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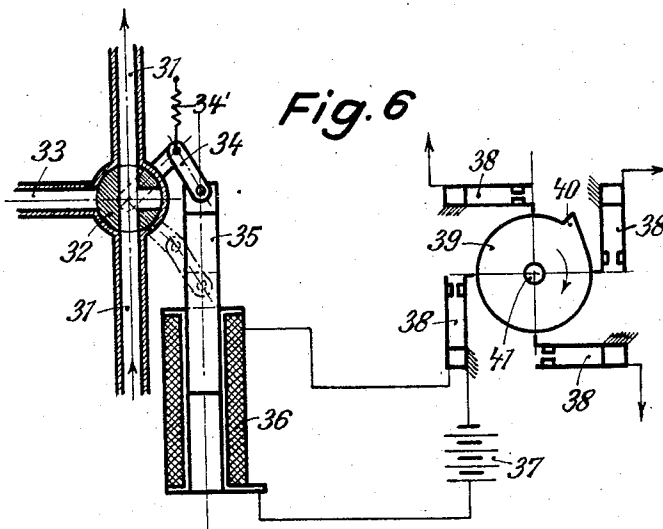
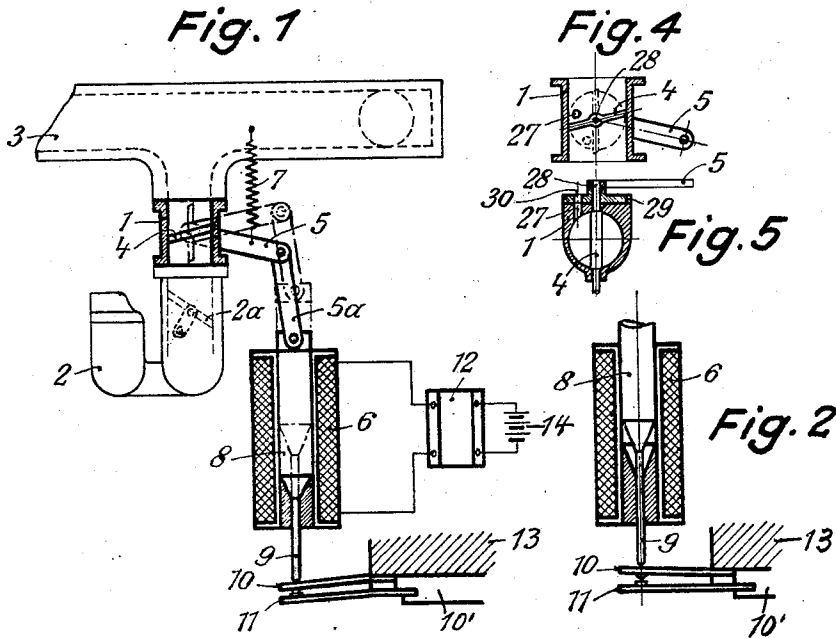
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2,259,656

