Sept. 22, 1925. 1,554,618

R. W. BARTON

GOVERNOR FOR INTERNAL COMBUSTION ENGINES

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Fig. 2

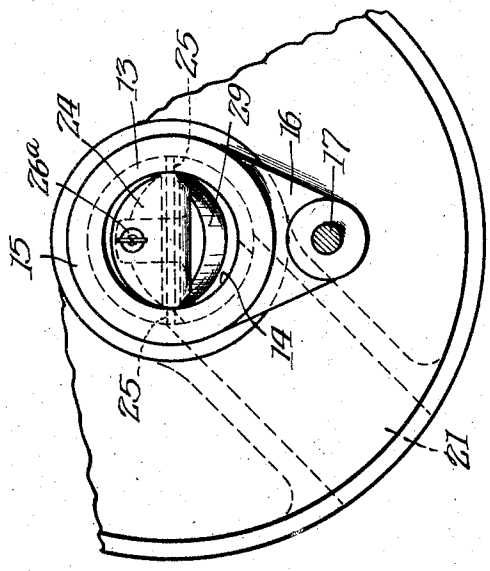
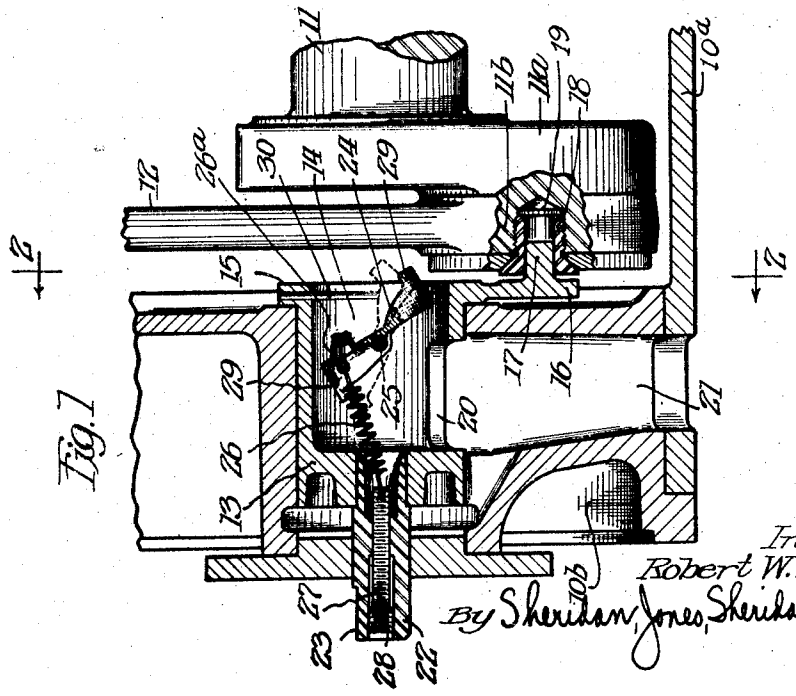


