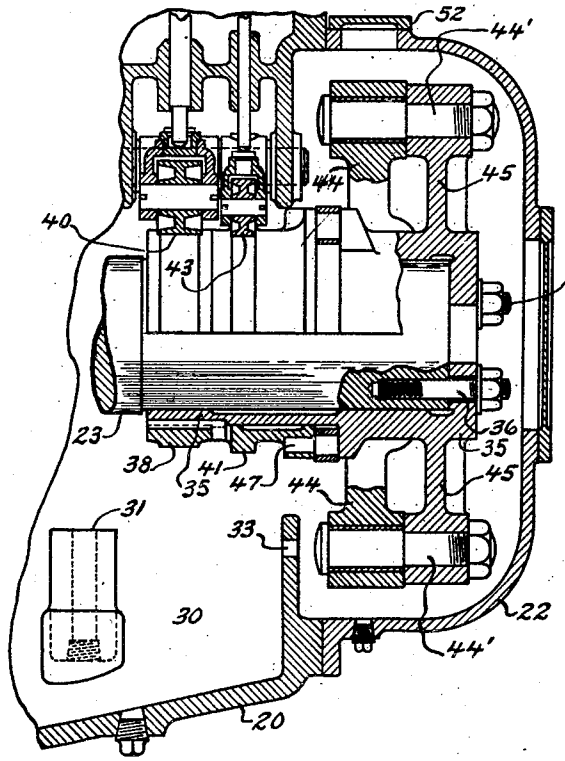
Feb. 3, 1931. M. J. GOLDBERG 1,790,912

PUMP GOVERNOR CONTROL MEANS

Original Filed April 19, 1926

FIG. 1



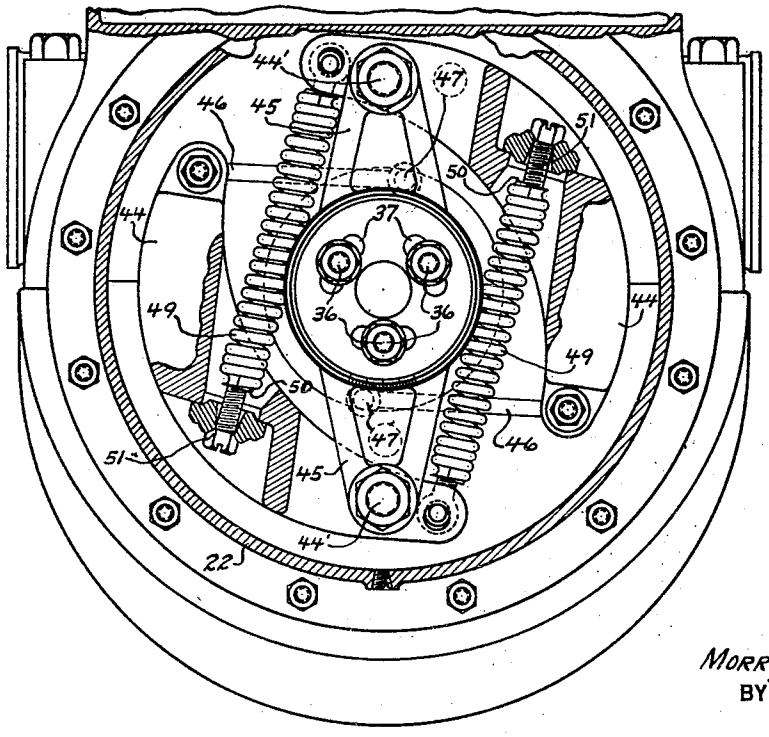


FIG. 2

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PUMP-GOVERNOR-CONTROL MEANS

Original application filed April 19, 1926, Serial No. 103,034. Divided and this application filed July 1, 1927. Serial No. 202,957.

This invention relates to improvements in pump governor control means, and especially to an improved governor assembly for the control of injection pumps used with solid injection engines.

An object of this invention is to produce a simple and reliable governor assembly adapted for the speed responsive control of fuel injection pumps.

A further object is an improved arrangement and mounting of a governor assembly, such as will permit the manufacture and complete assembly of the timing and control mechanism, apart from the engine.

A still further object is the creation of a governor assembly as a unitary structure, which embodies an easily accessible means for changing the timing of the injection pumps, relative to the engine on which they are used.

A still further object of this invention is the creation of a governor of the rotatable-sleeve type, which may be designated as a torsional governor, and which was especially designed for the control of injection pump mechanism, of the type described in my co-pending application, Serial No. 202,956, dated July 1, 1927.

Further objects and advantages of the invention will appear from the drawings and the following detailed description.