INTERNAL COMBUSTION ENGINE FITMENT

Filed Aug. 12, 1938

2 Sheets-Sheet 1



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Fig. 3

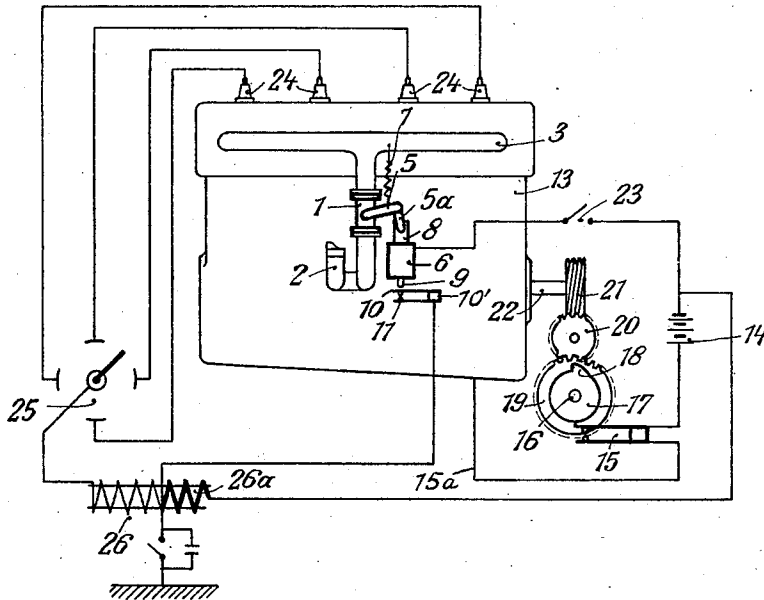
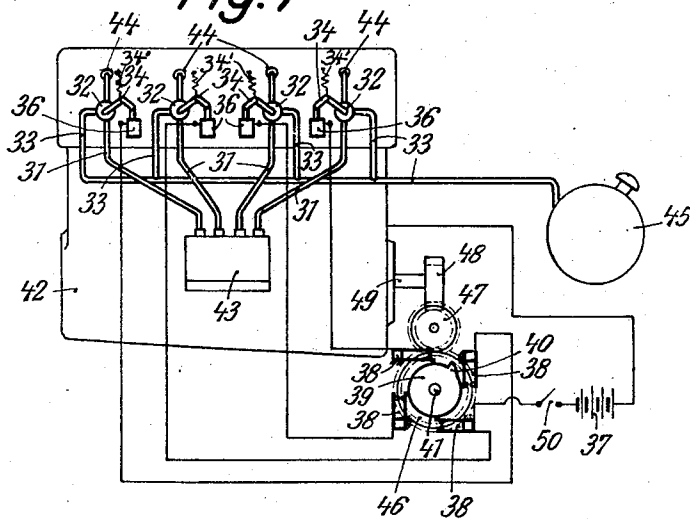


Fig. 7



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UNITED STATES PATENT OFFICE

2,259,656

INTERNAL COMBUSTION ENGINE FITMENT

Willy Neumann, Rollberg, Uber Bernau, near
Berlin, GermanyApplication August 12, 1938, Serial No. 224,618
In Germany August 12, 1937

13 Claims. (Cl. 123-102)

This invention relates to an improved device for attachment to internal combustion engines.

An object of the present invention is to avoid excessive wear upon the parts of an internal combustion engine of the high compression type.

It is known that internal combustion engines when subject to constant load at high speeds of revolution, for instance when used in automobiles travelling along modern automobile roads, wear rapidly, in that due to the constant high loading of the engine, bearings and pistons wear, and valves burn. The wearing of the pistons and bearings, is due to the breaking down of the oil film or to general lack of lubrication; and the burning of valves is due to lack of adequate cooling by reason of a bad metallic contact of the valve on its seat due to carbon deposit or dirt on the valve seat. Automobile engines are today not able to withstand the loading put upon them by travelling for long periods of time on full throttle.

According to the present invention, at times when the engine is running at full throttle, the fuel mixture and if desired also the ignition is periodically cut off for a short time, for instance for one second. The speed of the vehicle during this period of relief for the engine will be reduced one or two miles an hour when the vehicle is travelling for instance at sixty miles an hour, which need hardly be considered, and would hardly be noticed by the driver.

If the fuel mixture at each period of relief is only cut off from one of the cylinders, then no perceptible reduction of the motive output would occur. The engine however, which will be turning at for instance, 3,000 revolutions per minute when driving the vehicle at 60 miles an hour, will run free during this relief period for fifty revolutions, so that during this fifty revolutions the contacting surfaces of cylinder and pistons, the main bearings and the ends of the crank shaft will be able to collect again a further oil film. Also the valves can cool in this relief period and the valve seats clear themselves, so that the danger of their burning is reduced to a minimum.

The cutting off of the fuel mixture, as also if desired, the cutting off of the ignition during the relief periods, are preferably effected by auxiliary devices which are independent of the carburettor throttle.

A hand operated switch arrangement is preferably provided which is put into action at full load condition of the engine, and operates for instance automatically every two minutes the igni-

tion coil for the motor, so that the cutting in and out is independent of the driver.

One form of construction of the device operating independently of the carburettor is shown by way of example in the drawings, in which—

Figure 1 is a fragmentary view of a carburetor intake manifold of an internal combustion engine showing means operatively connected thereto for shutting off the fuel supply and opening the circuit of the ignition system of the engine.

Figure 2 is a view partly in cross section of an electromagnet constituting the actuating mechanism for said means.

Figure 3 is a view of a four cylinder internal combustion engine and diagrammatically showing the circuit for controlling the circuit of the ignition system of the engine.

Figure 4 is a longitudinal sectional view of a connection between the carburetor and intake manifold showing an auxiliary valve for momentarily shutting off the fuel supply to the engine and an atmospheric inlet between said valve and intake manifold.

