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ENGINE GOVERNOR CONTROL VALVE

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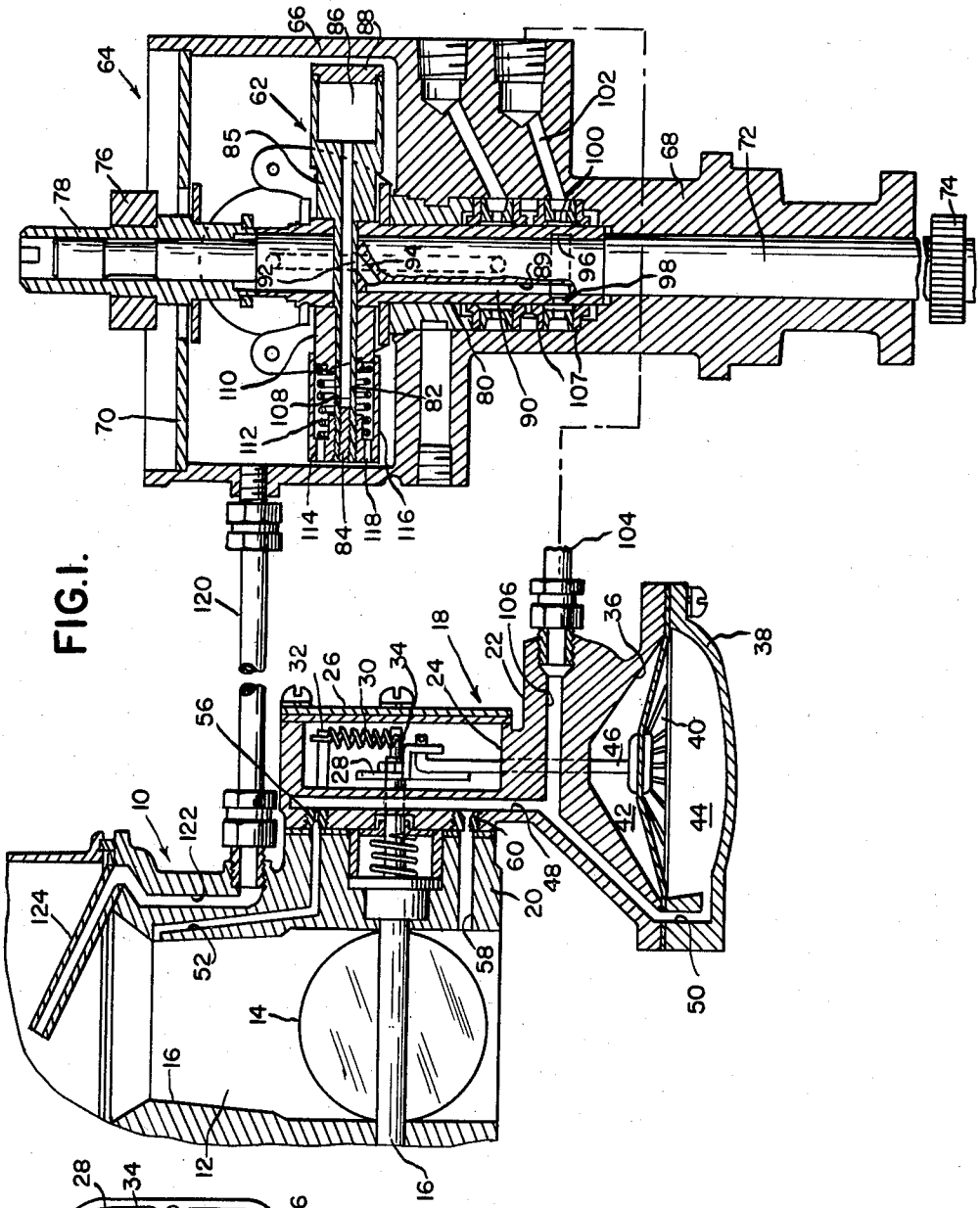


FIG. 1.

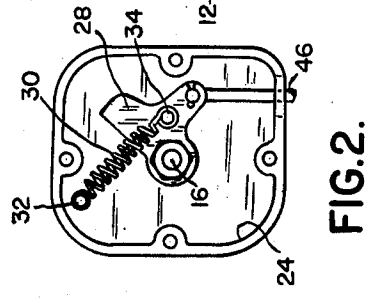


FIG. 2.

