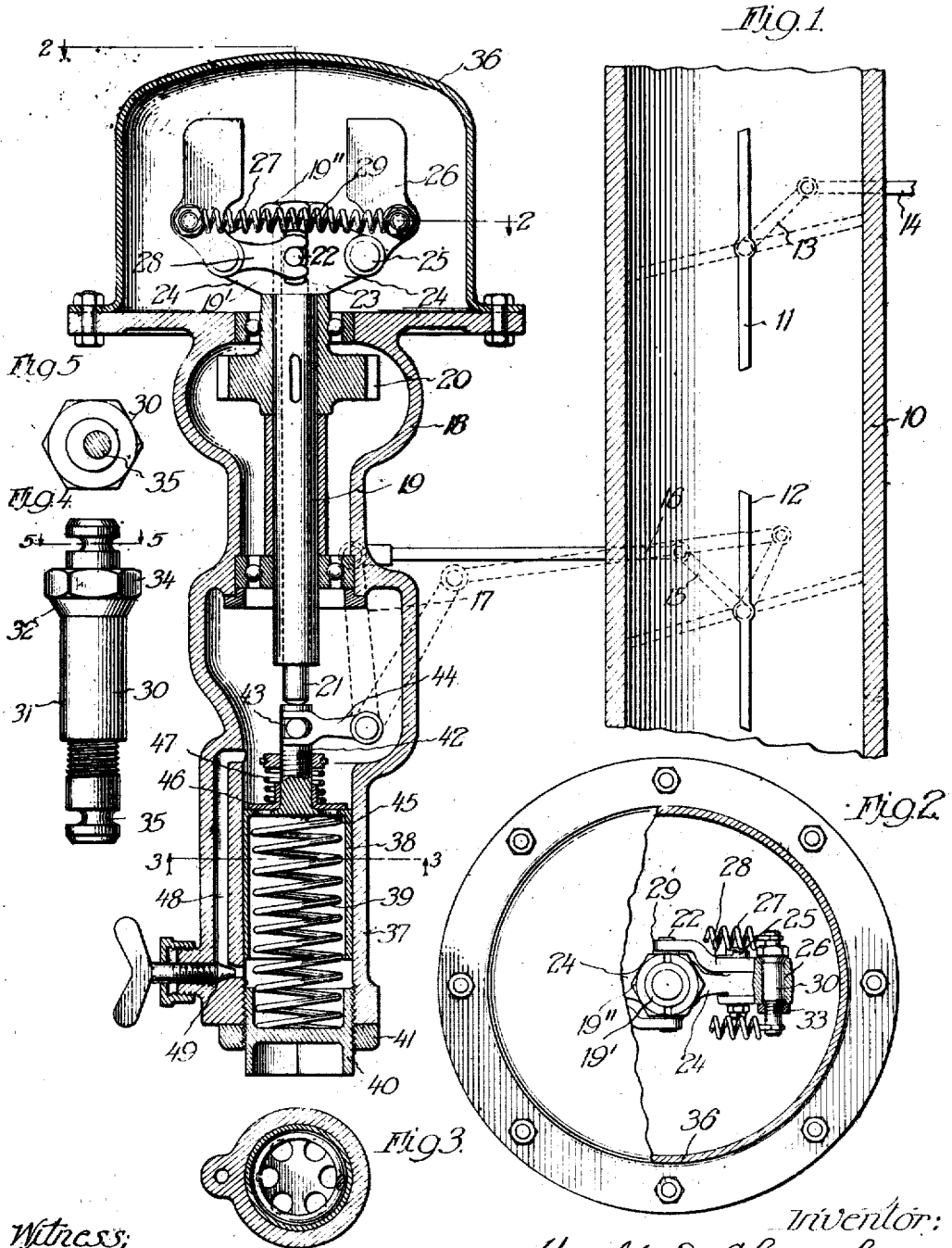


H. D. CHURCH,
HYDROCARBON MOTOR.
APPLICATION FILED AUG. 21, 1915.

1,265,883

Patented May 14, 1918.



Witness:
E. R. Bawitt.
A. H. Spear.

Inventor:
Harold D. Church,
by Milton T. Libbitt,
Att'y.

UNITED STATES PATENT OFFICE.

HAROLD D. CHURCH, OF DETROIT, MICHIGAN, ASSIGNOR TO PACKARD MOTOR CAR COMPANY, OF DETROIT, MICHIGAN, A CORPORATION OF MICHIGAN.

HYDROCARBON-MOTOR.

1,265,883.

