E. HIGGINS.

GOVERNOR FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED DEC. 28, 1908.

942,071. Patented Dec. 7, 1909.

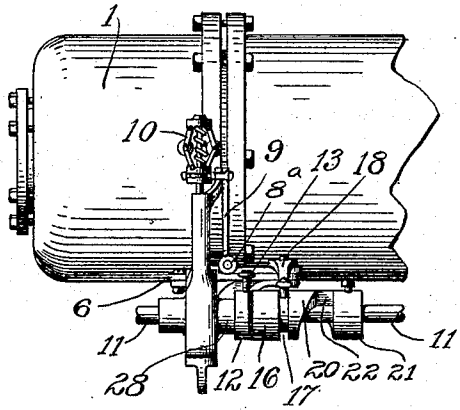

FIG. 1.

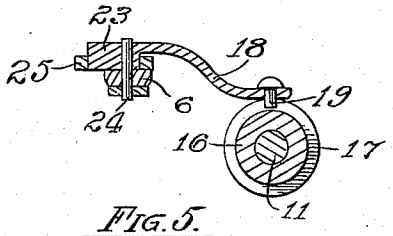

FIG. 5.

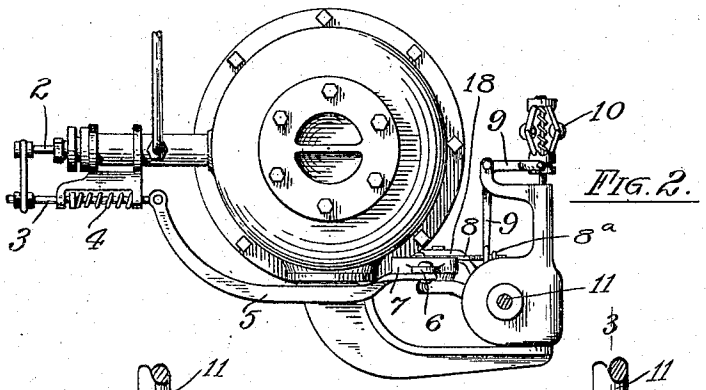

FIG. 2.

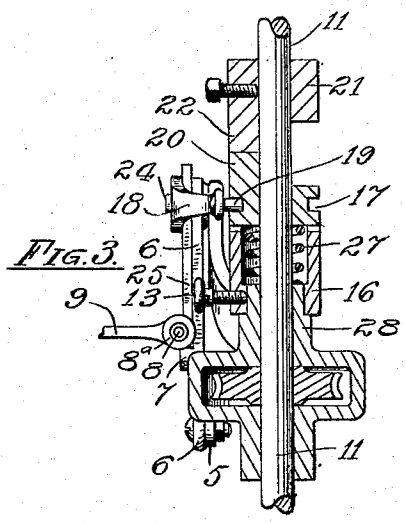

FIG. 3.

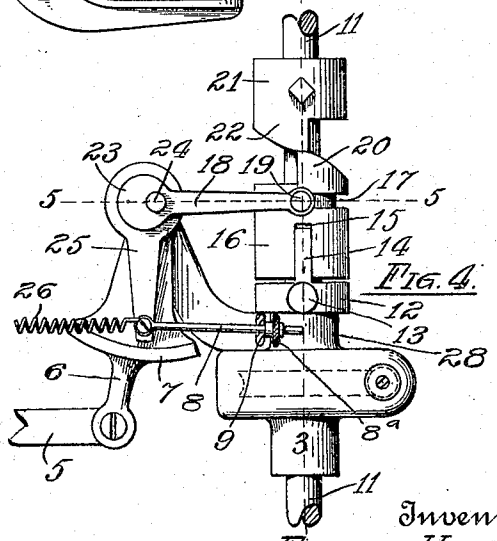

FIG. 4.

Witnesses
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GOVERNOR FOR INTERNAL-COMBUSTION ENGINES.

942,071. Specification of Letters Patent. Patented Dec. 7, 1909.

Application filed December 28, 1908. Serial No. 469,664.

To all whom it may concern:

Be it known that I, EUGENE HIGGINS, a citizen of the United States of America, residing at Lansing, in the county of Ingham and State of Michigan, have invented certain new and useful Improvements in Governors for Internal-Combustion Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to improvements in governors for internal combustion engines, and its object is to provide means whereby the governor will automatically modify the stroke of the fuel pump of an internal combustion engine, according to the load; and to provide the device with various new and useful features hereinafter more fully described and particularly pointed out in the claims, reference being had to the accompanying drawings in which:

Figure 1 is a side elevation of a portion of the engine with my device attached. Fig. 2 an end elevation of the same. Fig. 3 an enlarged detail in longitudinal section on the line 3—3 of Fig. 4. Fig. 4 a plan view of the same, and Fig. 5 a transverse vertical section on the line 5—5 of Fig. 4.

Like numbers refer to like parts in all of the figures.

1 represents the combustion chamber of any convenient internal combustion engine. 2 the plunger of a pump adapted to supply liquid fuel to the engine at each stroke of the pump. 3 a reciprocating rod attached to the pump plunger to operate the same. 4 a spring to retract the pump plunger. 5 a connecting rod to move the rod 3 and plunger 2 in the opposite direction on the working stroke of the plunger. 6 is an arm pivoted at 24 to operate the rod 5. On this arm is a segment 7 having one end a little nearer the eccentric than the other end and engaged by a friction pawl 25 journaled on an eccentric 23, which pawl engages the segment at different periods of the movement of the eccentric according as it is adjusted opposite the segment by the governor, said eccentric also being pivoted at 24 and operated by an arm 18. This arm 18 is provided with a pin 19 in its movable end which engages a groove 17 in a reciprocating member 16 slidable on the cam shaft 11 of the engine, said member being moved in one direction by a spring 27 within the same, and moved in the opposite direction by a cam projection 22 on a collar 21 mounted on the shaft 11 and rotating therewith, for which purpose the member 16 has a similar oppositely inclined projection 20 engaged by the opposing cam surface 22 at each rotation of the collar 21, whereby the spring 27 is compressed and the member 16 reciprocated longitudinally of the shaft.

