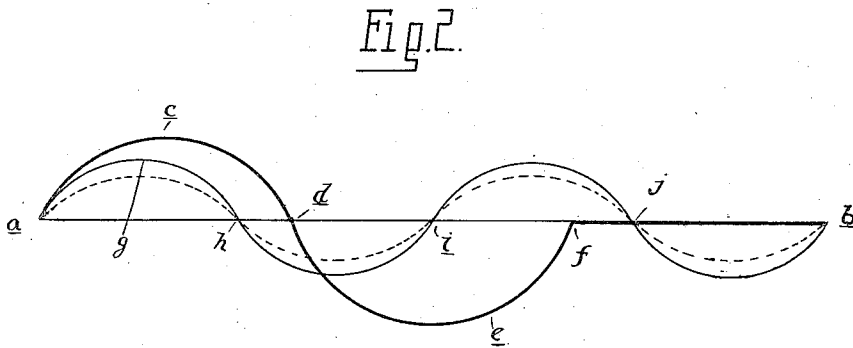
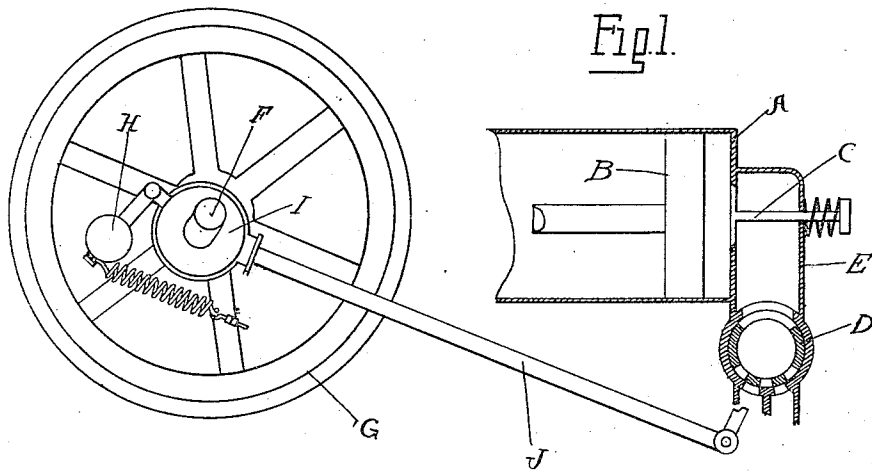


N. T. HARRINGTON.
GOVERNOR FOR EXPLOSION ENGINES.
APPLICATION FILED JAN. 27, 1908.

1,036,617.

Patented Aug. 27, 1912.



Witnesses
R. Ford
James P. Barry.

Inventor
Norman T. Harrington
By *Whitmore Hubert Whitmore*
attys

UNITED STATES PATENT OFFICE.

NORMAN T. HARRINGTON, OF LANSING, MICHIGAN.

GOVERNOR FOR EXPLOSION-ENGINES.

1,036,617.

Specification of Letters Patent. Patented Aug. 27, 1912.

Application filed January 27, 1908. Serial No. 412,833.

To all whom it may concern:

Be it known that I, NORMAN T. HARRINGTON, 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 Explosion-Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention relates more particularly to explosion engines of the four-cycle type, and it is the object of the invention to obtain a simple construction of throttle governing means, avoiding the complications due to the peculiar timing of the valves required for engines of this type.

In the operations of engines of the above type, the admission valve is opened but once during the cycle of the two revolutions of the crank, and generally remains open for more than one-quarter of this cycle. It is therefore difficult to adapt a simple governing mechanism such as may be employed for steam engines for controlling and properly timing the operation of this admission valve. On the other hand, the admission valve of an explosion engine may be operated automatically by the suction of the engine piston if the same quantity of explosive mixture is taken into the cylinder at each suction stroke. With the present invention the governing mechanism, as simple in its construction as that employed for a steam engine, is combined to cooperate with a properly timed inlet valve to vary the quantity of the explosive mixture introduced into the cylinder.

In the drawings, Figure 1 is a diagrammatic illustration of my improved governing mechanism; Fig. 2 is a diagram illustrating the principle of operation.

A is the cylinder of an explosion engine, B the piston, and C the admission valve, which may be of any suitable construction, but, as shown, consists of a spring closed automatic valve.

D is a second valve controlling the flow of the explosive mixture through the inlet conduit E and this, as shown, is a rotary valve which is opened by movement in either direction from a neutral position.

