No. 867,273. PATENTED OCT. 1, 1907.

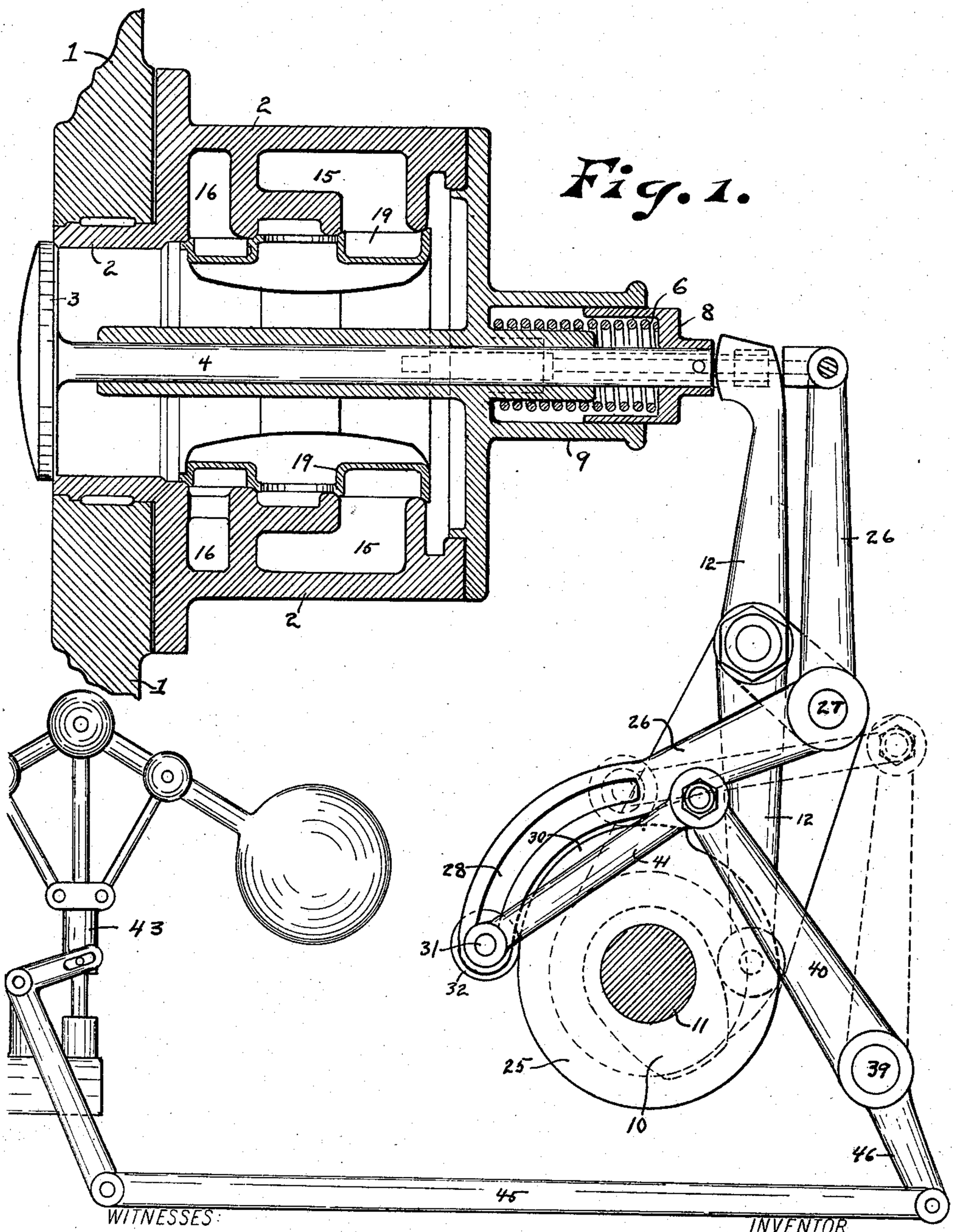
E. H. HOLMES.

VALVE MECHANISM.

APPLICATION FILED AUG. 30, 1905.

2 SHEETS—SHEET 1.

Fig. 1.



WITNESSES:

J. R. Enwin

Della Higgins

INVENTOR

Ernest Hugo Holmes

BY

Edwin A. Huebner

ATTORNEYS.

No. 867,273. PATENTED OCT. 1, 1907.

E. H. HOLMES.

VALVE MECHANISM.

APPLICATION FILED AUG. 30, 1905.