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ENGINE GOVERNOR CONTROL VALVE

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3 Claims. (Cl. 137—56)

This invention relates to engine governors and more particularly to a control for centrifugal type engine governors.

One object of this invention is to provide an improved control for centrifugal governors which is constructed of a relatively few simple parts, inexpensive to manufacture and at the same time highly efficient.

Another object of the invention is to provide a control for an engine governor which is closely associated with the ignition distributor shaft in a manner to provide a very compact assembly.

Other objects and advantages of the invention will become apparent as the following description proceeds, especially when considered in conjunction with the accompanying drawing wherein:

Figure 1 is a sectional view illustrating portions of a carburetor, and a governor comprising a throttle actuating unit and a controlling unit, constructed in accordance with the present invention.

Figure 2 is a view of a portion of the throttle actuating unit of the governor, with the cover plate removed.

Referring now more particularly to the drawing, the carburetor is generally indicated at 10 and has a barrel 12 and a throttle plate 14 supported within the barrel. The throttle plate 14 is secured to a shaft 16 extending transversely of the barrel and supported for rotation about its axis to turn the throttle plate from the open position shown to closed position.

The governor comprises a throttle actuating unit 18 secured to the carburetor casing 20. The throttle actuating unit comprises a housing 22 having a recess 24 and a cover plate 26 secured over the recess to close the same. The throttle shaft 16 projects through the carburetor casing and through the housing of the throttle actuating unit and terminates within recess 24. A governor lever 28 is secured to the end portion of shaft 16 within the recess, and a tension coil spring 30 has one end secured to a fixed post 32 within the recess and the other end secured to the governor lever 28 as indicated at 34. The effect of the tension spring is to urge the shaft 16 to a position in which the throttle plate is fully open, as shown in Figure 1, or counterclockwise in Figure 2.

The throttle actuating unit housing 22 has a second recess 36, and a cover plate 38 is secured to the housing and extends across the recess to close the same. The cover plate 38 is outwardly bulged in order to increase the size of the space enclosed. A flexible diaphragm 40 extends across the recess 36 and is clamped to the housing by the cover plate 38. The diaphragm serves to divide the recess into separate chambers 42 and 44.

A diaphragm rod 46 has one end secured to the diaphragm 40 at the center of the latter, and the other end pivotally connected to the governor lever 28. The intermediate portion of the rod 46 extends through the portion of the housing 22 separating the recesses 24 and 36 and is slidable longitudinally therein. The diaphragm 40 and rod 46 are normally urged to the position shown in Figure 1 by the governor spring 30.

The housing 22 has a passage 48 which connects into a passage 50 in cover plate 38, and passage 50 opens into the chamber 44 beneath the diaphragm. A passage 52 in the carburetor casing opens into the throat of the venturi 16 at the upstream side of the throttle plate and connects into passage 48 through the restriction of jet 56. The carburetor casing has another passage 58 which opens into the barrel at the downstream side of the throttle plate and connects into the passage 48 through the restriction or jet 60.

The control unit for the governor is generally indicated at 62. The control unit is closely associated with the ignition distributor 64. The ignition distributor comprises a cup-shaped housing 66 having a tubular shank portion 68 depending from the bottom wall thereof. The upper end of the housing is closed by a plate 70 which serves as a support for the usual circuit interrupter mechanism not shown.

Journaled in the shank portion 68 for rotation is the distributor shaft 72 having the upper end projecting through the housing 66 and having a pinion 74 secured to the lower end for connecting the drive shaft to the camshaft of the engine. The usual cam 76 is secured to a tubular part 78 sleeved on and secured to the drive shaft 72. The connection between part 78 and shaft 72 is adjustable so that part 78 and hence cam 76 can be rotated relative to shaft 72 to provide for spark advance.

The drive shaft 72 has a sleeve 80 extending over a portion of the shaft which extends from within the tubular portion 68 of the housing to a point within the cup-shaped portion of the housing. The sleeve 80 is rigidly secured to the shaft in any suitable manner. Projecting transversely through the shaft 72 and sleeve 80 is a radially extending tubular member 82 which is rigidly secured to the shaft and sleeve in any suitable manner. One end of the tubular member is internally threaded and is closed by a plug 84 threaded thereinto. Alternatively, if the passage in the member 82 is not extended through the left end thereof, the plug 84 may be omitted. The other end of the member has an enlarged abutment portion 85 which engages the sleeve 80 to properly position the tubular member transversely thereof. The hollow interior of the tubular member extends through the enlarged abutment portion and opens into an enlarged space 86 at the opposite end of the member. This end of the member is closed by a cap 88 secured therein in any suitable manner. In the present instance a threaded connection is employed.

