

Feb. 28, 1950

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2,499,263

ELECTRIC GOVERNOR AND IDLE CONTROL

Filed March 29, 1948

2 Sheets-Sheet 1

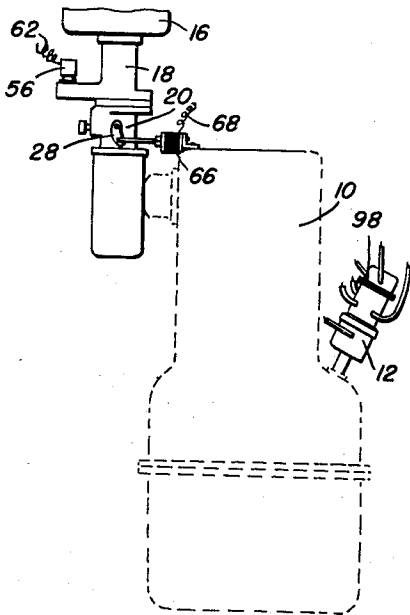


Fig. 1.

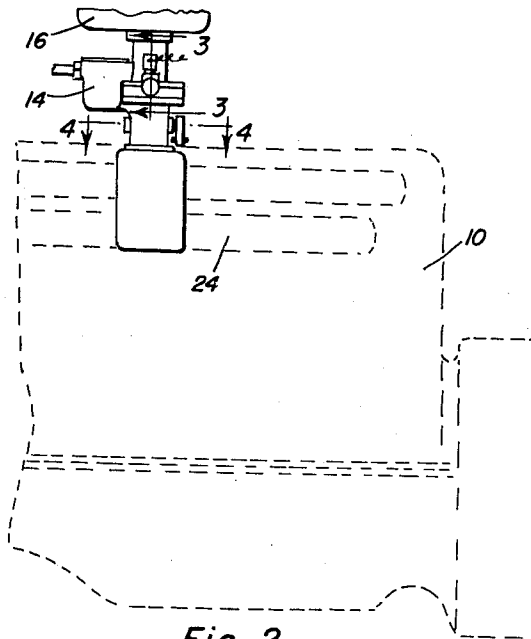


Fig. 2.

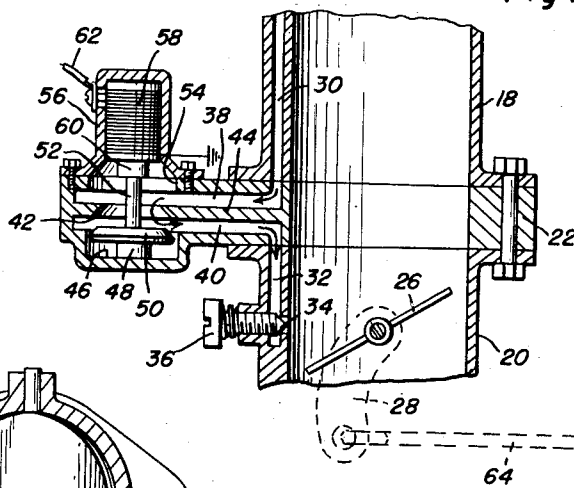


Fig. 3.