2 SHEETS—SHEET 2.

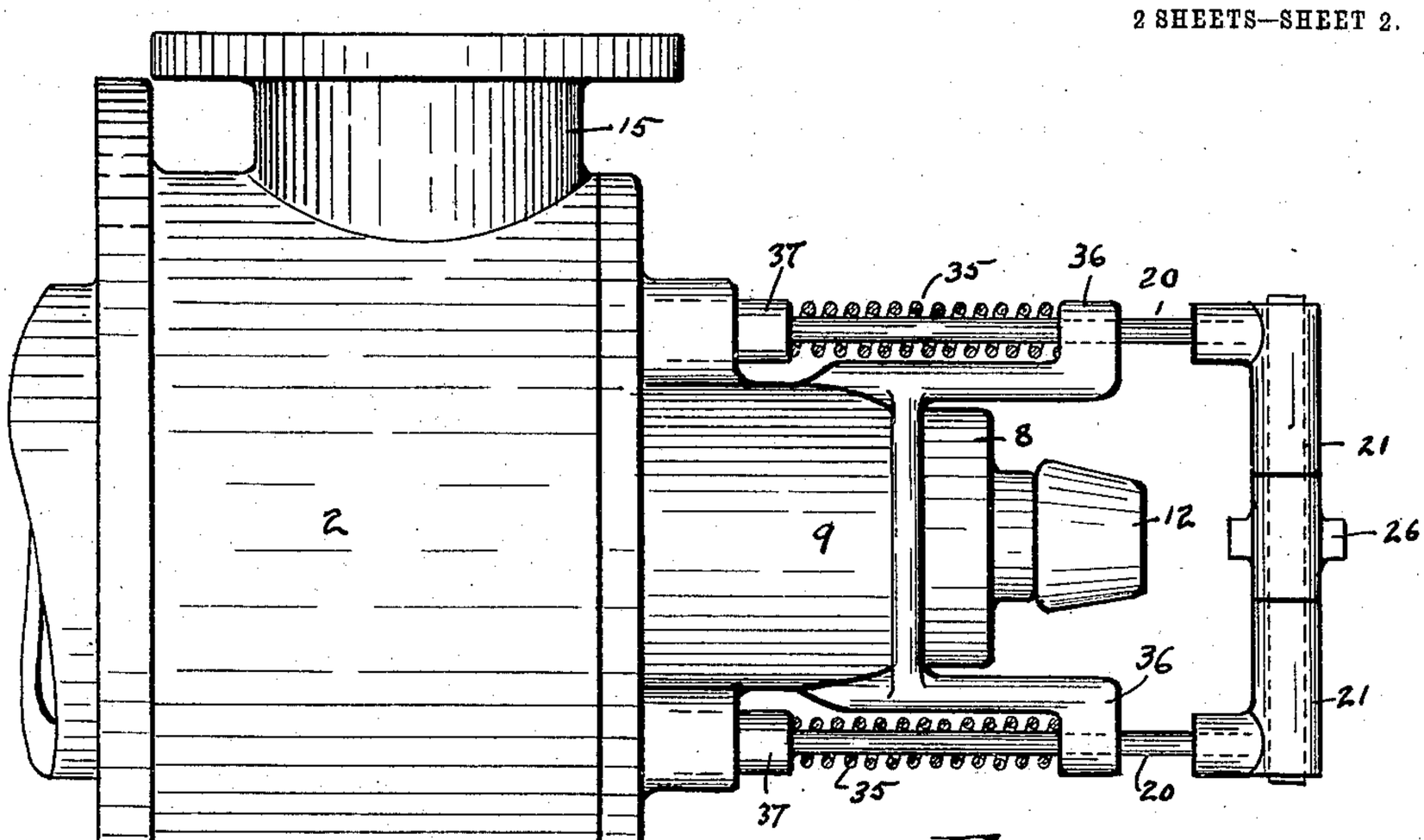


Fig. 2.

