet duct, opens and closes the control nozzle thereby to cause the vacuum created in the air duct to operate a vacuum responsive diaphragm actuated valve. This diaphragm actuated valve simultaneously and synchronously controls the admission of gases into the air stream from the carburetor as well as the gases from the crank case resulting from leaky piston rings and partial distillation of crank case lubricants.

With the above and other objects in view, which will more readily appear as the nature of the invention is better understood, the same consist in the novel construction, combination and arrangement of parts, hereinafter more fully described, illustrated and claimed.

In the drawing:

The figure is a vertical sectional view of the apparatus constituting the present invention and illustrating its combination with the air intake duct of the engine.

Referring to the drawing, it will be observed that the air intake duct, designated generally as A and leading to the intake manifold of the engine, includes the flanged sections 1 and 2 having arranged therebetween a ring 3 which carries therewith a primary aspirating nozzle 4. This nozzle has its mouth or discharge end 5 opening in the direction of air flow in the conduit and is curved or rounded at its back or rear portion so that the velocity of incoming air induces a vacuum in the nozzle which causes it to aspirate gases as will presently appear.

As will be apparent from the drawing, the

said aspirating nozzle 4 is located down stream of the throttle valve B which is mounted in the entrance section 1 of the air intake duct A. Said nozzle 4 is provided with an extension 6 which connects with the passage 7 in the casing of a vacuum controlled valve device designated generally as C. Also, the said passage 7 has its inner end opening within the seat 8 of the casing of said valve device C, and is opened and closed by a gas control valve 9 which is normally biased to its seat by a spring whose force is automatically counteracted by a diaphragm.

That is to say, the valve 9 is provided with a stem 10 whose upper end is connected with a diaphragm 11 by means of a suitable nut and washer arrangement 11a. The outer edges of the flexible diaphragm 11 are clamped between the upper and lower threaded sections of the casing of the valve device C thereby forming a gas tight vacuum chamber D at the upper side of the diaphragm. The upper end of the stem 10, that is, the portion having the nut and washer assembly 11a, is engaged by a spring 12 which normally presses the flexible diaphragm 11 to the dotted line position shown and also maintains the valve 9 against the seat 8 to block or close entrance to the passage 7. The spring 12 is housed or guided within a suitable nipple 13 fitted to the upper section of the valve casing as will be readily apparent from the drawing. It will also be seen that the nipple 13 is in turn connected by a tube 14 with a control nozzle 15 located in the section 1 of the duct A and adjacent the zone of operation of the throttle valve B.

The outlet end of the nozzle 15 is, like the nozzle 4, also curved so that the mouth of the nozzle is disposed in the direction of air flow in the duct A, and said mouth is controlled directly by one wing of the throttle valve B. When the throttle is closed the mouth of the nozzle 15 is likewise closed. On the other hand, when the throttle is moved toward opening position, the nozzle mouth is uncovered and the vacuum induced in the duct A, by the operation of the engine, is transmitted through the tube 14 to the vacuum chamber D of the valve device C. When this occurs the diaphragm is moved to the full line position shown in the drawing against the force of the spring 12 and the valve 9 is unseated.

When the valve 9 is moved from its seat 8 by vacuum conditions in the air intake duct A, the passage 7 and consequently the nozzle 4 are placed in communication with the T-fitting 1a at the lower end of the valve casing. This fitting

communicates with a pipe 16 connected with the cover of the crank case thereby to evacuate gases therefrom and is also connected with a tube 17 leading to the top of the carburetor. At the point where the tube 17 connects with the T-fitting 7a, there is provided a secondary aspirating nozzle 18. This nozzle has its mouth or orifice disposed in the direction of gas flow induced in the tubes 16 and 17 by the vacuum manifested in the pipe 6 and passage 7, as a result of the nozzle 4 having its open end disposed in the air stream of the duct A.

The operation of the device is as follows:

When the engine is initially turned over by the starter, the throttle B is in obstructing relation to the passage of air in the duct A and the control nozzle 15 is closed by one wing of the throttle. The vacuum thus initially created in the air duct builds up, and, when the throttle B is moved to uncover the open end of the nozzle 15, as when the motor starts and attains running speed, the velocity of air rushing through the duct A and passing over the nozzle 15 will induce a vacuum in tube 14 and also in the chamber D above the diaphragm 11. Thus the diaphragm will move upwardly against the force of the spring 12 and lift the valve 9 from its seat. When this occurs, it will be apparent that the mouth 5 of the aspirating nozzle 4, being also subject to vacuum conditions in the duct A, will draw gases from the top of the carburetor, as well as draw otherwise useful gases from the crank case into the air stream of the duct A through the parts 6, 7, 7a and 16 and 17.

It will thus be apparent that when the motor is in operation, the automatic valve device C will function in accordance with speed or load conditions to admit supplemental fuel from the carburetor, and will also scavenge the crank case so as to evacuate the gases therefrom into the air stream, therefore causing the motor to utilize all available gaseous fuel with consequent economy in operation.

I claim:

1. A fuel economizer for internal combustion engines, including, in combination, an air duct leading to the intake manifold of the engine, a primary aspirating nozzle in the air duct, and means for controlling communication of said nozzle with tube means leading to the crank case and the carburetor, said means comprising a gas control valve biased to closed position by spring pressure and opened by vacuum in a chamber at one side of a diaphragm, a control nozzle in the air duct up-stream of the aspirat-

ing nozzle and in piped relation to the said chamber, and a throttle valve in the air duct for controlling the passage of air therein, said throttle valve being arranged so as to open and close the mouth of the control nozzle thereby to permit vacuum in the air duct to operate said diaphragm and cause the gas control valve to open and also permit vacuum in the air duct to aspirate gases through said primary aspirating nozzle into the air stream of said duct.

2. A fuel economizer for internal combustion engines, including, in combination, a sectional air duct leading to the intake manifold of the engine, a ring arranged between the sections of said duct, an aspirating nozzle carried by said ring and having its discharge end projecting into the passage of the duct with its mouth facing down stream, a vacuum responsive diaphragm controlled valve device including a valve and a valve seat, means forming a passageway communicating with said aspirating nozzle and the valve seat, a T-fitting also communicating with said valve seat and having a tube connected therewith leading to the crank case of the motor and also having therein a secondary aspirating nozzle connected by a tube with the engine carburetor, a control nozzle in the air duct up-stream of the primary aspirating nozzle and communicating with the vacuum responsive diaphragm controlled valve device, and a throttle valve in the air duct and arranged with respect to the control nozzle to open and close the same.

3. A fuel economizer for internal combustion engines, including, in combination, an air duct leading to the intake manifold of the engine, tubes respectively connecting with the top of the crank case and the top of the carburetor and leading to a common valve seat, a spring seated and diaphragm unseated gas valve for said seat, a primary aspirating nozzle opening into the air duct and having communication with said tubes when the valve is unseated, and means for controlling said gas valve, said means comprising a control nozzle in the air duct up-stream of the primary aspirating nozzle and in piped communication with a vacuum chamber at one side of said diaphragm, and a throttle valve in the air duct for controlling the passage of air therethrough and also covering and uncovering the control nozzle thereby to synchronize the opening and closing of the gas valve and the functioning of the primary aspirating nozzle with the speed and load demands of the engine.

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