Specification of Letters Patent.

Patented May 14, 1918.

Application filed August 21, 1915. Serial No. 46,658.

To all whom it may concern:

Be it known that I, HAROLD D. CHURCH, a citizen of the United States, and resident of Detroit, Wayne county, State of Michigan, have invented certain new and useful Improvements in Hydrocarbon-Motors, of which the following is a specification.

This invention relates to hydrocarbon motors and particularly to the control thereof.

10 It is customary in most motors used in commercial motor vehicles or trucks to employ a governor to prevent excessive speed of the motor and thus of the truck. With the governors as generally used there is sometimes a "hunting" tendency due to the inertia of the governor closing the throttle valve too quickly and then opening it again as the speed goes down. It is one of the objects of the present invention to obviate this difficulty and provide a governor mechanism that will be smooth in its action and which will also permit a slight excess of speed and consequently of power for a limited time above the normal maximum limit to which the governor is set. One form of the invention is shown and described in this application but it will be understood that this form is illustrative only and that various changes therefrom and modifications thereof may be made without departing from the spirit or scope of the invention.

35 The above and other objects of the invention will appear from the following description taken in connection with the drawings which form a part hereof, and in which:

Figure 1 is a vertical sectional view through a governor mechanism and motor intake pipe, embodying the invention;

40 Fig. 2 is a plan view of the governor mechanism shown in Fig. 1 with part of the cover cut away;

Fig. 3 is a transverse section looking up, on the line 3-3 of Fig. 1; and

5 Figs. 4 and 5 are detail views.

Referring to the drawings, 10 represents the intake pipe of a hydrocarbon motor, and 11 is a throttle valve therein, the valve shown being of the butterfly type. Arranged in series with the valve 11 is a similar valve 12, and it will be understood that either of these valves may entirely close the intake pipe 10 and that when one of them is open, the other may control the passage of

gas through the intake from the maximum 55 to the minimum amount.

The valve 11 is arranged to be operated by hand as through an arm 13 and a rod 14, while the valve 12 is adapted to be governor controlled through the arm 15, link 16 and 60 bell crank 17.

The governor casing 18 is adapted to be suitably mounted upon the motor, preferably in proximity to the intake pipe 10 so that the connections 15, 16 and 17 may be 65 as simple as possible, and its rotatable shaft 19 is adapted to be driven by the motor through suitable gearing including the gear 20. The shaft 19 is shown as hollow or of tubular form and has a sleeve 19' secured 70 upon its upper end as by a nut 19". An operating rod 21 passes through the shaft 19 and is provided with a cross pin 22 which slides in slots 23 arranged for it in the shaft 19 and sleeve 19'. The sleeve also has lugs 75 24 upon which are pivotally mounted as at 25, the ball members 26 of the governor. One or more springs 27 draw the weighted ends of the ball members 26 toward each other into the rest position in which they are 80 shown in Fig. 1 of the drawings. The inwardly extending arms 28 of the ball members are formed with yoke ends 29 which co-operate with the cross pin 22 to move the operating rod 21 longitudinally as the governor ball members 26 change their position 85 due to centrifugal force as the shaft 19 is rotated.

Means for adjusting the tension of the governor springs 27 are provided in the 90 form of pins 30, one of which is mounted in each of the ball members 26. Each of these pins is formed with a cylindrical part 31 and a shoulder 32 and has a nut 33 by means of which it may be adjusted and locked in 95 its seat in the ball member. Also there is an angular part 34 by which the pin may be turned. Each end of the pin is formed with a crank or eccentric nib 35 to which the ends of the springs 27 are connected and it will 100 be seen that by turning one of the pins in its seat these nibs may be moved relatively to the nibs of the other pin and a tightening or loosening of the springs will result. To thus adjust the tension of the springs, it 105 will be understood that it is only necessary to loosen the nuts 33, turn the pins the desired amount, and then tighten the nuts.

A cap 36 is detachably secured to the casing 18 over the governor to thereby protect it from dust and dirt while at the same time offering easy access for adjustment and repair.

The lower part of the casing 18 is in the form of a cylinder 37, which is shown as having its axis in line with the driving shaft 19 of the governor, and in this cylinder a hollow piston 38 operates and is spring-pressed upwardly as by the coil spring 39. The lower end of the cylinder 37 is closed by an adjustable cap 40 threaded into the cylinder and locked in adjusted position by a nut 41.

