No. 891.360. PATENTED JUNE 23, 1908.

S. A. MOSS.

GOVERNING MECHANISM FOR OIL OR GAS ENGINES.

APPLICATION FILED AUG. 6, 1906.

2 SHEETS—SHEET 1.

Fig. 1.

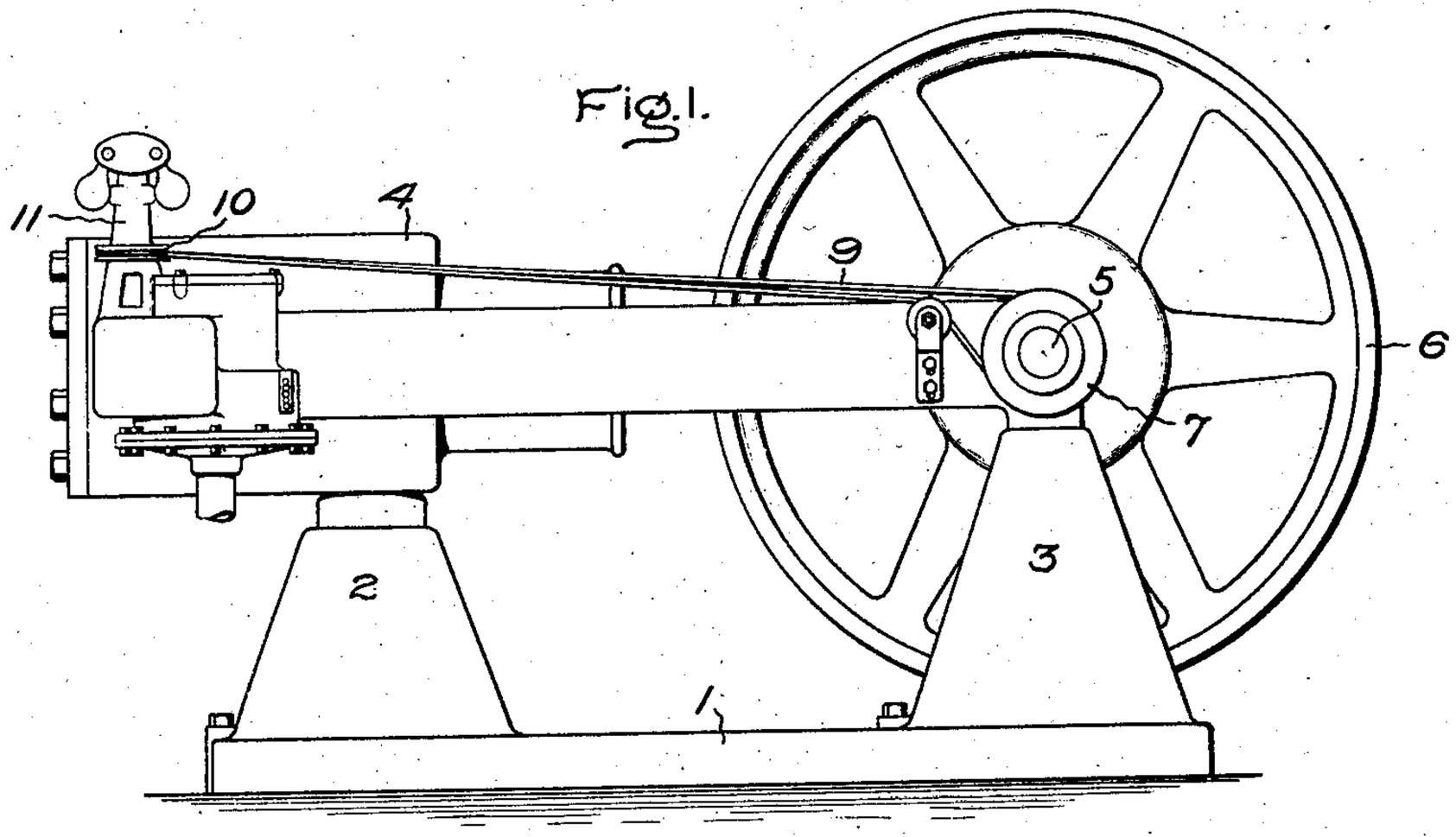
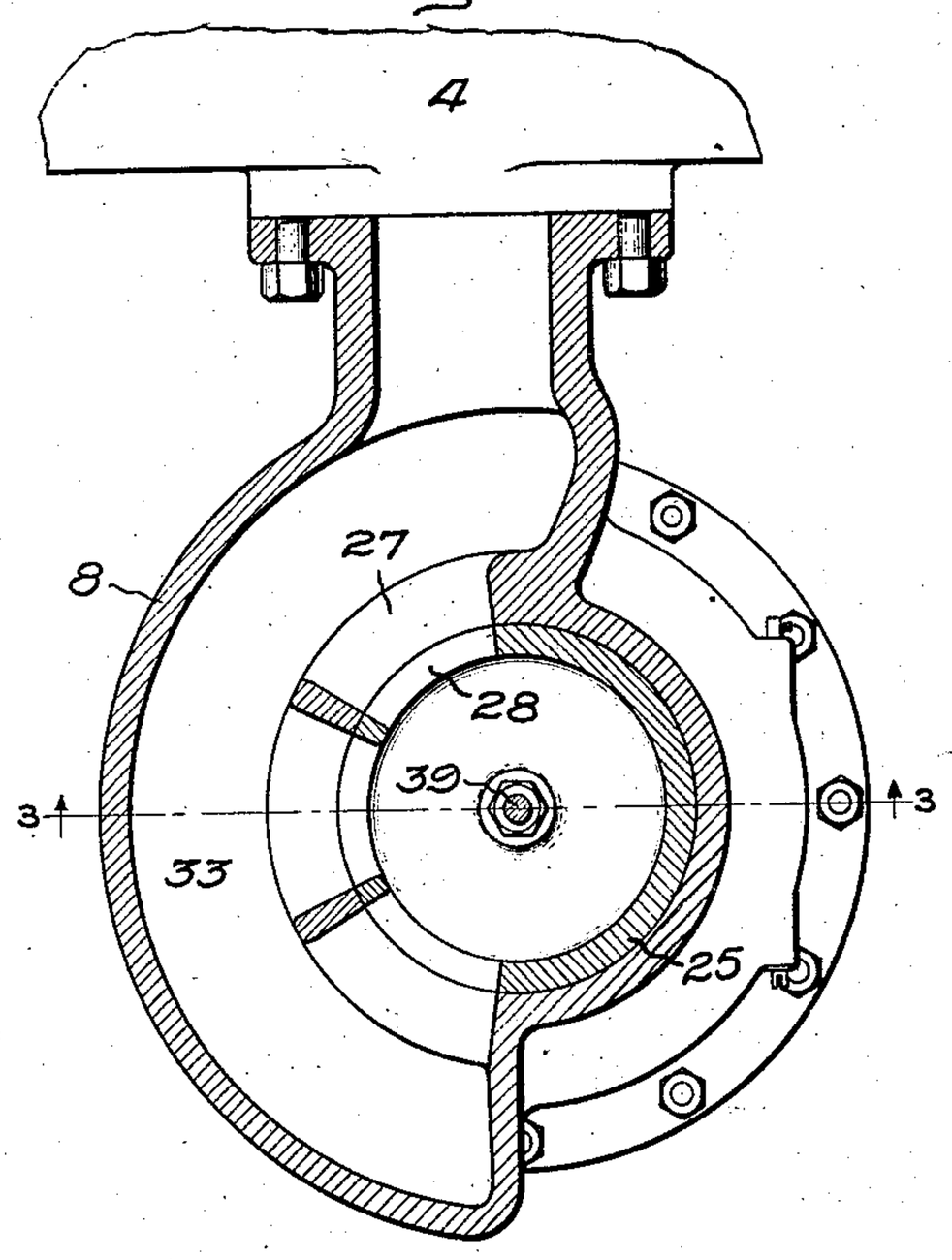