Figure 5 is a cross sectional view of the connection shown in Figure 4.

Figure 6 is a diagrammatic view of means for periodically shutting off the fuel supply to an engine arranged with a priming pump.

Figure 7 is a view of a four cylinder Diesel-engine showing the embodiment of the invention applied thereto.

In carrying out the embodiment of the invention shown in the accompanying drawings, a tubular member 1 is interposed between a carburetor 2 arranged with the usual throttle valve 2a and the intake manifold 3 of an engine 13 and said member 1 being provided with a throttle valve 4. Said valve 4 is adapted to be actuated to position to close the passage through the member 1 by an electromagnet coil 6 through a pair of pivotally connected links 5, 5a having the free end of link 5 connected to the valve 4 and the free end of link 5a pivoted to one end of a plunger core 8 slidably mounted in the coil 6. When the coil 6 is de-energized, the valve 4 is urged to open position by a spring 7 connected at the opposite ends to the engine manifold 3 and an intermediate portion of the link 5, as shown in the dot and dash line position in Figure 1.

The circuit of the electric ignition system of the engine is adapted to be opened simultaneously with the shutting off of the fuel mixture from the carburetor 2 to the intake manifold 3 by the auxiliary valve 4. To accomplish this purpose, the plunger core 8 is provided with a pin 9 ex-

tending axially from the end of said plunger core opposite the end connected to the link 5a, as shown in Figure 1. When the plunger 8 is drawn into the coil 6 by the energization of said coil, the pin 9 moves toward the free end of a spring contact 10 fixed at the opposite end to the engine block 13 in any suitable manner, as shown at 10' in Figures 1 and 3, and the movement of the pin 9 toward the contact 10 actuating said contact into engagement with a contact 11 mounted in spaced relation with the contact 10. The contacts 10 and 11 are connected in the electric circuit of a coil forming a part of the ignition system of the engine, so that the engagement of the contact 10 with the contact 11 will short circuit said ignition coil (see Figure 3), and the circuit of the ignition system is opened when the valve 4 is actuated to closed position by the energization of coil 6.

Figure 2 shows the normal position of the plunger core 8 when the coil 6 is de-energized and the pin 9 is positioned to permit the contact 10 to assume a position out of engagement with the contact 11. In this normal position of the plunger core 8, the valve 4 is in open position and the electric circuit of the ignition system is closed, whereby the engine is operating in its usual manner.

The electromagnet coil 6 is energized from a source of electricity which may be the source of electricity for the ignition system of the engine, such as a storage battery, as indicated at 14 in Figures 1 and 3, and the circuit of said coil 6 is controlled by an intermittently operative circuit breaker, as diagrammatically shown at 12 in Figure 1. The circuit breaker is adjusted to intermittently close the circuit of the coil 6 at predetermined time intervals of short duration, whereby the valve 4 is actuated to close the communication between the carburetor 2 and the intake manifold 3 by the coil 6 through the core 8 and links 5, 5a, and open the electric circuit of the ignition system of the engine through the short circuiting action of the contacts 10 and 11.

The control device comprising the coil 6, core 8, links 5, 5a, pin 9 and contacts 10, 11 shown in Figures 1 and 2, are shown connected in the electric circuit of the ignition system of an internal combustion engine 13 in Figure 3. In said Figure 3, the intermittently operative circuit breaker 12 is shown as comprising a pair of contacts 15 consisting of a fixed contact electrically grounded in the engine block 13 by conductor 15a. The other contact is carried by a resilient arm electrically connected to the source of electricity 14 and normally positioning said contact out of engagement with the fixed contact, and adapted to be intermittently actuated to engage the fixed contact by a cam 18 arranged on the periphery of a disk 17 mounted on a rotatable shaft 16. The shaft 16 is rotated from the engine shaft 22 through a gear 19 fixed on the shaft 16 and meshing with a gear 20 meshing with a worm gear 21 fixed on the engine shaft 22. When the cam 18 engages the resilient contact arm of the contacts 15, the electromagnet coil 6 is energized and the plunger core 8 is drawn into said coil and the valve 4 is actuated to close the communication between carburetor 2 and intake manifold 3 and interrupt the feed of fuel to the engine 13. In the present illustration of the invention, the interruption in the fuel feed will occur upon each revolution of the disk 17. This intermittent closing of the valve 4 may be varied by changing

the ratio of the gearing 19, 20 and 21. The shaft 16 may be rotated by an electric motor instead of being rotated from the engine shaft 22. The controlling means 6, 8 for the valve 4 may be placed in automatic operation by the operator of the vehicle through a switch located on the instrument board of the vehicle and diagrammatically shown at 23 in Figure 3 as being interposed in the connection between one terminal of the coil 6 and the source of electricity. The circuit of the coil 6 is completed by grounding the other terminal in the engine block 13, so that it is connected to the conductor 15a of the contact 15.