The shaft 72 has a longitudinally extending slot 89 milled axially along its outer surface and this slot cooperates with the adjacent inner surface of the sleeve 80 to define a passage 90. The passage 90 connects into the interior of the tubular member by a port 92 in the tubular member and a connecting passage 94 in the shaft. The internal surface of the sleeve 80 has an annular groove 96 adjacent the lower end of passage 90. Ports 98 extend through the sleeve 80 in circumferentially spaced relation thereabout from the base of the annular groove 96 to the outer surface of the sleeve. It will be noted that the tubular portion 68 of the distributor housing has an internal annular groove 100 which extends around the sleeve 80 in registration with the ports 98, and a passage 102 in the tubular portion 68 of the housing connects into the annular groove 100. A conduit 104 extends from passage 102 and connects into the passage 106 in the governor housing which, in turn, connects into the passage 48 therein. Sealing gaskets 107 extend between sleeve 80 and tubular portion 72 above and below groove 100.

The tubular member 82 has an air inlet opening or port 108 spaced a substantial distance from the sleeve 80. A tubular weight or valve element 110 is mounted on the tubular member 82 for sliding movement therealong and

normally is positioned radially inwardly of the air inlet opening 108 to expose the latter for the free passage of air into the tubular member. The valve element 110 is normally retained in the position illustrated by a compression coil spring 112 which encircles the tubular member 82 and has one end abutting the valve element 110. The other end of the coil spring abuts a tubular cover 114 which is threaded on the end of tubular member 82. The cover 114 has an extension or sleeve portion 116 which extends over the coil spring and over a portion of the valve element. The cover 114 is provided with ports 118 for the free passage of air.

Air may freely enter the cup-shaped housing 66 by way of conduit 120 which connects into a passage 122 in the carburetor casing which, in turn, connects into a conduit 124. Conduit 124 opens into the interior of the carburetor above the throat of the venturi.

The operation of the structure thus described should be readily apparent. Below governing speeds, the operator controls the throttle plate 14 in the usual manner. However, when governing speed is reached, a combination of venturi and manifold vacuum from passages 52 and 58 acts on the governor diaphragm to close the throttle plate. The chamber 42 above the diaphragm may be vented to atmopshere, and by reason of the reduction in pressure beneath the diaphragm, it moves downwardly from the position illustrated and draws the diaphragm rod downwardly. As a result, the shaft 16 is rotated to the closed position of the throttle plate against the action of the governing spring 30. Instead of being vented, the chamber 42 may be closed and contain air under a predetermined pressure.

The two calibrated by-pass jets 56 and 60 in the vacuum passages 52 and 58 meter the vacuum from the venturi and the manifold to provide the correct balance for proper operation of the governor. At speeds below governing r.p.m., this vacuum is weakened by air bleeding through the control unit 62 so that no premature governing action will occur. The flow of bleed air is from the carburetor through the conduit 120 into the tubular member 82 through the passage in the shaft 72 and sleeve 80 and conduit 104 to the passage 48 in the governor housing. Combined venturi and manifold vacuum, transmitted through the governor system passages, draws the bleed air past the governor valve to the throttle actuating unit 18 of the governor.

In the controlling unit 62 at the distributor, centrifugal force acting on the weighted valve element 110 which keeps pace with engine speed, overcomes the tension of valve spring 112 and urges the valve element 110 radially outwardly so that it tends to cover opening 108, when governing speed is reached. This greatly restricts the amount of air bleeding through to chamber 44 beneath the diaphragm, thus allowing the combined venturi and manifold vacuum to operate the diaphragm. As the vacuum acting on the diaphragm increases, the diaphragh moves the governor lever 28 against the tension of the governor spring 30 to close the throttle plate. The governed engine speed is held constant by centrifugal force of the valve element 110 balanced against the tension of the valve spring 112. Any slight change in engine speed will cause the governor valve 110 to react immediately, either increasing or decreasing the amount of air bleeding through the governor valve opening 108. A change in the amount of air bleed will, in turn, cause an instant response from the diaphragm to increase or decrease the throttle plate opening.

It will be understood that the governor mechanism herein described may be operated in connection with a throttle plate separate and apart from the usual throttle plate operated by the foot pedal accelerator. If the governor mechanism is used in connection with the throttle plate operated by the usual foot pedal accelerator, then the connection between the accelerator and the throttle plate should be a non-positive one so that the governor mechanism may function even though the accelerator is fully depressed. The arrangement must be such that when the accelerator is released, the connection between it and the throttle plate is capable of closing the latter against the action of the governor spring 30.