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 6.

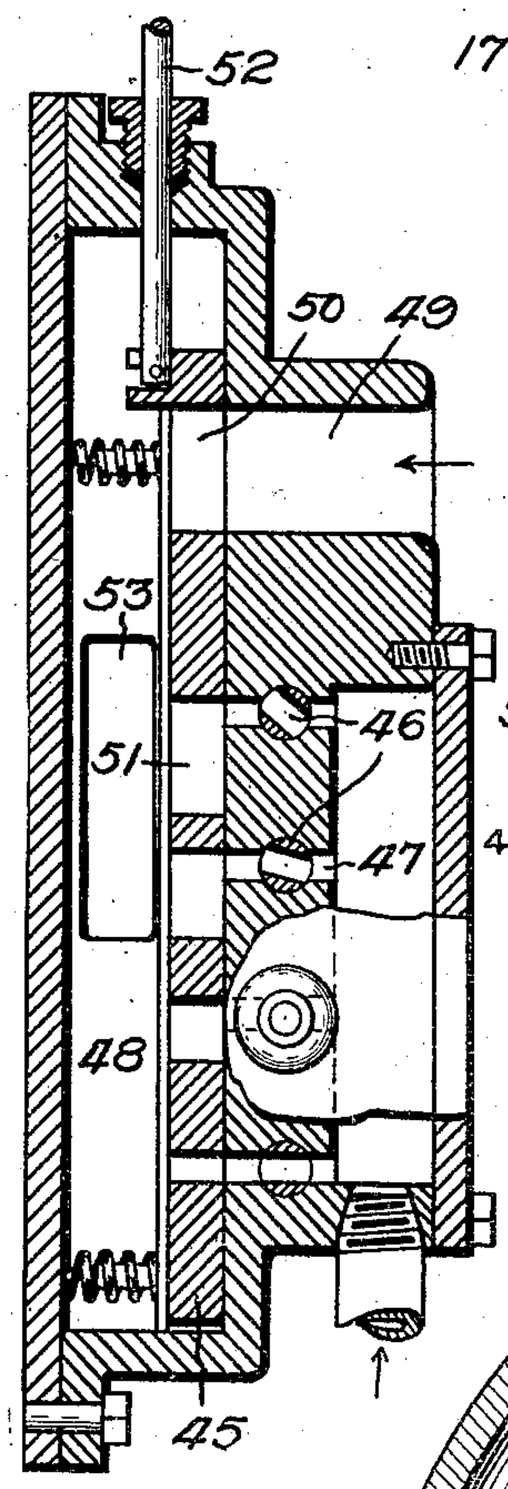


Fig. 3.

Fig. 5.