The piston 38 is formed with a stem 42 having a cross pin 43 which coöperates with the yoke ends 44 on the bell crank lever 17 hereinabove referred to. Thus, the tendency of the spring pressed piston 38 is to yieldingly press the horizontal arm of the bell crank lever 17 upwardly, and thus move the rod 16 to the right in Fig. 1 and close the throttle 12 in the intake pipe 10. Therefore, this spring device, as it may be termed, constantly tends to close the throttle valve 12, and it will be seen that the lower end of the operating rod 21 abuts the upper end of the stem 42 of the piston 38 and by reason of the greater strength of the springs 27 of the governor tending to force the operating rod 21 downwardly, the valve 12, when the governor is idle, is held by the governor spring 27 in open position as shown in the drawings. Hence any adjustment of the tension of the spring 39 by the cap 40 will act directly on the governor. Therefore this arrangement provides a second and finer and more accessible adjustment for the governor.

It will be understood also that as the governor shaft 19 is rotated, the governor ball members 26 begin to move outwardly and thus raise the operating rod 21. This permits the spring device in the cylinder 37 at the lower end of the governor casing to act upon the throttle valve through the connections shown and more or less close the valve, depending upon the exact position of the rod 21. Thus the piston 38 may be said to follow the operating rod 21 in upward movements, and if the speed of governor shaft 19 were suddenly increased the ball members 26 would fly outwardly quickly and the throttle valve would be almost instantly closed. To prevent this sudden closing of the throttle under these conditions, a dash-pot mechanism is arranged in combination with the piston 38. This dash-pot mechanism permits the piston to move downward rapidly but makes its upward movement more sluggish. Thus, the piston is provided with ports 45 and a valve 46 therefor slides on the stem 42. A light spring 47 presses the valve 46 down-

wardly on the ports 45, but permits the valve to rise when the piston 38 moves downwardly. It is intended that the cylinder 37 shall be filled with oil or a similar liquid to a point somewhat above the top of the piston 38 and the cylinder is provided with a by-pass 48 controlled by a valve 49, which permits the slow passage of the oil around the piston. Thus it will be seen that when the operating rod 21 presses the piston 32 downwardly, the valve 46 will rise and permit the oil beneath the piston to pass freely to the part of the cylinder above the piston, and the movement of the rod 21, and consequently the opening action of the throttle 12, is not retarded in any way. However, when the operating rod 21 is suddenly raised as by a rapid increase in speed of the driving shaft 19, the piston 38 will not readily follow the rod 21, but will be sluggish in its movement due to the fact that the ports 45 will be closed by the valve 46 and the oil will by-pass slowly around the piston through the valved opening. Thus the throttle valve 12 will close more slowly than it would were there no retarding means provided, and therefore, while the governor and consequently the operating rod 21 may "hunt" to some extent, the piston 38 and consequently the throttle valve 12, will more slowly reach the normal running position of the parts where they will be controlled in the usual manner by the governor.

It will also be observed that by opening the hand controlled throttle 11 very suddenly, the motor may be speeded up and carried somewhat above its normal maximum speed before the governor-controlled throttle can sufficiently close to check it. This will permit the operator to get a slight burst of power for starting the truck or getting it out of a hole, where he would not be able to do so if the throttle valve 12 immediately followed the position of the operating rod 21.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In a hydrocarbon motor, the combination with a throttle valve thereof, of a governor adapted when idle to hold said throttle valve open, a spring device tending to close the throttle valve, and a dash pot for retarding the closing action of said valve.

2. In a hydrocarbon motor, the combination with a throttle valve thereof, of a governor adapted when idle to hold said throttle valve open, a spring device tending to close the throttle valve, and a dash pot for retarding the closing action of said valve, said dash pot permitting free movement of the valve toward open position.

3. In a hydrocarbon motor, the combination with a throttle valve thereof, of a governor adapted when idle to hold said throttle valve open, a spring device tending to close the throttle valve, and a dash pot for retarding the closing action of said valve, said dash pot permitting free movement of the valve toward open position.

nation with a throttle valve thereof, of a governor and connections, said connections including means to actuate said throttle valve more sluggishly during acceleration than during retardation of the motor.

4. In a hydrocarbon motor, the combination with a throttle valve thereof, of a governor and connections, said connections including means to move said valve directly with the governor as the motor slows down and to move said valve sluggishly with the governor as the motor speeds up.

5. In a hydrocarbon motor, the combination with a throttle valve thereof, of a governor adapted to positively open the valve, and a sluggishly operating spring device adapted to close the valve.

6. In a hydrocarbon motor, the combination with a throttle valve thereof, of a governor adapted to positively open the valve, a spring device adapted to close the valve, and means for causing a sluggish action of said spring device in one direction.