The subject matter of this application constitutes a division of that originally included in my co-pending application, Serial No. 103,034, filed April 19, 1926.

It will be observed that the space relationship, the proportion and construction of the governor parts, the sleeves, cams, and other parts of the assembly, may be varied substantially without departure from the scope and full intendment of this invention; also that the described governor may be used as a speed responsive control for any number of pump actuating and controlling cams, and may be used for the control of other similar mechanism; the specific example illustrated being merely a single executional embodiment of the invention, which is submitted in response to the statutory requirements relating to applications for Letters Patent.

In the drawings, Fig. 1 is a fragmentary sectional elevation, showing the construction of the governor, the sleeves, and their relation to the injection pump rockers and tappets. This view shows only a fragmentary portion of the governor case; the remaining mechanism not being material to a description of this invention. Fig. 2 is an end elevation of the governor, partly in section, in which is shown the means for effecting a timing adjustment between the governor assembly and the engine.

In the following description of the drawing, the reference characters used in my above mentioned co-pending application, Serial No. 103,034, of which the present case is a division, have been preserved in order better to co-ordinate the different parts and functions of the mechanism described in these two cases.

Referring by numerals to the drawings, the present device, and especially the moving parts thereof, may be enclosed in suitable housings, such as are shown at 20 and 22. If desired, a single enclosing structure may be employed in lieu of the two separate housings. A suitable level of oil may be maintained in either or both of the housings, 20 and 22, by which the moving parts of the governor, sleeves, etc., are lubricated through an ordinary splash action.

The two housings which form the governor case are preferably located at one end of the engine to which connected, and about one end of an engine shaft, such as the crank shaft 23. This provides the source of motion for operating the governor and the pumps. A suggested location and arrangement of the governor and pump operating mechanism described, may be seen by reference to the drawings accompanying my application Serial No. 103,034.

The entire governor assembly is, by preference, mounted on a sleeve 35, which is part of the assembly. The sleeve is fitted over the end of the crank shaft 23, and adjustably attached thereto by a holding means, such as bolts 36, threaded into the end of the shaft. The sleeve 35 is provided at the closed end with curved slots 37, so

that by loosening the bolts, the sleeve may be rotated about the shaft 23. A cam 38 is preferably carried by sleeve 35, and serves to operate the injection pump plungers (not shown), through tappet-rollers 40, in a manner which will appear from the drawing. The time of operating the rollers 40 by means of cam 38 will be determined by the position of sleeve 35 on shaft 23; hence, by making the position of this sleeve adjustable through the medium of slots 37 and bolts 36, I have provided a simple and accessible means for adjusting the timing of the injection periods for the various cylinders of the engine. It will be understood that a single cam 38, in the example described, may serve to operate a number of injection pump plungers.

An additional cam 41 is preferably rotatably mounted on sleeve 35, and serves to operate mechanically the suction valves for the injection pumps, by means of tappet-rollers 43. The position of cam 41 on sleeve 35 is determined by the position of the governor parts, when the engine is in operation. In this manner the time of closing of the suction valves of the pumps, and hence the amount of fuel injected into the cylinders of the engine, are controlled by the governor.

The governor proper comprises weights 44, preferably pivoted at 44′, on projections 45, which may consist of portions made integral with sleeve 35. The governor weights 44 are preferably connected to cam 41 by means of links 46. The links engage the cam 41 by means of pins 47. The centrifugal action of the governor weights 44 is preferably opposed by governor springs 49. An adjustment for the tension of the springs, and hence the action of the governor, is provided by nuts 50 and adjustable bolts 51. The housing 22 may be provided with a removable cap 52, which renders the bolts 51 accessible for adjustment.

The operation of the governor, and its action in effecting a speed-responsive control over the injection pump operation, will be apparent from the above description of parts. It will be seen that as the governor weights fly outwardly under the action of centrifugal force, they will partially rotate cam 41 about the sleeve 35, and thereby vary the time of contact of cam 41 with rollers. 43. This will in turn, vary the time of closing of the injection pump suction valves in a manner which is fully described in my co-pending application, Serial No. 202,956, dated July 1, 1927. It will be understood, however, that the governor and sleeve assembly may be readily adapted to other fluid control means in connection with engines or other apparatus.

The governor through its control of cam 41 provides a means for simply and positively controlling the speed of the engine under a varying load. The entire governor assembly is rendered accessible by merely removing the housing 22, and the bolts 36, after which the governor mechanism, including cams 38 and 41, may be removed for inspection or adjustment.

The housing 20, serves to enclose an oil chamber 30, the level of oil therein being determined by a constant level drain 31. The housing 22 is by preference kept filled with oil to approximately the same level as that in reservoir 30. The oil level within the housing 22 is determined automatically by means of an opening 33, which provides a supply of oil, such that the weights 44 in revolving will dip into the oil, and by splash and agitation will serve to lubricate the entire governor mechanism, as well as the pump and valve operating apparatus.