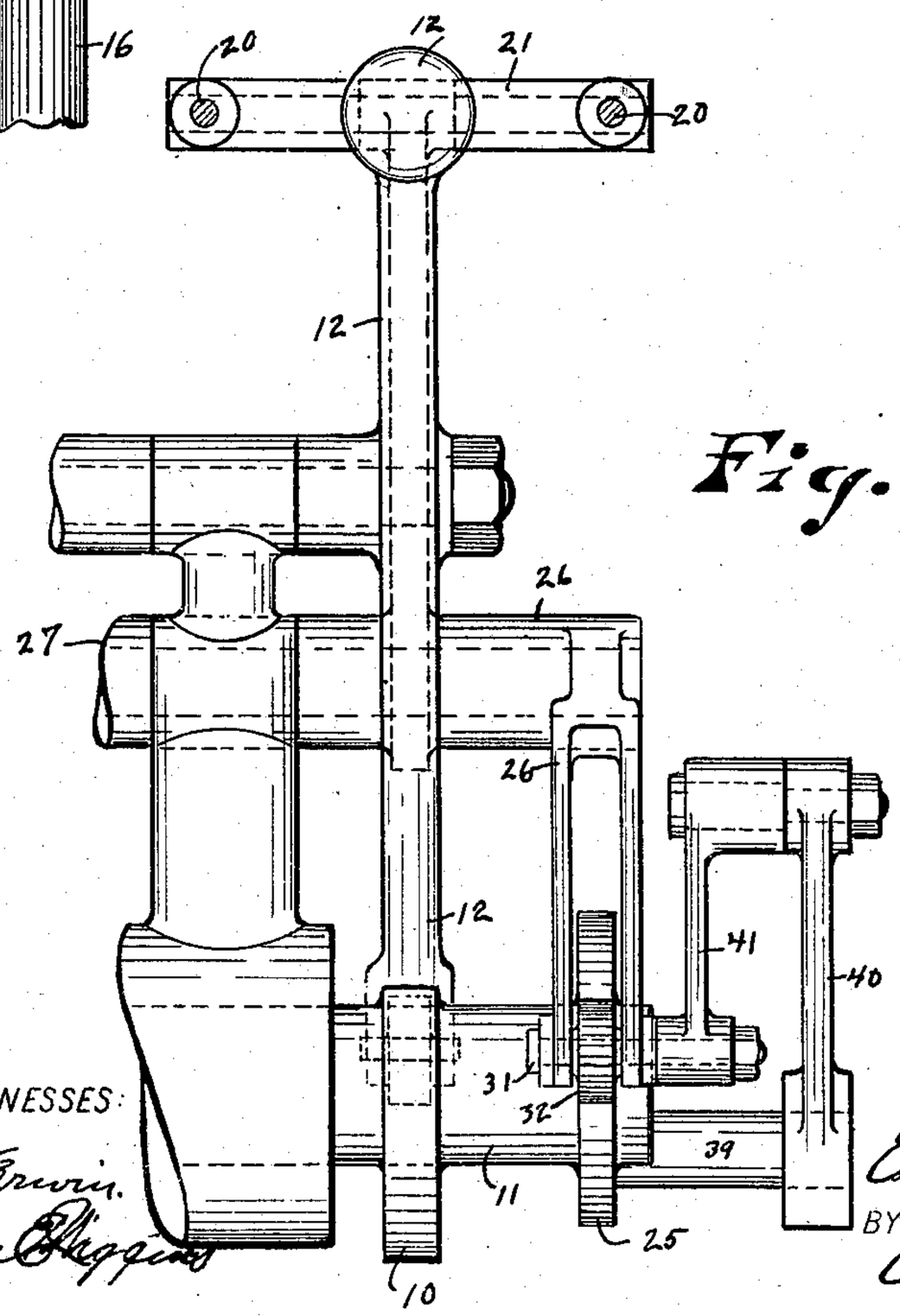


Fig. 3.

WITNESSES:

O. R. Ervin.

Drew Higgins

INVENTOR

Ernest Hugo Holmes

BY Evans & Mehuler

ATTORNEYS.

UNITED STATES PATENT OFFICE.

ERNEST HUGO HOLMES, OF MILWAUKEE, WISCONSIN.

VALVE MECHANISM.

No. 867,273. Specification of Letters Patent. Patented Oct. 1, 1907.

Application filed August 30, 1905. Serial No. 276,357.

To all whom it may concern:

Be it known that I, ERNEST HUGO HOLMES, a subject of King Oscar of Sweden, residing at Milwaukee, county of Milwaukee, and State of Wisconsin, have invented new and useful Improvements in Valve Mechanisms, of which the following is a specification.

My invention relates to improvements in valve mechanisms with especial reference to that class of valves and actuating mechanisms used to control the admission of the working fluid to internal combustion engines.

The object of this invention is to provide a form of construction in which the supply of explosive fluid may be regulated by an ordinary governor through the medium of a cut off valve.

In the following description, reference is had to the accompanying drawings in which,

Figure 1 is a vertical, sectional view of a valve and a portion of the cylinder of an internal combustion engine, drawn on the axis of the inlet port and showing also the valve actuating mechanism in its relation to the cam shaft of the engine. Fig. 2 is a plan view of the same. Fig. 3 is an elevation in detail of the cam actuated connections as seen from the direction of the cylinder, the valve stems being shown in cross section.

Like parts are identified by the same reference characters throughout the several views.

