

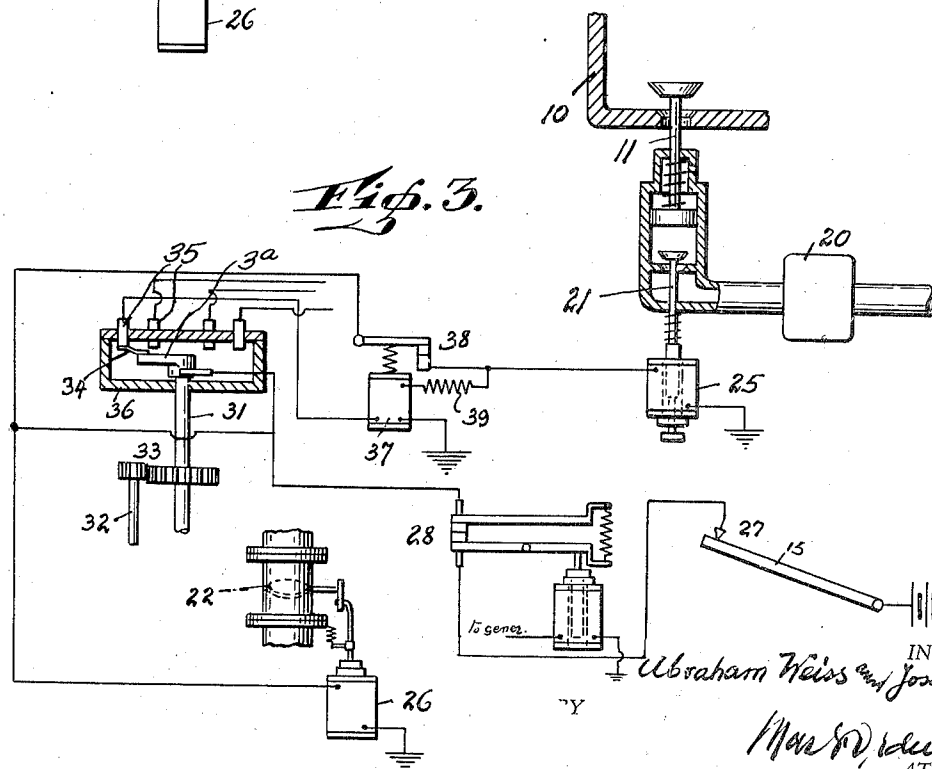
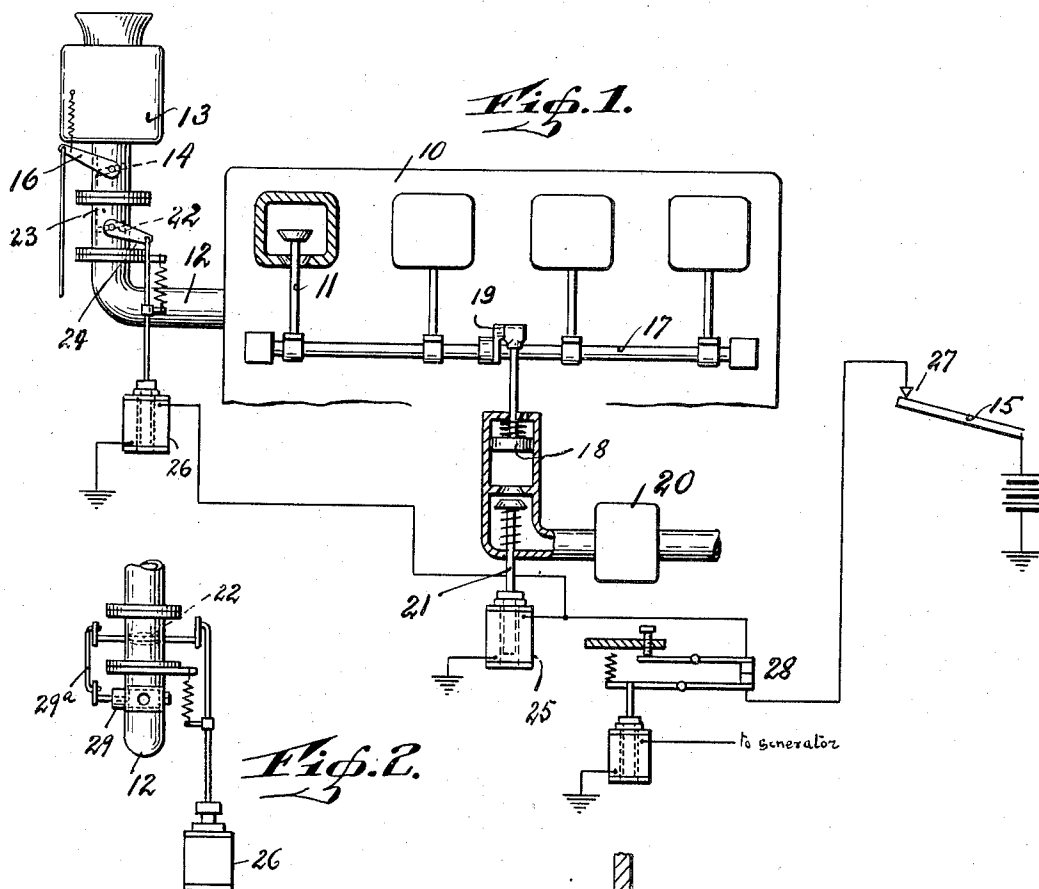
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METHOD AND MEANS FOR SAVING FUEL IN INTERNAL-COMBUSTION ENGINES