The drawings and the foregoing specification constitute a description of the improved engine governor control valve in such full, clear, concise and exact terms as to enable any person skilled in the art to practice the invention, the scope of which is indicated by the appended claims.

What we claim as our invention is:

1. A governor control unit comprising means providing an air passage, a rotatable shaft adapted to be driven at variable speeds, a sleeve secured to and embracing said shaft, said shaft being formed with a groove in its outer surface, the inner surface of said sleeve extending over said groove and cooperating therewith to define a portion of said air passage, an elongated closed tubular stem extending through and secured to said shaft and projecting radially outwardly from opposite sides of said shaft through and beyond diametrically opposite sides of said sleeve and rotatable as a unit with said shaft and sleeve, a vented housing for said shaft enclosing said stem, the interior of said tubular stem comprising a portion of said air passage, a connecting passage in said shaft and a port in said tubular stem cooperating to provide communication between the first and second mentioned portions of said air passage, said tubular stem having an air inlet port in one end portion thereof projecting beyond one side of said shaft and sleeve extending transversely to the axis of and through the side wall of said stem and opening into the interior of said stem at a point spaced radially outwardly from said sleeve, a valve element sleeved on and slidable along said one end portion of said tubular stem for opening and closing said air inlet port to thereby open and close said air passage, spring means normally moving said valve element inwardly along said stem to open said air inlet port, said valve element being movable radially outwardly along said stem against the action of said spring means by centrifugal force of a predetermined magnitude to close said air inlet port, the opposite end portion of said tubular stem serving as a counterweight for said one end portion thereof including the structure carried thereby.

2. A governor control unit comprising means providing an air passage, a rotatable shaft adapted to be driven at variable speeds, a sleeve secured to and embracing said shaft, said shaft being formed with a groove in its outer surface, the inner surface of said sleeve extending over said groove and cooperating therewith to define a portion of said air passage, an elongated closed tubular stem extending through and secured to said shaft and projecting radially outwardly from opposite sides of said shaft through and beyond diametrically opposite sides of said sleeve and rotatable as a unit with said shaft and sleeve, a vented housing for said shaft enclosing said stem, the interior of said tubular stem comprising a portion of said air passage, a connecting passage in said shaft and a port in said tubular stem cooperating to provide communication between the first and second mentioned portions of said air passage, said tubular stem having an air inlet port in one end portion thereof projecting beyond one side of said shaft and sleeve extending transversely to the axis of and through the side wall of said stem and opening into the interior of said stem at a point spaced radially outwardly from said sleeve, a valve element sleeved on and slidable along said one end portion of said tubular stem for opening and closing said air inlet port to thereby open and close said air passage, adjustable spring means carried by said one end portion of said tubular stem urging said valve element inwardly along said tubular stem to a normal position at the radially inner side of said air inlet port to open the latter, said spring means comprising a radially adjustable abutment on the end of

said stem and a compression spring interposed between said valve element and abutment, said valve element being movable radially outwardly along said tubular stem against the action of said spring means by centrifugal force of a predetermined magnitude to close said air inlet port, the opposite end portion of said tubular stem serving as a counterweight for said one end portion thereof including the structurre carried thereby.

3. A governor control unit comprising means providing an air passage, a rotatable shaft adapted to be driven at variable speeds, an elongated closed tubular stem extending through and secured to said shaft and projecting radially outwardly from opposite sides of said shaft, the interior of said stem constituting a portion of said air passage, said tubular stem having an air inlet port in one end portion thereof projecting beyond one side of said shaft extending transversely to the axis of and through the side wall of said stem at a point spaced radially outwardly from said shaft, a vented housing for said shaft enclosing said stem, a radially unbalanced valve member for opening and closing said port to thereby open and close said air passage, said valve member being sleeved on said one end portion of said stem for sliding movement therealong, and spring means urging said valve member radially inwardly along said stem to a normal position at the radially inner side of said air inlet port to open the latter,

said valve member being movable radially outwardly against the action of said spring means by centrifugal force of a predetermined magnitude to close said port, the opposite end portion of said tubular stem serving as a counterweight for said one end portion thereof including the structure carried thereby, and said opposite end portion of said stem having an enlarged air chamber in communication with the portion of said passage within said stem.

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