The essential features of the governor operation will be observed from the fact that cam 41 consists of a sleeve-like member freely rotatable about the sleeve 35. If the cam 41 were fixedly mounted on sleeve 35, the cycle of operation of tappet rollers 41 and 43 would remain unaffected by change in speed or load of the engine. The governor weights 44 acting through the links 46, serve to rotate the cam 41 and thereby to change the time of closing the suction valves of the injection pumps. The applicability of this movement of cam 41 relative to the pump-plunger actuating cam 38, will be obvious to those skilled in the art.

It will be seen that the described governor assembly provides a simple and automatic means for effecting a speed control over solid injection engines or like apparatus. The governor assembly above outlined in detail, has been designed as simply as possible, and contains a minimum number of parts, and requires practically no adjustment over a long period of use. The assembly has proven in experimental use to be entirely dependable in operation, and unusually economical in manufacture.

Although my invention consists largely in the construction and arrangement of parts hereinbefore described and particularly pointed out in the claims, yet I do not limit my invention to the precise form or construction of parts shown or the several parts thereof, inasmuch as various alterations may be made without changing the scope of my invention.

I claim as my invention:

1. In a speed-responsive control device, a rotatable shaft, a sleeve adjustably attached to said shaft, a control cam rotatably mounted on said sleeve, an actuating cam adapted for rotation by said sleeve, governor mechanism carried by said sleeve, and connecting means between said governor mechanism and one of said cams, and adapted to vary the angular relation between said cams.

2. In a speed-responsive control device, in combination with an actuating shaft therefor, a sleeve for mounting said device on said shaft, a cam carried by said sleeve and adapted to operate associated reciprocating mechanism, a second cam on said sleeve, adapted for the control of such mechanism, means for adjustably positioning the device on said shaft, and centrifugal means, carried by the sleeve, and adapted, responsively to the speed of said shaft, to vary the angular relation between said cams.

3. In a speed-responsive control, in combination with a rotatable shaft of associated mechanism and a housing surrounding the end of the shaft, and forming a splash-oiling reservoir, a unitary control assembly including an adjustable sleeve on the shaft, a plurality of actuating members carried by the sleeve, and governor mechanism carried by said sleeve and adapted relatively to displace the actuating members, said governor and control assembly adapted to be splash-lubricated within said housing.

4. In a speed-responsive control device, in combination with a rotatable shaft of associated apparatus, and a lubricating housing for said device, a sleeve adjustably attached to the shaft, a member on the sleeve, for driving associated apparatus, a control cam on said sleeve, and governor mechanism within the housing and carried by said sleeve, whereby the relative positions of said cam and said sleeve may be varied, said sleeve and members carried thereby, being removable and attachable, as a unit, with respect to said shaft.

5. In a pump operating and controlling device, a pump actuating member and pump discharge regulating means including a cam; and a mounting member for the device, by which it is adapted to be adjustably secured, as a unit, to a rotatable driving shaft.

6. In a governing and operating unit for a pump and the like, a pump actuating cam and a discharge governing device, including a valve operating member, movable relatively to said cam, said unit being adjustably secured to a substantially plane surface on a rotatable shaft, and adapted to be driven by the shaft.

7. In a device for controlling and operating a pump and the like, a driving shaft, a pump driving member, adapted to be driven by the shaft, and adjustable with respect thereto, a rotatable pump controlling member, a governor, connected with the pump controlling member, and a carrier for said members and governor, adjustably secured to said shaft.

8. In an actuating and controlling device, for pumps and the like, a pump operating and governing mechanism, including a plurality of relatively displaceable cams, a one-piece sleeve adapted to carry said mechanism, a shaft adapted to rotate the sleeve, and means providing an adjustable connection between the sleeve and shaft.

9. In an actuating and control apparatus for pumps and the like, in combination with a rotatable shaft, pump operating and controlling mechanism including a pair of angularly displaceable pump control members, and a mounting means for said mechanism adapted to permit its ready introduction and removal, as a unit, with respect to said shaft, said means including a hollow, slotted member and a bolt extending through a slot in said member, whereby the mounting means may be adjustably attached to the shaft.

10. In an actuating and control apparatus for pumps and the like, and associated with an operating shaft therefor, a sleeve adapted to serve as a mounting for pump controlling mechanism, and having one end substantially closed and adjustably attached to the shaft, a second sleeve mounted on the first named sleeve, a pump-influencing member carried by each of said sleeves, and a governor adapted to effect a relative rotation between the sleeves.

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