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METHOD AND MEANS FOR SAVING FUEL IN
INTERNAL-COMBUSTION ENGINESAbraham Weiss and Joseph Weiss,
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4 Claims. (Cl. 123-102)

This application is somewhat similar to our earlier application Serial #472,534, filed January 15, 1943, and pertaining to a method and means for saving fuel in internal combustion engines.

Our earlier method consists in that when the engine or vehicle attains a certain speed while running on level ground or downhill, a valve in the engine cylinder (either the ordinary exhaust valve or an auxiliary exhaust valve) is opened, so that upon the release of the feed control, such as of the accelerator pedal, the engine is rendered ineffective and the braking effect on the piston eliminated, permitting the vehicle or engine to run by its own momentum for a considerable distance until the speed reaches a certain low limit. In this manner a considerable quantity of fuel may be saved.

However, even the limited quantity of fuel feed, while the engine is idling, is a waste which particularly with heavy trucks and buses may become considerable and can be avoided. To this end our new method consists in that simultaneously with the opening of an exhaust valve, or in lieu thereof, the throttle valve in the carburetor or injector control valve is automatically closed so that the fuel feed will be entirely cut out when the engine is rendered ineffective and continues to run by its own momentum.

Other objects will be clear from the detailed description of this invention.

In the accompanying drawing which forms part of this specification, and in which similar reference characters denote corresponding parts:

Figure 1 is a diagrammatic view of one embodiment of our invention;

Figure 2 is a detail thereof; and

Figure 3 is a similar view to that of Figure 1 of another embodiment of our invention.

Let 10 denote an internal combustion engine of any well-known type with a single or multiple cylinder, 11 either the usual exhaust valves or auxiliary exhaust valves provided in the cylinders, the manifold 12 and the carburetor 13 having the usual throttle 14 operated through the accelerator pedal 15 in conventional manner by means of a crank arm 16 or the like.

17 denotes an oscillatory cam shaft adapted to positively actuate the valves 11 and which may be operated through a pressure actuated plunger 18 or the like, operatively connected to said cam shaft by crank 19. The pressure for actuating said plunger 18 may be supplied from a power unit 20 of any suitable construction and may be controlled through a valve 21 in the manner hereinafter described.

In addition to the usual throttle 14 we provide an auxiliary throttle 22 in a pipe section 23 which may be inserted between the carburetor 13 and the manifold 12 and suitably fixed thereto. This throttle 22 is adapted to be actuated independently of said throttle 14 and simultaneously with the operation of the exhaust valves 11.

In the present embodiment, the valves 21, as well as the throttle 22, are operated electrically through solenoids 25 and 26, respectively, included in an electrical circuit controlled by a manual or accelerator actuated switch 27 and a generator or governor actuated switch 28.

The operation is as follows:

When the engine or vehicle attains a certain speed, the switch 28 automatically closes. If now the fuel control or accelerator 15 is released, the switch 27 closes the electric circuit which will energize the solenoids 25 and 26. The former will cause the opening of the valve 21, so that the power from power unit 20 may operate the plunger 18 to oscillate the cam shaft 17 so as to open the exhaust valves 11. As a result thereof, the engine will be rendered ineffective and continue to run by its own momentum until the speed had slowed down sufficiently to cause the switch 28 to open.

Simultaneously with the opening of the valves 11, the energized solenoid 26 will cause the auxiliary throttle 22 to close, shutting off entirely the supply of fuel while the engine is idling.