1 is a portion of the cylinder of a gas engine, 2 is valve casing for the inlet port, and 3 is a main valve provided with a stem 4 which extends longitudinally through the casing and is actuated to close the valve 3 by means of a spring 6. The stem 4 is provided with a cap 8 which is movably seated in the spring socket 9, with the spring interposed between the cap and the head of the valve casing. The valve 3 is opened by means of a cam 10 on the cam shaft 11, which cam actuates a lever 12 at the proper intervals and presses the cap 8 and valve stem inwardly. These parts may be of any ordinary construction, and the arrangement is such that the valve 3 will be held open by the cam 10 during the suction interval and will then be closed by reaction of spring 6.

The valve casing is provided with an air inlet passage 15 and a gas inlet passage 16, preferably annular in form, and arranged in communication with air and gas admission ducts not shown in the drawing. The admission of air and gas through these passages 15 and 16 is controlled by a multi-seated puppet valve 19, which is provided with actuating stems 20, one on each side of the stem 4, which extends axially through the valve 19 as best shown in Fig. 1.

The stems 20 are connected with a cross head 21 which is actuated from the main shaft by a cam wheel 25 through the lever 26, which is pivoted at 27 to any suitable support and connected with the cross head at its upper end.

It will be observed that the lower arm of the lever 26 is curved and provided with a slot 28, curved substantially in conformity with the curve of the contact margin of the cam projection 30 on the cam wheel 25. A bearing block 31 is movably mounted in the slot 28 and is provided with a roller 32 which is adapted to bear upon the margin of the wheel 25 as shown. When the block 31 is at the lower end of the slot, the roller is in constant contact with the cam wheel 25, but when shifted to the upper end of the slot, it is at a greater radial distance from the center of the wheel, and out of contact with its margin, except when in registry with the higher portions of the cam projections 30. In the construction shown, the cam projection and motion transmitting connections are arranged to open the valve 19 outwardly. The valve 19 closes inwardly by reaction of springs 35 when the cam projection clears the roller 32 on the actuating lever 26. The springs 35 are located between fixed projections 36 on the casing and shoulders 37 on the valve stems. A rock shaft 39 is provided with an arm 40, connected by one or more links 41 with the journal block 31 of the roller 32, whereby a rocking movement of the shaft is communicated to shift the roller along the slot 28. This shaft may be rocked by means of any ordinary speed governor such as indicated at 43 in Fig. 1, whereby the admission of air and gas may be automatically controlled.

The cam projection 30 is preferably of such dimensions that when the roller 32 is at the lower end of slot 28, the valve 19 will be opened during the entire suction stroke, *i. e.*, the same interval as that of the valve 3. As the speed increases beyond normal limits, the operation of the governor weights oscillates the shaft 39 through the bar 45 and arm 46 to shift the roller 32 in the slot 28 and shorten the interval by increasing the radial distance of roller 32 from the axis of wheel 25 and thus lessening the interval during which lever 26 will be actuated by the cam projection and correspondingly shortening the interval of gas and air admission.

Owing to the fact that the roller 32 is shifted in the opposite direction from that of cam wheel movement, and in an arc corresponding with that of the cam projection, the opening movement of valve 19 will always take place simultaneously with that of the valve 3, but the admission of the mixture will be cut off prior to the closing of the valve 3 when the roller 32 is at the upper end of the slot, since the time of clearance of the cam projection is thus advanced in correspondence to the distance the roller has been shifted from normal position.

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

1. The combination with a valve, of a valve actuating lever and a rotary, lever-actuating cam; said lever being provided with a movable device arranged for contact with the cam; and means for shifting said device along the

lever in an arc of increasing radius from the cam axis and corresponding in curvature substantially to that of the contacting surface of the cam projection.

2. The combination with a valve, of a valve actuating lever, and a rotary, lever-actuating cam; a device movably mounted on said lever, adapted for motion receiving contact with the cam; a governing shaft, and means for transmitting motion from the governing shaft to shift said device along said lever in a curved line eccentric to the cam axis to vary the interval of motion receiving contact.

3. The combination with the main inlet valve of a gas engine cylinder; of an auxiliary cut off valve, controlling the admission of air or gas thereto; a lever for actuating the auxiliary valve in one direction; a cam in operative relation to said lever; a motion receiving device mounted on the lever and movable substantially in the arc of the contacting surface of the cam projection and eccentric to the cam axis; and governing mechanism for shifting the motion receiving device.

4. The combination with the inlet passage of a gas engine cylinder, of a valve therefor; a valve actuating lever; a lever actuating cam; a motion receiving device arranged to transmit motion from the cam to the lever; and a governing device arranged to move the motion receiving device along said lever in a direction to increase or decrease its distance from the axis of cam rotation and to shift it from one cam radius to another, substantially for the purpose set forth.

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

ERNEST HUGO HOLMES.

Witnesses:

CHAS. B. PERRY,

LEVERETT C. WHEELER.