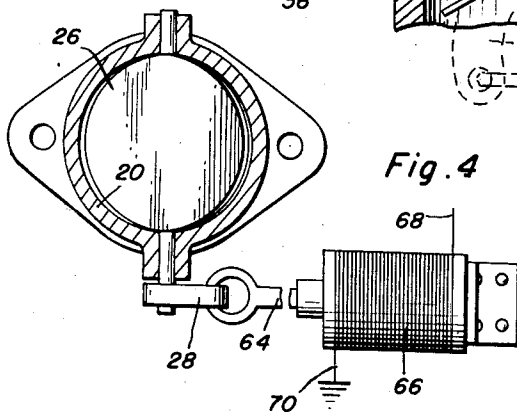


Fig. 4

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2 Sheets-Sheet 2

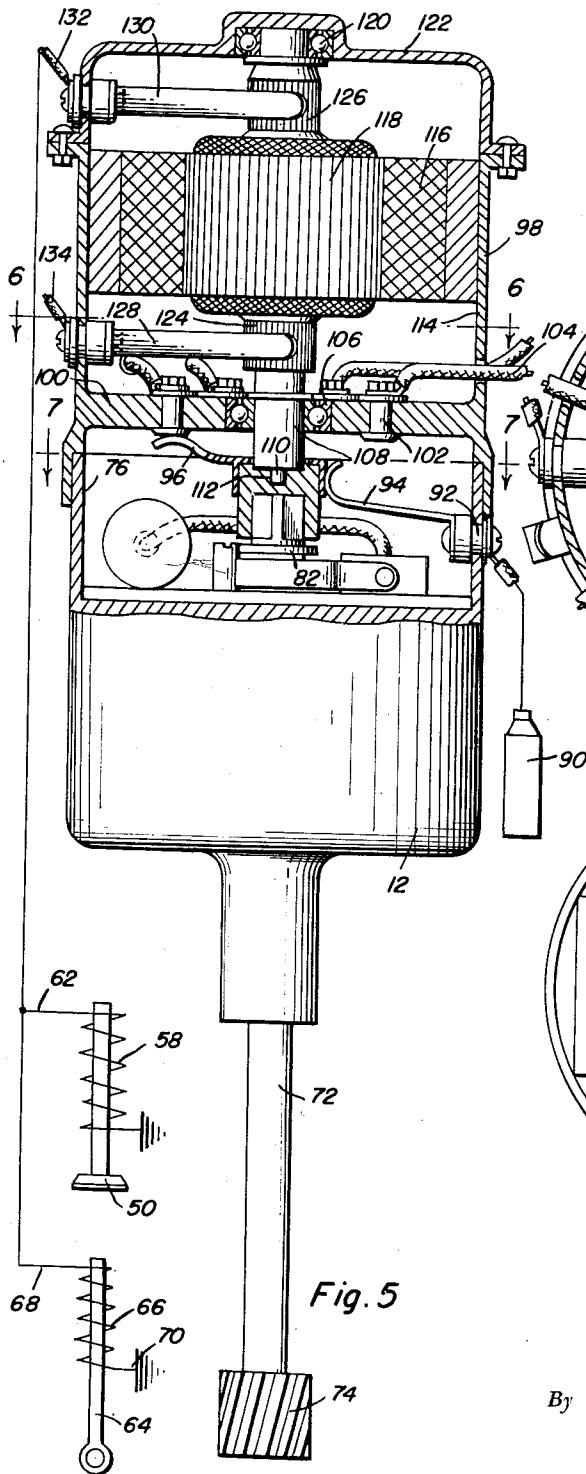


Fig. 5

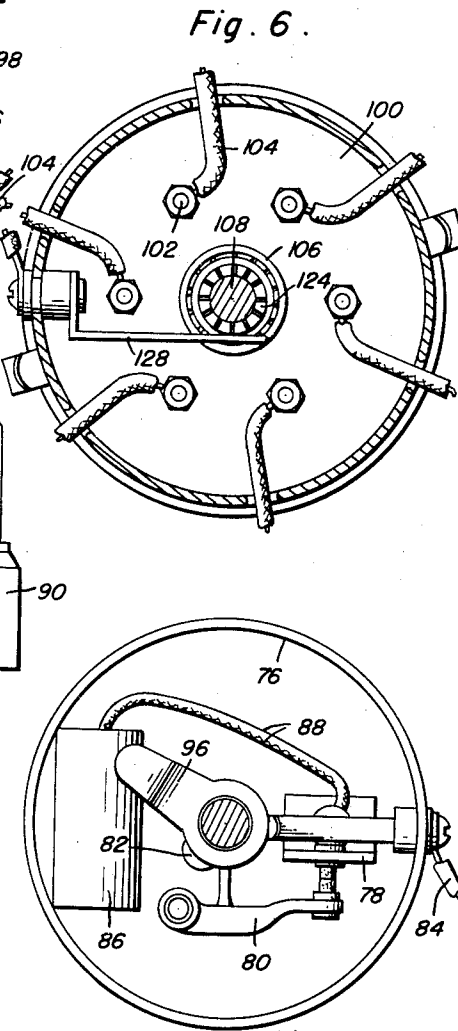


Fig. 6.

Fig. 7.

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2,499,263

ELECTRIC GOVERNOR AND IDLE CONTROL

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Application March 29, 1948, Serial No. 17,733

11 Claims. (Cl. 123-102)

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This invention comprises novel and useful improvements in an electric governor and idle control, and more specifically pertains to an engine speed responsive means for controlling an idling jet valve and the throttle valve of an engine in accordance with predetermined speed of the engine.