When the engine is to be rendered ineffective by the mere closure of the throttle 22, without opening the exhaust valves 11, it is advantageous to provide an air cock 29, or the like, in the manifold 12, and to cause it to operate simultaneously with the throttle 22, so that when the throttle 22 is closed, air will be allowed to be sucked into the cylinders during the suction periods. The compression of the air during the idle compression periods will have a braking effect on the pistons, while the vehicle is running idle and particularly downhill. It will also prevent oil from being sucked into the cylinders.

The cock 29 may be operatively connected to the throttle 22 as at 29^a to be actuated from the same solenoid 26, as shown in Figure 2.

In the modification shown in Figure 3, the valve 11 of each cylinder is operated by a separate pressure actuated plunger 18 controlled by its own valve 21 which in its turn is actuated by the solenoid 25. The latter is adapted to be energized by the closing of the electric circuit, which is controlled in addition to the manual or accelerator operated switch 27 and generator or

governor operated switch 28, by timing means which in the present example comprises an electric make and break mechanism or distributor 36. This mechanism may comprise a rotor 30a carried by a spindle 31 adapted to be driven from the main shaft 32 of the engine through gears 33. The rotor 30a is formed with a contact piece 34 which is adapted to successively close contacts with insulated contact points 35 provided in the housing of said mechanism and of which there is one designed for each cylinder. These contact points are each electrically connected to a corresponding solenoid 37, each of which actuates a switch 38. When this is closed, the current is adapted to flow into the corresponding solenoid 25. The speed controlled switch 28 is electrically connected to the spindle 31 and its rotor and also to each switch arm of switch 38. A short circuit, or a resistance wire 39, is provided between solenoid 37 and the wire leading from switch 38 to solenoid 25, the function of said wire 39 being, as soon as switch 38 is closed, to continue to feed the solenoid 37 and thereby retain the switch 38 closed during the momentary breaks of the circuit between the switch arm 34 and the contact point 35, so that the solenoid 25 may continue to be energized and thereby cause valve 11 to remain open so long as the speed controlled switch 28 and the accelerator controlled switch 27 are closed.

The mode of operation is as follows:

When the switch 28 is automatically closed through the operation of the generator or governor (not shown) and the accelerator switch 27 is closed, the electric circuit will feed the solenoid 26, causing it to close the throttle 22. At the same time it will close the circuit of the solenoid 37 as soon as contact between any of the points 35 and the rotor point 34 is made. As a result thereof, the switch 38 will be closed and the same circuit will energize the solenoid 25 which actuates the power controlling valve 21 with the result of opening the exhaust valve 11, as heretofore described.

When contact between points 34 and 35 is broken, the solenoid 37 will remain energized through the short circuit wire 39.

It is understood that instead of an auxiliary throttle any feed control at present in use may be actuated in a similar manner to cut off the fuel feed when the speed of the engine has reached a certain high degree.

It is also understood that the operation of the valves as well as of the throttle and other fuel control may be effected through suitable mechanical means. We therefore do not wish to restrict ourselves to any of the details described and shown.

What we claim is:

1. A method of controlling the operation of an internal combustion engine consisting in that when the engine acquires a certain speed an exhaust valve of the cylinder is automatically opened and the fuel feed simultaneously cut off rendering the engine ineffective and when the speed is reduced to a certain low limit, said exhaust valve is automatically closed and the fuel feed simultaneously restored.

2. In an internal combustion engine having a fuel control means, a cylinder valve, speed controlled means, timing means including make and break mechanism, an electric circuit controlled by said fuel control means, said speed controlled means and timing means, means actuated by said electric circuit for operating said valve under the control of said timing means so as to automatically open it when the engine acquires a certain speed, and means for retaining said valve open as long as said circuit is closed.

3. In an internal combustion engine having fuel control means, a cylinder valve, speed control means, an electric circuit controlled by said fuel control means and said speed control means, means actuated by said electric circuit for operating said valve and means for timing the operation of said valve so that when the engine acquires a certain speed said valve will be caused to automatically open under the control of said timing means.

4. In an internal combustion engine having fuel feed cut-off means, a cylinder valve, fuel feed control means, speed control means, an electric circuit controlled by said fuel feed control means and said speed control means, means simultaneously actuated by said electric circuit for operating said valve and said fuel feed cut-off means and means for timing the operation of said valve, so that when the engine acquires a certain speed said valve will be caused to automatically open under the control of said timing means.

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