Fig. 1



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Fig. 4

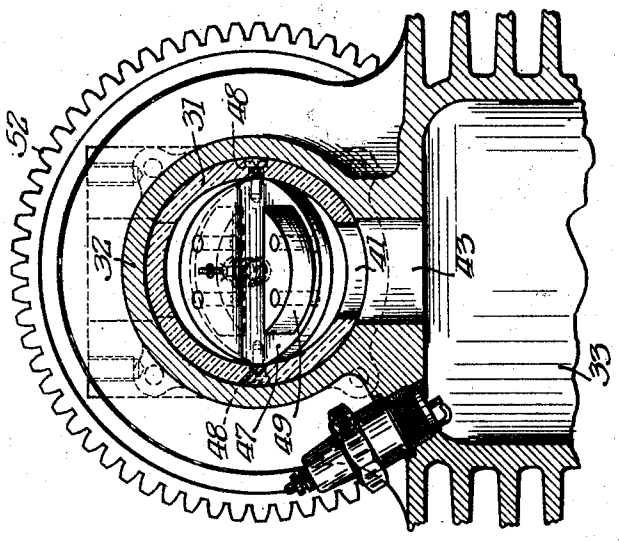
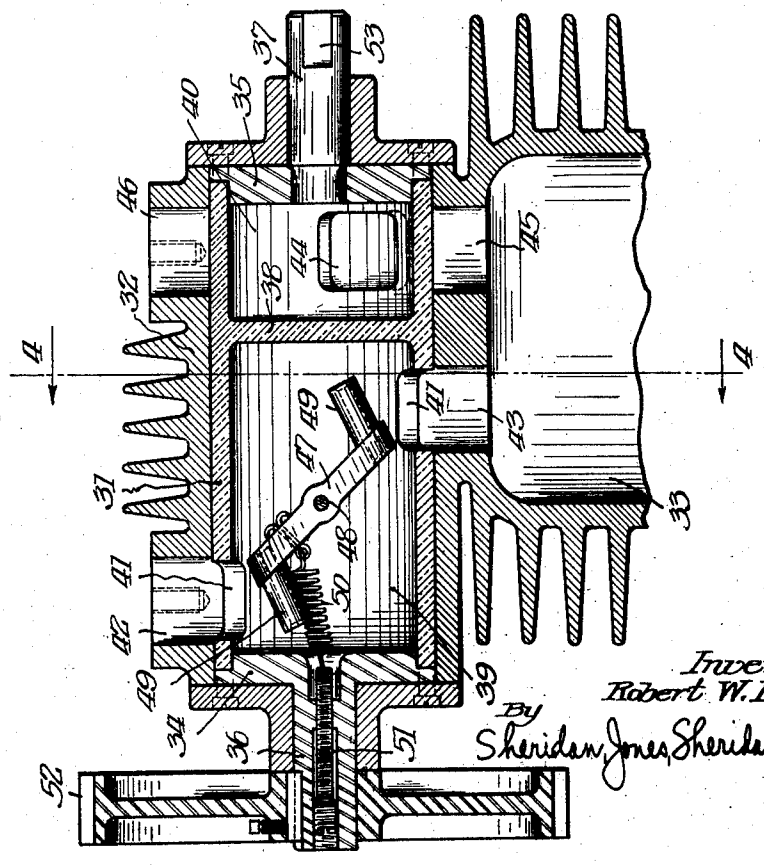


Fig. 3



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Patented Sept. 22, 1925. 1,554,618

UNITED STATES PATENT OFFICE.

ROBERT W. BARTON, OF CHICAGO, ILLINOIS, ASSIGNOR TO UNIVERSAL ENGINEERING COMPANY, OF MAYWOOD, ILLINOIS, A CORPORATION OF ILLINOIS.

GOVERNOR FOR INTERNAL-COMBUSTION ENGINES.

Application filed September 18, 1919. Serial No. 324,668.

To all whom it may concern:

Be it known that I, ROBERT W. BARTON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Governors for Internal-Combustion Engines, of which the following is a specification.

This invention relates to improvements in internal combustion engines, and more particularly to governing devices therefor.

One object of the invention is to provide, in combination with a rotary intake valve for internal combustion engines, a governor adapted for mounting directly on said valve and one which, upon operation of said valve, becomes self-actuable to vary the size of the outlet orifice of said valve. Another object is to provide a centrifugally controlled governor adapted to be mounted directly on the rotary intake valve of the engine and to be actuated thereby to open and close the outlet passage of said valve in suchwise as to control the flow of fluid therethrough, thus dispensing entirely with governors of the type now commonly employed, wherein the controlling influence of the governor is transmitted thereby from the rotary part on which the same is mounted to some stationary part of the engine on which the throttling mechanism is located.

Other objects and advantages will become apparent from the following description taken in connection with the accompanying drawings, wherein two embodiments of the invention are illustrated.