To prevent rotation and to adjust the time of the stroke of the pump relative to the cycle of the engine, a ring 12 is mounted on the journal bearing 28 of the shaft 11 and rotatively adjusted thereon and held by a thumb screw 13. This ring is provided with a tongue 14 which slidably engages a groove 15 in the member 16, and thus holds the same from rotating, and also permits its longitudinal movement on the shaft as described. This movement of the member 16 and action of the spring 27 oscillates the arm 18 at each revolution of the cam shaft 11. This time may also be adjusted by means of adjusting the collar 21, but I prefer the adjustment of the ring 12 as being more convenient when the engine is running. To move the pawl 25 in one direction a contractile spring 26 is attached thereto and opposing the spring and adjusting the pawl 25 in the opposite direction is a rod 8 attached thereto and having an adjustable nut 8^a thereon.

A forked bell crank lever 9 engages the nut and is freely movable away from the same, said lever being operated by a governor 10, whereby the pawl 25 is adjusted in opposition to the spring 26. This spring 26 is made very light so as not to interfere with the action of the governor, and is only of sufficient strength to move the pawl 25 and cause the nut 8^a to follow the lever 9 without exerting any appreciable force thereon, and the governor is heavy and strong enough to adjust the lever without reference to the slight action of the spring thereon.

As the governor increases in speed, it moves the pawl 25 toward the end of the segment more remote from the center of the eccentric 23. Thus when the eccentric turns toward the segment 7, the pawl 25 engages the same later in the movement the higher the governor runs, thus shortening

the stroke of the pump. When engaged with the segment, the pawl will jam between the eccentric and the segment and thus carry the arm 6 along with the same as though the lever 18 and arm 6 were a rigid bell crank until the member 16 is moved by the spring 27 to contact the cam 20 with the face of the collar 21 which completes the stroke of the arm 18. These automatic changes in the stroke of the pump vary the amount of fuel fed to the engine in proportion to the speed of the same, decreasing the fuel as the speed increases, whereby the engine is governed to uniform speed.

What I claim is:—

1. A governor for internal combustion engines comprising a pivoted arm carrying a segment, a pawl adapted to engage the segment and move the arm, means for laterally moving the pawl to operate the arm, and a centrifugal governor connected to the pawl to adjust the same opposite various parts of the segment.

2. A governor for internal combustion engines comprising a pivoted arm carrying a segment concentric with the axis of the pivot, a pawl adapted to engage the segment and move the arm about its axis, means for moving the pawl into engagement with the segment, means for moving the pawl about the axis of the arm, and a centrifugal governor connected to the pawl to adjust the same opposite various parts of the segment.

3. A governor for internal combustion engines, comprising a pivoted arm carrying a segment, a pawl pivoted eccentrically to the segment, a lever adapted to move the pawl toward the segment, and also to move the pawl about the axis of the segment, and a centrifugal governor connected to the pawl to adjust the same opposite various portions of the segment.

4. A governor for internal combustion engines having a fuel pump, comprising a pivoted arm connected to the plunger of the pump, a segment on the arm and concentric with the axis thereof, an eccentric having its axis in common with the axis of the arm, a pawl journaled on the eccentric, a spring connected to the pawl to move the same toward one end of the segment, and a centrifugal governor connected to the pawl to move the same toward the other end of the segment.

5. An internal combustion engine, comprising a fuel pump, a pivoted arm connected to the pump plunger to move the same in one direction, a spring to move the plunger in the opposite direction, a segment on the arm and concentric with the axis thereof, an eccentric having its axis in common with the axis of the arm, a pawl journaled on the eccentric and adapted to engage the segment, a spring attached to the pawl to move the same toward one end of the segment, a rod attached to the pawl opposite the spring, an adjustable nut on the rod, a bell crank lever engaging the nut, and a centrifugal governor connected to said bell crank lever to operate the same.

6. A governor for internal combustion engines having a fuel pump and a cam shaft, comprising a reciprocating lever to operate the fuel pump, a member slidable on the cam shaft and having a groove at one end and a cam projection at the other end, and also connected to the lever to operate the same, a collar on the cam shaft and having a cam projection engaging the projection on said member, a ring adjustable about the axis of the shaft, and a tongue on the ring slidably engaging the groove in said member.

7. In combination with an internal combustion engine having a fuel pump and a cam shaft, a lever to operate the pump, a pin in the movable end of the lever, a member longitudinally movable on the shaft and having a circumferential groove engaged by the pin, and also having a longitudinal groove in one end, and a ring adjustable about the axis of the shaft and mounted on the bearing of said shaft, a tongue on the ring engaging the longitudinal groove in the said member, a collar on the shaft, opposing cams on the collar and member, and a spring in said member to move the same toward the collar.

In testimony whereof I affix my signature in presence of two witnesses.

EUGENE HIGGINS.

Witnesses:

CHRISTIE A. STEARNS,

FRANK A. DWELLE.