The primary object of this invention is to provide a mechanism for automatically stopping the flow of combustible mixture through the idling jet of an engine when the engine exceeds its idling speed, and to automatically throttle the supply of combustible mixture to the intake manifold of an engine in accordance with the speed of the engine.

An important feature of the invention resides in the provision of a control valve for controlling the flow of combustible mixture through the idling jet of an engine and which control valve is embodied in an assembly which may be readily installed upon an engine and inserted in the idling jet passage thereof.

Another feature of the invention resides in the provision of a device in accordance with the foregoing features and objects wherein there is provided an automatic control means for the throttle valve of the engine to thereby operate the same for maintaining a predetermined speed of operation of the engine.

Still another important feature of the invention comprehends the provision of a common control means for operating the idling jet control valve and the engine throttle valve in the manner set forth in the foregoing objects and features.

Still another important object of the invention resides in the provision of a common control means which is mounted upon and driven by any suitable element of an internal combustion engine which is operated at a speed proportional to the speed of the engine.

A further additional object of the invention comprehends the provision of a control mechanism as set forth in the preceding objects and features wherein a generator is provided for controlling by means of solenoids the control valve of the idling jet and the throttle valve of the engine in accordance with predetermined means of rotation of the engine.

And a final important feature and object of the invention comprehends the provision of a control mechanism as set forth in the above-mentioned features and objects wherein the generator is housed in a replacement cover for the distributor of the engine, is electrically connected

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to the solenoids of the idling jet control valve and the engine throttle valve, and is detachably driven by the distributor shaft of the engine, which replacement cover is provided with means for establishing the customary electrical connection between the spark plug cables and the distributing contact member of the distributor.

These, together with various ancillary features and objects of the invention which will later become apparent as the following description proceeds, are attained by this device, a preferred embodiment of which has been illustrated by way of example only in the accompanying drawings, wherein:

Figure 1 is an end elevational view showing the elements of the invention applied to an internal combustion engine which is indicated in dotted lines;

Figure 2 is a fragmentary side elevational view of the arrangement of Figure 1;

Figure 3 is a fragmentary vertical transverse sectional detail view taken upon an enlarged scale through the combustible mixture supply conduit substantially from the plane of the section line 3-3 of Figure 2;

Figure 4 is a fragmentary horizontal sectional detail view taken substantially from the plane of the section line 4-4 of Figure 2;

Figure 5 is a diagrammatic view, parts being broken away and shown in vertical transverse section, of the speed responsive operating elements of the invention, and showing electrical connection of the same with the solenoid elements of the invention;

Figure 6 is a horizontal sectional detail view taken substantially from the plane of the section line 6-6 of Figure 5; and,

Figure 7 is a further horizontal sectional detail view taken substantially from the plane of the section line 7-7 of Figure 5.

Referring now more specifically to the accompanying drawings, wherein like numerals designate similar parts throughout the various views, attention is directed first to Figures 1 and 2 wherein 10 designates generally an internal combustion engine of any desired construction and design, and which is provided with the customary distributor body 12 suitably mounted upon the engine and of any desired construction.

The engine is further provided with the conventional carburetor 14 of any desired type and to which air is supplied as by an air cleaner 16, a fragment of which has been shown in these views.

An air intake conduit 18 is in communication

with the air cleaner 16 and with the carburetor 14 in any desired manner, and constitutes the upper section of a fuel or combustible mixture conduit which connects the carburetor 14 with the intake manifold of the engine. The section 18 is detachably connected to the complementary combustible mixture section 20 and has interposed therebetween an idling jet control valve assembly including a body 22.

This lower section 22 communicates with an intake manifold 24 of conventional construction and in the customary manner.

As will be more readily seen from Figure 3, the lower section 20 of the fuel mixture conduit is provided with the usual throttle valve 26 which may be the usual butterfly valve, provided with an operating crank lever 28 to which is attached the usual throttle control mechanism with which an engine is customarily provided. The sections 18 and 20 are provided with aligned and registering passageways 30 and 32 comprising a part of the idling jet passage by means of which a portion of the fuel mixture is by-passed around the throttle valve when the latter is in its closed position, to supply sufficient fuel to permit the engine to idle or run at a low speed during the throttle closed position. The lower passage 32 is provided with a discharge port 34 controlled by a needle valve 36 in accordance with conventional practice.