F is the crank shaft of the engine, G the fly wheel thereon, and H a centrifugal governor of any suitable construction and con-

trolling an eccentric I which operates the rod J connected to the valve D.

With the above described construction, in operation the valve D will be opened and closed by the operation of the eccentric I and rod J at regular intervals, being twice opened and twice closed in each cycle of the engine. On the other hand, the valve C will be opened but once in each cycle and for a period which is in excess of any one period in which the valve D is opened. The difference in the timing of the operation of the two valves will not however interfere with the introduction of a full charge of the explosive mixture into the engine cylinder, as the valve D only closes momentarily, and will be reopened again during the open period of the valve C. The result is that during the instant of the closure of the valve D there is only a temporary reduction in the pressure of the gases in the engine cylinder, but upon the reopening of said valve the full pressure is quickly restored and the full charge is introduced into the cylinder.

In the operation as just described, it has been assumed that the engine is running at normal speed, and that the governing mechanism is not in action. Whenever the speed of the engine is accelerated there will be an adjustment of the portion of the eccentric I due to the operation of the centrifugal governor H, and this will diminish the amplitude of the movement of the valve D so as to restrict the flow of gas through the conduit E. Any degree of restriction may be effected to the point where the eccentric I becomes concentric with the axis of the shaft F and the valve D is completely closed. A different relative timing effect for the two valves C and D may be obtained by an adjustment of the normal position of the eccentric about the shaft F, but I preferably make such an adjustment as to cause the valve D to close during the middle portion of the suction stroke. This will prevent the formation of too high a vacuum at the beginning of the suction stroke, and will also permit the equalization of pressure at the end of the suction stroke and after the temporary closure of the valve.

The mechanism described will produce a governing effect which for all practical purposes is as exact as could be obtained by a

direct control of the admission valve C and by means of the complicated mechanism necessary for the variable operation of this valve.

- 5 On the diagram, Fig. 2, the line *a—b* represents one complete cycle of the operation of the engine. The heavy line between the points *a* and *d* indicates the timing of the movement of the operation of the exhaust valve, and the heavy line *e* between the points *d* and *f* indicates the operation of the admission valve, while the heavy line between the points *f* and *b* indicates the period in which both inlet and exhaust valves are closed. 10 The light line *g* indicates the operation of the controlling valve D by the eccentric I and, as illustrated, this valve is closed at regular intervals at the points *a*, *h*, *i*, *j* and *b*. The closing at *i* occurs during the interval for the suction stroke and before the closing of the inlet valve but, as shown, the valve D is again opened and remains open until after the closing of the inlet valve. 20

What I claim as my invention is:

- 25 1. In an explosion engine, the combination with a periodically-opening admission valve, of a valve controlling the same conduit having merely an instantaneous closure intermediate its open periods, and means for 30 varying the degree of opening of said valve.
2. In an explosion engine, the combination with a periodically-opening admission valve, of a constantly moving valve controlling the same conduit having merely an instantaneous closure intermediate its open 35 periods, an eccentric for operating said valve, and means for varying the throw of said eccentric.
3. In an explosion engine, the combination with a periodically-opening admission 40 valve, of a valve controlling the same conduit continuously operating with a simple harmonic movement having merely an instantaneous closure at the point of greatest 45 acceleration in its movement, and means for

varying the amplitude of movement of said valve.

4. In an explosion engine, the combination with a periodically-opening admission valve, of a continuously moving oscillating 50 valve controlling the same conduit having an instantaneous closure at the center of its oscillation, and means for varying the amplitude of oscillation.

5. In an explosion engine, the combination with an admission valve, of a valve controlling the same conduit adapted to be opened by a movement in either direction from a neutral position, an eccentric for operating said valve alternately upon opposite 55 sides of its neutral position, and centrifugal operating means for varying the throw of said eccentric. 60

6. In an explosion engine, the combination with an admission valve, of a valve controlling the same conduit adapted to be opened by a movement in either direction from a neutral position, and an eccentric for operating said valve alternately upon 65 opposite sides of its neutral position. 70

7. In an explosion engine, the combination with a main admission valve, of an adjustably controlled oscillating valve controlling the same conduit having an instantaneous closure at the center of its oscillation in all positions of control adjustment. 75

8. In an explosion engine, the combination with a main admission valve, of an oscillating valve controlling the admission to said main valve having in each direction of 80 movement a plurality of open periods and an instantaneous closure intermediate such open periods.

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

NORMAN T. HARRINGTON.

Witnesses:

NELLIE KINSELLA,
JAMES P. BARRY.