Figure 1 is a vertical sectional view taken through the crank case of a two-cycle internal combustion engine, showing the preferred mounting of the rotary intake valve in an engine of this type, and also showing the governing device operatively associated therewith;

Fig. 2 is a section taken on line 2—2 of Fig. 1, showing the valve and governor in front elevation;

Fig. 3 is a vertical sectional view taken through the upper portion of a cylinder of a four-cycle internal combustion engine, showing the preferred mounting of the rotary intake valve in an engine of this type and also showing the governing device operatively associated therewith; and

Fig. 4 is a section taken on line 4—4 of Fig. 3.

Referring more in detail to the drawings, one corner of the crank case of a two-cycle engine is shown in section in Fig. 1, wherein the lower wall or section of the case is shown at 10^a and the removable end or cover section of the case at 10^b. The crank shaft is shown at 11, and in the particular type of engine illustrated said shaft is of the so-called "over-hung" type, the same terminating at one end, as shown, within the crank case, said end being provided with the usual crank arm 11^a and the crank pin 11^b, to which latter the connecting rod 12 is attached in the usual manner.

Mounted in the end or removable wall or section 10^b of the crank case in any suitable manner, and preferably in line with the shaft 11, is shown the rotary intake valve 13 of the engine, said valve being preferably horizontally disposed and of the hollow cylindrical type and open at one end in order to provide an outlet passage or orifice 14 leading into the crank case or compression chamber. This valve at its inner end is provided with an outwardly flared flange 15, which is adapted to bear against the adjacent surface of the crank case wall, as shown, in order to prevent longitudinal displacement of said valve outwardly. A suitable driving arm 16 projects beyond the periphery of the flange 15 and is provided at its lower end with a stud 17 designed to fit within a suitable bearing 18 which lines the hole or socket 19 disposed preferably in the center of the crank pin 11^b. From this it will be noted that a driving connection is provided for the rotary valve 13, whereby the said valve may be driven at crank shaft speed directly from the crank pin of said shaft. It is preferred, in connecting the driving arm 16 of the valve with the crank pin, to position the former in rather close proximity to the outer end of the bearing 18, so as to provide against longitudinal displacement of the valve inwardly. As has already been pointed out, the annular flange 15 prevents longitudinal displacement of the valve outwardly.

A suitable slot or port 20 is provided in the wall of the valve 13 and is adapted to register with the upper end of the fuel passage 21 provided in the crank case cover 10^b, at the proper time and for the proper duration, with respect to the cycle of operation of the engine, to properly admit the work-

ing fluid into the interior of the crank case or compression chamber. The lower end of the fuel passage 21 communicates with the carburetor or other charge-forming device.

Securely fastened to the outer end of the valve 13, and adapted to rotate therewith, is a small stub shaft 22. This shaft preferably extends through the outer wall of the crank case so that the outer end thereof will be exposed exteriorly of the case, as shown in Fig. 1. This shaft is provided with a cam surface 23 which may be utilized to operate any desired form of ignition system to supply a properly timed spark to the cylinder of the engine, or, if desired, a coupling can be secured to the cam surface of the shaft and in this manner adapt such shaft for driving a magneto of any standard type or other similar device for the purpose of supplying ignition to the engine.

The governor which forms the subject-matter of the present application is designated generally by reference character 24, said governor being preferably in the form of a butterfly or disk valve, and is mounted on a diametrically disposed pivot rod 25 within the valve 13 adjacent the inner end of said valve and intermediate such end and the inlet port or slot 20. This butterfly valve or governing disk 24 is normally held in the position shown in dotted lines in Fig. 1 by means of the coil spring 26, the said spring being attached at one end to said valve and at its other end to an adjusting screw-threaded stem 27 mounted within a suitable bore arranged concentrically within the stub shaft 22, said stem being accessible through the outer end of said stub shaft so that the same may be readily adjusted to increase or diminish the tension of said spring as may be desired. It is preferred to provide a suitable screw-threaded plug 28, which also fits within the bore provided in the stub shaft, so that after the spring has been adjusted said bore may be effectually closed to thus prevent accidental displacement of the adjusting stem. As above stated, the pivot rod 25 on which the butterfly valve or governing disk 24 is mounted is disposed diametrically within the fuel passage of said valve 13, and it is to be further noted that said pivot rod is rigidly mounted in such position by anchoring its opposite ends in the wall of said valve 13. Thus it will be observed that upon rotation of the valve 13 the governor disk will be rotated therewith and, by virtue of said disk being oppositely weighted as at 29, the same will be readily acted upon by centrifugal force against the tension of the spring 26, in such wise that the tendency of said valve is to approach the full closed position more and more as the engine speeds up, thus providing a governing action. The connection of the spring 26 with the governor disk is preferably in the form of a swivel, as shown, so that when said spring is adjusted no twisting or distortion of the same is caused.