In Figure 3, the ignition system of the engine 13 is shown as comprising spark plugs 24, there being one spark plug for each cylinder of the engine, a distributor 25 having four fixed contacts electrically connected with the spark plugs and a contact maker electrically connected with a coil 26 having a primary winding 26a electrically connected in the circuit of coil 6 and the contact 11, so that closing of the circuit of the coil 6 by the contacts 15 will actuate the plunger core 8 into the coil 6 and the contact 10 by pin 9 into engagement with contact 11 which will short circuit the primary winding 26a and intermittently open the circuit of the ignition system simultaneously with the shutting off of the fuel supply by the valve 4. The feed of fuel to the engine may be interrupted without opening the ignition circuit of the engine by omitting the pin 9 and contacts 10, 11 and the circuit thereof with the primary winding 26a.

The valve 4 may not completely close the passage in the connecting member 1 when it is actuated to closed position by the energization of the coil 6 with the result that fuel will be fed to the intake manifold 3 when it is intended to completely shut off the fuel feed to the engine. This incomplete closing of the valve 4 for any reason may be overcome by introducing air into the manifold which will produce a fuel mixture which is too lean or weak to ignite. This is accomplished by providing a perforation 27 in the connecting member 1 between the valve 4 and the intake manifold 3 to constitute an inlet for atmospheric air, and a disk 29 mounted on a shaft 28 rotatably mounted in the member 1, and by which shaft the valve 4 is pivotally mounted in the member 1. The disk 29 is arranged with a perforation 30 adapted to be positioned in registry with the perforation 27 in the closed position of the valve 4, as shown in Figures 4 and 5, so that the air is drawn into the manifold 3 only when the valve 4 is in closed position. The disk 29 is actuated simultaneously with the opening of the valve 4 under the influence of the spring 7, to position the perforation 30 out of registry with the perforation 27, and prevent air from entering the manifold 3.

In Figures 6 and 7, the invention is shown to be adapted to control the feed of fuel to an engine arranged with a priming pump and particularly to a Diesel engine, and comprises a two-way valve 32 rotatably mounted in an enlargement in a pipe 31 for delivering fuel from a primary pump 43 to a jet spray nozzle 44 arranged in the compression chamber of an engine 42. In Figure 7, there are shown four pipes 31 and four jet spray nozzles 44, one pipe and nozzle being for each cylinder of a four cylinder engine. The valve 32 is adapted to control the delivery of fuel to the nozzles 44 and return of the fuel to a fuel supply tank 45 through pipes 33 connected at one end to the enlargements in pipes 31 and at

the opposite ends in communication with the tank 45, as shown in Figure 7. The valve 32 is actuated to predetermined positions by electromagnetic means similar to the electromagnet 6, 8 shown in Figures 1 to 3, inclusive, and comprising a coil 36 mounted on the exterior of the engine 42 adjacent each valve 32 and a plunger core 35 slidable in the core and operatively connected to the valve 32 through a link connection 34. The cores 35 are normally positioned out of the coils 36 by a spring 34', and the links 34 are connected to the valves 32 and cores 35 to actuate the valves to open the communication between the priming pump 43 and nozzles 44 when the cores 35 are out of the coils 36, as shown in Figure 6, and close said communication when the cores are drawn into the coils. The coils 36 are in electric circuit with a source of electricity, such as a battery 37, and said circuit is normally open and adapted to be momentarily closed by a circuit maker comprising an annular series of equidistantly spaced and normally open contact makers 38 equal in number to the number of cylinders of the engine 42, there being in the present instance four of such contact makers, and each contact maker is interposed in the electrical connection between a coil 36 and the battery 37. The contact makers are successively closed by a cam 40 arranged on the periphery of a disk 39 mounted on a rotatable shaft 41 centrally of the series of contact makers and rotated from the engine shaft 49 through a suitable train of gears 46, 47 and 48, as shown in Figure 7. In the operation of the engine 42, the contact makers 38 are successively closed and the corresponding coils 36 are successively energized to successively actuate the valves 32 to close the portion of the pipes 31 leading from the valves to the nozzles 44 from the portion of the pipes 31 leading from the valves to the priming pump 43, whereby the feed of fuel to each cylinder of the engine 42 is momentarily interrupted at predetermined spaced intervals of time. This interruption in the feed of fuel to the engine is automatic and may be placed into operation or discontinued at the option of the operator through the actuation of a switch mounted at a convenient place, such as the instrument board of a motor vehicle, and interposed in the circuit of the coils 36 as shown in a diagrammatic manner at 50 in Figure 7. When the coils 36 are energized the valves 32 will be actuated to open communication between priming pump 43 and supply tank 45.