The insert body 22 includes a pair of substantially parallel upper and lower passageways 38 and 40 constituting inlet and outlet passages and which are interposed between and respectively register with the idling jet passageways 30 and 32. Thus, the idling jet mixture necessarily passes from the passage 30, into the passageway 38, and returns by the passageway 40 into the passageway 32 and so to the jet orifice 34.

A valve port 42 formed in a partition 44 between the inlet and outlet passages 38 and 40, is provided in the body 22. Below the valve port 42 the body is provided with an enlarged chamber 46 whose bottom wall constitutes an abutment for receiving the end 48 of a valve 50 to thereby limit the downward or opening movement of this valve. The valve 50 controls the valve port 42 and is provided with a valve stem 52 which extends through an opening 54 in the upper surface of the body 22 which is in alignment with the valve port 42.

A hollow casing 56 is detachably secured to the body 22 to form a closure for the opening 54, and this casing is provided with a solenoid coil 58 for actuating the solenoid armature 60 attached to the end of the valve stem 52. An electric conductor 62 supplies current to the solenoid 58, which is suitably grounded, for a purpose to be later set forth.

As will be more clearly apparent by reference to Figure 4, the butterfly valve 26 has its operating crank or lever 28 connected to an operating rod 64 which forms part of or is detachably connected to an armature slidably received in the solenoid coil 66 which is suitably mounted upon the engine 10, and is provided with a current supplying conductor 68 and is grounded to the engine as at 70.

Attention is next directed more specifically to Figure 5 wherein it will be seen that the body portion 12 of the distributor is provided with the customary rotatable distributor shaft 72 suitably journaled therein, which shaft at its lower extremity is provided with a gear 74 which is

driven by the cam shaft or other instrumentality, not shown, of the internal combustion engine 10. The distributor 12 is mounted in any suitable manner upon the engine 10 and since this mounting is of known design, the same is not illustrated herein.

It should be here noted that the distributor body is provided with a hollow chamber 76 within which are received the moving parts of the distributor, these including, as will be seen in Figure 7, a stationary breaker element 78, the movable or rocker breaker contact element 80, the breaker cam 82 suitably carried upon the distributor shaft 72, together with a low tension lead 84 forming a part of the customary low tension circuit of the breaker of the distributor, not shown. In accordance with usual practice, the distributor is further provided with the customary condenser 86 suitably connected by conductors 88 with the breaker point assembly. Since the distributor construction so far described is of known design, a detailed statement of its operation and construction is believed to be unnecessary.

The usual distributor is provided with a detachable cover provided with terminals to which the usual spark plug cables are attached, these terminals being sequentially and selectively engaged in proper order by a rotating distributor finger carried by the distributor shaft 72. In accordance with this invention, however, this customary cover is removed and a replacement cap or cover is provided for carrying out the usual functions of the distributor as well as for other purposes to be now set forth.

It should be here noted, however, that the customary ignition coil indicated generally at 90 is connected by a suitable insulated terminal 92 and a spring contact member 94 with the removable distributor arm or finger 96 detachably mounted upon the upper end of the distributor shaft 72.

The replaceable distributing cap consists of a body member 98 which is of hollow construction and is adapted to have seating engagement upon the open end of the distributor body 12, and is provided with a partition 100 to form a closure for the chamber 76.

The partition 100 is provided with a plurality of terminals 102 extending therethrough and arranged in an annular assembly for selective engagement by the contact finger 96 of the distributor. These terminals 102 are engaged with the customary spark plug cables 104 for selective energization of these spark plugs, not shown. The partition 100 is further provided with an anti-friction bearing 106 in which is journaled the armature shaft 108 whose lower end is provided with a tongue 110 receivable in a driving groove or slot 112 formed in the hub of the distributor arm 96 for driving engagement of the armature shaft.

This shaft extends into a chamber 114 formed in the body 98 above the partition 100, which chamber is provided with the customary generator feel coils 116 between which is rotatably mounted the generator armature or rotor 118. The other end of the shaft 108 is journaled in an anti-friction bearing 120 carried by a cap member 122 detachably secured upon the open upper end of the body member 98. Upon opposite sides of the rotor 118, are commutated segments 126 and 128 which are slidably contacted by brushes 130 and 128. The brush 130 is connected to a cable 132 for supplying current to the sole-

noids, while the brush 128 is connected to a lead

134 which is suitably grounded to the frame of the vehicle in which the engine is mounted.