It is also to be noted that the governor disk, at the point where the spring is swiveled thereto, is preferably provided with an outwardly extending pocket 26ª, as shown more clearly in Fig. 1 of the drawings, so that under normal working conditions of the governing disk, the point of attachment of the spring to the disk will preferably lie in substantially the same vertical plane with the rod on which the disk is pivoted, so that less force will be required in effecting a complete closure of the valve, or any movement thereof in advance of its normal working position. In short, it has been found that by attaching the spring in this manner, a more sensitive action of the governing disk is realized, particularly in its movement from the position shown in Fig. 1 to fully closed position.

A suitable stop 30 is carried by the valve 13 at its inner end, which prevents the governing disk, when the engine is at rest, from being thrown past its normal position, as shown in dotted lines. By this means the governing disk is also prevented from turning in a reverse direction when the engine is operated, as will be readily observed. The governor disk in Fig. 1 of the drawing is shown in the position which it assumes during normal operation of the engine.

From the foregoing it will be observed that upon rotation of the cylindrical valve 13 the weighted governor disk will be acted upon by centrifugal force in suchwise as to cause the same to swing or rotate on its pivot to thus effect a partial or complete closing of the outlet orifice 14 of said valve, thereby regulating the flow of fluid through said orifice and controlling the speed of the engine. It will be observed that by the proper adjustment of the spring 26 the regulation of the flow may be proportionate to the rotational speed. When the outlet orifice 14 has been sufficiently obstructed to cause a reduction in the flow of fluid therethrough, and hence a reduction in the speed of the engine, the centrifugal force acting upon the governor disk will diminish and said disk will accordingly be drawn or swung in the reverse direction by the spring 26, thus permitting an increased flow of fluid through the outlet passage so that the engine may again pick up. It will be observed that the speed and power output of the engine can be governed to any predetermined standard by the proper adjustment of the spring.

From the above it will be observed that a governor has been provided which is adapted to rotate with the inlet valve, the outlet orifice of said valve being regulated by such governor. In this manner the complicated, unreliable and troublesome features

of the ordinary governor now in common use are eliminated.

In Fig. 3 of the drawings an application of the present improvements to an engine of the four-cycle type is illustrated. The rotary valve in this form of the invention is illustrated at 31, and is shown mounted horizontally in a suitable cylindrical casing or cylinder 32 disposed on the top of the working cylinder 33 of the engine. The valve 31 in this embodiment of the invention is provided with cover plates 34 and 35 at its ends, said plates being provided with outwardly projecting stub shafts 36, 37, respectively. There is provided a partition wall 38 which divides the hollow cylindrical chamber of said valve 31 so as to provide an intake chamber or passage 39 and an exhaust chamber or passage 40. The chamber 39 is provided with two slots or ports 41, designed to register respectively with the inlet port 42 provided in the casing 32 and the inlet port 43 provided in the top of the working cylinder 33. A plurality of slots or ports 44 (only one of which is shown in the drawings) is provided in the walls of the exhaust chamber 40, and these are designed to register with the exhaust port 45 provided in the top of the working cylinder 33 and the exhaust port 46 provided in the casing 32 and communicating with the atmosphere. These ports 41 and 44 are adapted to register with their corresponding ports in the working cylinder 33 and casing 32 at the proper time and for the proper duration, with respect to the cycle of operation of the engine, to properly admit the working fluid into said working cylinder and to permit of such fluid exhausting after it has been fired. As will be readily appreciated, the intake port 42 communicates by suitable means with the carburetor or other charge-forming device of the engine.