7. In a hydrocarbon motor, the combination with a throttle valve thereof, of a governor adapted to positively open the valve, a spring device adapted to close the valve, and means for causing a sluggish action of said spring device as it closes the valve while permitting freer action as the valve is opened.

8. In a motor, the combination with a throttle valve, of a centrifugal governor operated by the motor, a spring device acting sluggishly against the governor spring with a tendency to close the throttle valve and means permitting quick action of the governor to be conveyed to the throttle valve for opening the latter.

9. In a motor, the combination with a throttle valve, of a centrifugal governor operated by the motor, and having a driven shaft, a rod controlled by the governor and arranged co-axial with said shaft, a device connected to operate said throttle valve and arranged in the path of said rod, and a dash pot connected to said device.

10. In a motor, the combination with a throttle valve, of a centrifugal governor operated by the motor, and having a driven shaft, a rod controlled by the governor and arranged co-axial with said shaft, a device connected to operate said throttle valve and arranged in the path of said rod, a dash pot connected to said device, and a spring for yieldingly operating said device in one direction.

11. In a motor, the combination with a throttle valve, of a centrifugal governor operated by the motor, and having a driven shaft, a rod controlled by the governor and arranged co-axial with said shaft, a device connected to operate said throttle valve and arranged in the path of said rod, a dash pot connected to said device, and a spring for

operating said device to follow the centrifugal action of the governor.

12. In a motor, the combination with a throttle valve, of a centrifugal governor operated by the motor, and having a driven shaft, a rod controlled by the governor and arranged co-axial with said shaft, a device connected to operate said throttle valve and arranged in the path of said rod, and a one way dash pot adapted to retard the movement of said device in one direction.

13. A governor device comprising a driven shaft, a centrifugal governor mounted thereon, a sliding rod controlled by the governor, a device for operating a valve and arranged in the path of said rod, a cylinder having a by-pass, a piston in said cylinder connected to said device, and a valve in said piston adapted to permit relatively free movement of the device in one direction.

14. A governor device comprising a driven shaft, a centrifugal governor mounted thereon, a sliding rod controlled by the governor, a device for operating a valve and arranged in the path of said rod, a cylinder having a by-pass, a piston in said cylinder connected to said device, a valve in said piston, and a spring for operating said device to follow the centrifugal action of the governor.

15. A governor device comprising a vertical driven shaft, a centrifugal governor mounted at the upper end thereof, a sliding rod controlled by the governor and extending downwardly through the shaft, a casing for all of said parts and having a cylinder formed at its lower end in line with the governor shaft, a piston in said cylinder, a spring tending to move said piston upwardly against the downward tendency of the governor when it is idle, a valve in said piston, said cylinder containing a liquid such as oil and having a by-pass around the piston, and a valve operating device connected to said piston.

16. In a hydrocarbon motor, the combination with a throttle valve thereof, of a spring device tending to close said valve, a governor tending when idle to open said valve and being stronger than said spring device, and means for adjusting the action of both the governor and the spring device.

17. In a hydrocarbon motor, the combination with a throttle valve thereof, of a spring device tending to close said valve, a governor tending when idle to open said valve and means for adjusting the action of both the governor and the spring device.

18. In a governor, a rotatable shaft, ball members pivoted thereon, adjustable pins mounted on said ball members and having eccentric nibs, and a spring having its ends connected to said nibs.

19. In a governor, a rotatable shaft, ball members pivoted thereon, a spring connect-

ing said ball members, and an eccentric for adjusting the tension of said spring.

20 In a governor, a rotatable shaft, ball members pivoted thereon, a spring connecting said ball members, means mounted in said ball members transversely of said shaft to which means the ends of said spring are connected, said means being so formed that they may be moved to shift the position of parts to which the spring ends are connected while maintaining practically the same position relative to the shaft.

21. In a governor, a rotatable shaft, ball members pivoted thereon, rotatable means mounted on said ball members, eccentric nibs on said means and springs connecting said ball members, the ends of said springs being joined to the nibs of said rotatable

means so that the rotation of one of said means will adjust the tension of said springs without materially unbalancing said governor.

22. In a hydrocarbon motor, the combination with a throttle valve thereof, of a governor adapted to move said valve freely in one direction, means adapted to move said valve in the opposite direction and means adapted to retard the operation of said second named means.

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

HAROLD D. CHURCH.

Witnesses:

A. K. SPEER,
H. B. KNAP.