As will be readily apparent from Figure 5, the power lead 132 is connected with the conductor 62 to supply current to the solenoid coil 58 for operating the control valve 50, and also is connected to the lead 68 for supplying current to the solenoid coil 66 for energizing the control rod 64 to operate the throttle valve.

The operation of the device is as follows:

With the replacement cover assembly mounted upon the generator body 12, the normal functions of the generator are now effected. However, this replacement cover now journals a generator which is thus carried by and operated by the distributor, being driven by the distributor shaft at a speed which is therefore proportional to the speed of rotation of the engine. Consequently, the current produced by the generator is also in proportion to and varies with the speed of the engine. The solenoid coils are so proportioned that the current produced by the generator at a speed of rotation above the idling speed of the engine will energize the coil 58 and thus close the control valve 50 to shut off the flow of combustible mixture through the idling jet passages of the engine. Thus, when the engine exceeds its idling speed, and the functioning of the idling jet passageway is no longer necessary, the latter is closed to thus economize upon fuel and save the fuel which would otherwise be fed through this passageway to the idling jet. The valve 50 may be returned to its open position upon deenergization of the coil 58 by gravity or by a suitable spring means, not shown.

At the same time, the coil of the solenoid 66 is likewise in constant electrical contacts with the generator power lead 132, and is so calibrated that when a predetermined engine speed is attained, the current produced by the generator will be sufficient to actuate the coil and operate the rod 64 to close the throttle valve until the speed drops below the predetermined engine speed. Thus, the varying current output of the generator which is proportional to engine speed is utilized to operate the throttle valve to maintain the engine in operation at a predetermined speed. Any suitable means may be provided for varying the speed of the engine which the throttle valve is designed to maintain, one such satisfactory means being a rheostat resistance interposed in the lead line 68 of the coil 66 to thus regulate the current strength and consequently the engine speed at which the throttle valve will be actuated.

Of course, the throttle valve and the idling jet control valve may be operated in accordance with the predetermined selected engine speed by other mechanisms than a generator. For this purpose, a ball type of governor could be employed or any other speed responsive mechanism utilized.

From the foregoing, it is felt that the manner of operating and utilizing the device will be readily understood and further explanation is believed to be unnecessary.

However, since numerous changes will readily occur to those skilled in the art after a consideration of the foregoing specification and attached drawings, it is not desired to limit the invention to the exact construction shown and described, and hence all suitable modifications may be employed falling within the scope of the appended claims.

Having described the invention, what is claimed as new is:

1. In an internal combustion engine having a

combustible mixture supply conduit with a throttle valve and an idling jet passage therein; a control means for said idling jet passage comprising a valve controlling flow through said idling jet passage, and means including a generator mounted within and driven by the distributor of an internal combustion engine and responsive to a predetermined engine speed for operating said valve to closed position.

2. The combination of claim 1 wherein said distributor has a hollow cap, said generator being mounted in said cap.

3. The combination of claim 1 including a hollow cap for the distributor of an internal combustion engine, said generator being mounted within said cap and having its armature aligned with the distributor shaft and connected thereto by the distributor finger.

4. The combination of claim 1 including a valve body, parallel inlet and outlet passages in said body, said passages extending laterally from and being interposed in said idling jet passage, a valve port connecting said inlet and outlet passages, said valve being mounted in said body for controlling said valve port.

5. The combination of claim 4 wherein said valve is disposed for movement in a vertical plane and being opened by downward movement, a recess in said valve body for receiving the head of said valve in its open position, and a valve closing solenoid mounted on the top of said body.

6. An automatic valve control mechanism for internal combustion engines having a distributor, a fuel supply conduit with a throttle valve and an idling passage, comprising; a control valve controlling flow through said idling jet passage, and a common means responsive to an engine speed above idling speed for closing said control valve and responsive to speeds in excess of a predetermined engine speed for actuating said throttle valve.

7. The combination of claim 6 wherein said common means includes a rotatable driven member mounted upon and driven by said distributor.

8. The combination of claim 7 wherein said driven member is journaled in and extends through the cap of said distributor and is connected with the shaft of said distributor.

9. The combination of claim 6 including a solenoid for controlling one of said valve, said common means including a generator electrically connected with said solenoid.

10. The combination of claim 9 wherein said generator is mounted upon and driven by said distributor.

11. The combination of claim 6 wherein each of said valves is actuated by a solenoid, said common means comprising a generator electrically connected with each valve solenoid, said solenoids being operable by different generator voltages conforming to predetermined engine speeds.

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