The embodiment of the invention shown in Figures 6 and 7 may be applied to an internal combustion engine by inserting a valve in the fuel feed pipe to the carburetor in place of the valves 32 whereby an electromagnet 36, 35 would control said valve and feed of fuel to the carburetor.

It should be understood that the invention is used with engines that are used for motive power for other purposes than automobiles, such as aeroplanes.

The period of relief for the engine, and the time between consecutive relief periods can of course, be selected as desired or according to requirement.

I claim:

1. A method of controlling internal combustion engines independently of the speed of the engine, which consists in interrupting the operation of the engine for short intervals of time at periodic intervals.

2. A method of controlling internal combustion engines independently of the speed of the engine, which consists in interrupting the supply of an ignitable fuel mixture to the engine for short intervals of time at periodic intervals.

3. A method of controlling multi-cylinder internal combustion engines independently of the speed of the engine, which consists in interrupting the operation of the cylinders successively for short intervals of time at periodic intervals.

4. A method of controlling internal combustion engines independently of the speed of the engine, which consists in interrupting the supply of ignitable fuel and the ignition simultaneously for short periods of time at successive intervals of time.

5. A method of controlling combustion engines independently of the speed of the engine, which consists in weakening the fuel mixture to the engine below the ignition point of the mixture at periodic intervals of time.

6. A method of controlling internal combustion engines independently of the speed of the engine, which consists of partially shutting off the fuel mixture from the engine and adding pure air to the portion of the ignitable fuel mixture passing to the engine to dilute said mixture below the ignition point for short intervals of time at periodic intervals of time.

7. A device for attachment to internal combustion engines, consisting of means to periodically interrupt the fuel mixture supply to the engine for short intervals of time, and means to bring said interruption means into operation.

8. A device for attachment to internal combustion engines, consisting of a pipe connection adapted to be fitted between carburetor and engine, means to control extra air flow into said connection, means to periodically operate said control, and means to bring said control into operation.

9. A device for attachment to internal combustion engines comprising means to vary the fuel mixture by air dilution over a range beyond its point of ignition, an electromagnet operating said means, and means to periodically open and close the circuit of said electromagnet for short intervals of time.

10. A device for attachment to internal combustion engines, comprising means to vary the fuel mixture by air dilution over a range beyond its point of ignition, an electromagnet operating said means, means to periodically open and close the circuit of said electromagnet for short intervals of time, and means to simultaneously short circuit the ignition of the engine.

11. A device for attachment to internal combustion engines, comprising a pipe connection adapted to be inserted between carburetor and engine, an air inlet therein, means to cover said air inlet, means to periodically displace said covering means, means to operate said displacing means at regular intervals of time for short periods of time, and means to set said operating means into action.

12. A device for attachment to internal combustion engines, comprising a pipe connection adapted to be inserted between carburetor and engine, a throttle valve therein, an electromagnet, a movable core in said electromagnet, a connection between said core and said throttle valve, a periodically operated automatic circuit breaker in the circuit of said electromagnet, and means to bring said circuit breaker into operation.

13. A device for attachment to internal com-

bustion engines, comprising a pipe connection adapted to be inserted between carburetor and engine; a throttle valve therein, an electromagnet, a movable core in said electromagnet, a connection between said core and said throttle valve, a periodically operated automatic circuit breaker in the circuit of said electromagnet, means to

bring said circuit breaker into operation, a pair of contacts in the ignition circuit of the engine, and means controlling the opening and closing of said contacts and connected to the core of said electromagnet.

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