The governor disk in this form of the invention is shown at 47 pivoted on the diametrically disposed rod 48 within the chamber 39 intermediate the inlet ports 41. The governor disk is oppositely weighted as at 49, said weights in this form of the invention as distinguished from the form disclosed in Fig. 1, being in the form of separate elements attached to opposite faces of the disk in any suitable manner, said elements being preferably of sufficient length so that at least one may contact with the adjacent end of the chamber when the disk is in its normal, inoperative position, so as to prevent the same from being swung in a reverse direction when acted upon by the centrifugal force imparted thereto when the engine is operated. There is also provided in this form of the invention a spring 50 for the disk, which normally tends to hold said disk in its open position. This spring 50 may be adjusted by suitable means 51 analogous to the adjusting means disclosed in Fig. 1 of the drawings. In Fig. 3, however, the adjusting means or stem is positioned in a central bore provided in the stub shaft 36, which shaft in this form of the invention is provided with a gear or sprocket wheel 52 designed to be connected with the crank shaft of the engine by any suitable means, so that upon operation of the engine the valve will be operated and properly timed. The gearing for operating the valve in this type of engine (four-cycle) may be of any of the well-known 2-to-1 reduction type. The stub shaft 37, which projects outwardly of the casing 32 at the other end of the valve, corresponds to the stub shaft 22 in the form shown in Fig. 1, said shaft 37 being provided with a cam surface 53 designed to be utilized in operating any desired form of ignition system, as described more fully in connection with Fig. 1.

It will be obvious to those skilled in the art that various changes and modifications may be made in the construction herein illustrated and described, without departing from the spirit of the invention, and accordingly it is not desired to limit the invention except where limitations appear in the appended claims.

No claim is herein made to the rotary intake valve shown and described, or to its driving mechanism apart from the combination of these features with the governor.

I claim:

1. The combination with a rotary cylindrical intake valve for internal combustion engines, said valve having an axial passage therein and being open at its inner end to provide an outlet orifice, of a centrifugally controlled governor pivotally mounted within said passage adjacent said outlet and actuable upon operation of said valve to regulate the size of said outlet.

2. The combination with a rotary cylindrical intake valve for internal combustion engines, said valve having an axial passage therein and being open at its inner end to provide an outlet orifice, of a pivoted element mounted in said passage adjacent said outlet and movable to obstruct the flow of fluid therethrough, means for normally maintaining said element in its retracted or open position, and means whereby upon operation of said valve said element will be actuated to obstruct said outlet to thereby govern the speed of said engine, the degree of obstruction being dependent upon the rotational speed of said valve.

3. The combination with a rotary cylindrical intake valve for internal combustion engines, said valve being open at its inner end to provide an outlet orifice, of a governing element pivoted within said valve adja-

cent said outlet and movable to obstruct the flow of fluid therethrough, and means for normally maintaining said element in its retracted or open position, the opposite sides of said element being weighted so as to render the same susceptible to centrifugal action upon operation of said valve.

4. In an internal combustion engine, a horizontally disposed rotary cylindrical valve having a passage therethrough for the admission of the charge into said engine, and a governor disk pivotally mounted within said passage on a diametrically disposed axis.

5. In an internal combustion engine, a horizontally disposed rotary cylindrical valve having a passage therethrough for the admission of the charge into said engine, a governor disk pivotally mounted within said passage on a diametrically disposed axis, resilient means for opposing the operation of said governor, and means for limiting the action of said resilient means.

6. In an internal combustion engine, a horizontally disposed rotary cylindrical valve having a passage therethrough for the admission of the charge into said engine, a governor disk pivotally mounted within said passage on a diametrically disposed axis, resilient means for opposing the operation of said governor, and means for limiting the action of said resilient means, said last-named means comprising a stop carried by said valve.

In testimony whereof, I have subscribed my name.

ROBERT W. BARTON.