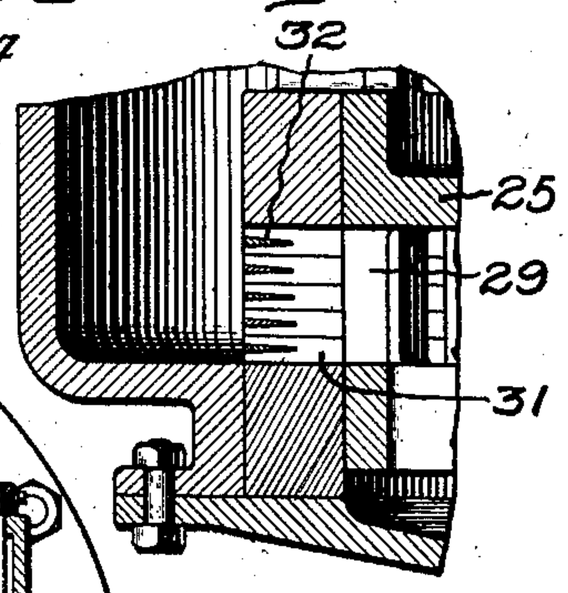
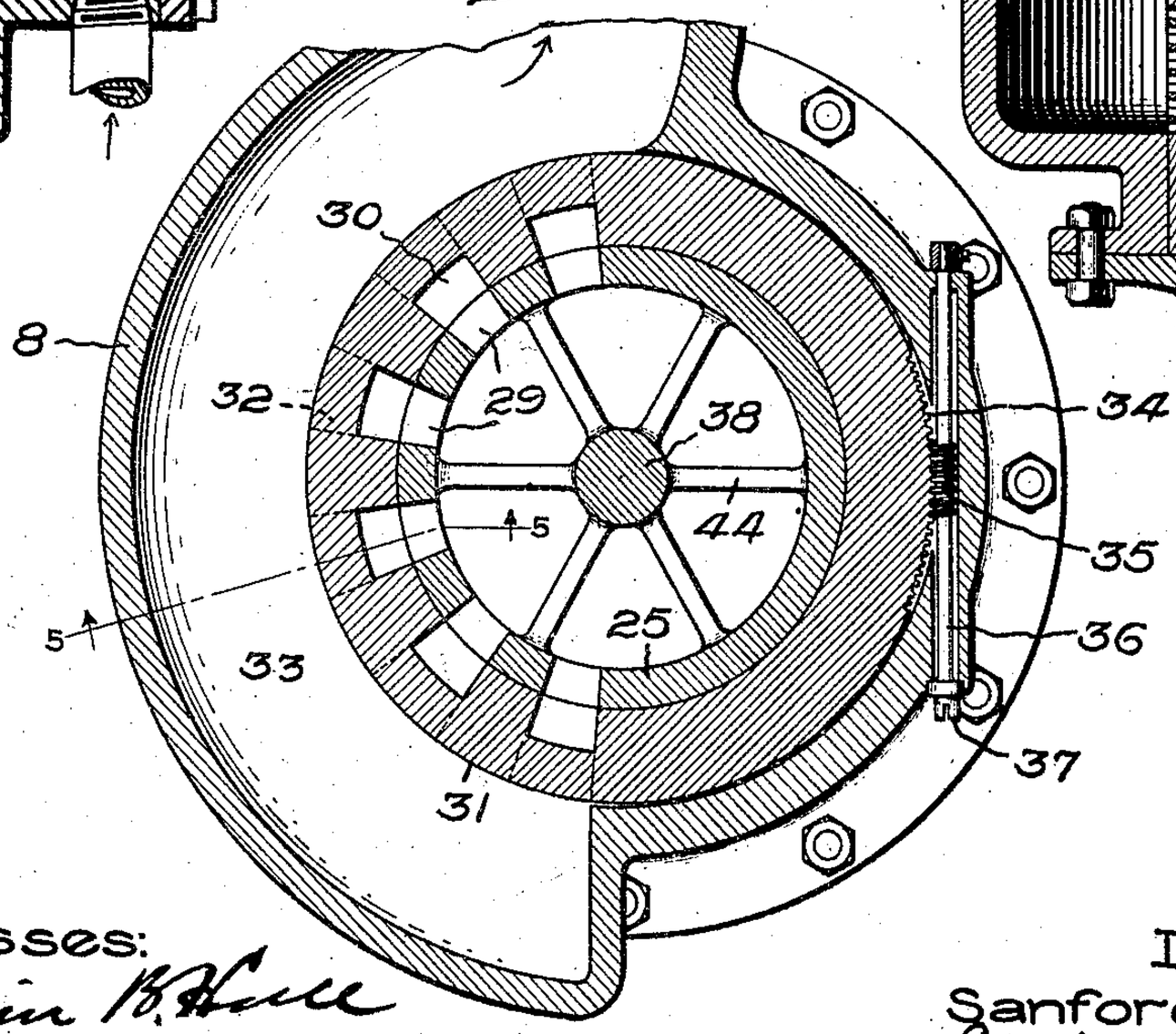


Fig. 4.



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UNITED STATES PATENT OFFICE.

SANFORD A. MOSS, OF LYNN, MASSACHUSETTS, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

GOVERNING MECHANISM FOR OIL OR GAS ENGINES.

No. 891,360. Specification of Letters Patent. Patented June 23, 1908.

Application filed August 6, 1906. Serial No. 329,311.

To all whom it may concern:

Be it known that I, SANFORD A. MOSS, a citizen of the United States, residing at Lynn, county of Essex, State of Massachusetts, have invented certain new and useful Improvements in Governing Mechanism for Oil or Gas Engines, of which the following is a specification.

The present invention relates to a governing mechanism for oil or gas engines which keeps the engine speed constant by regulating the quantity of the charge of air and combustible admitted to the cylinder. As the quantity of the charge is varied the velocity with which it travels to the cylinder from suitable sources of supply tends to vary. This variation in velocity will cause irregular variations in the supply of combustible and consequent irregular variations in the ratio of air to combustible in the charge.

The object of my invention is to overcome the irregularities referred to and obtain a proper ratio of air to combustible in the charge under all load conditions. By my invention the supply of combustible can be regulated independently for several different positions of the governor mechanism but it is obvious that the desired ratio might be obtained by regulating the air supply instead of the supply of combustible if desired.

In the accompanying drawings illustrating one of the embodiments of my invention, Figure 1 is a side view of an engine with my invention applied thereto; Fig. 2 is a section on line 2—2 of Fig. 3; Fig. 3 is a vertical section through the governor and the valve controlled by it; Fig. 4 is a section on the line 4—4 of Fig. 3; Fig. 5 is a section on line 5—5 of Fig. 4; and Fig. 6 is a sectional view of a modification.

For the purpose of illustration, the invention is shown as attached to a horizontal engine, but it is to be understood that it may be used with a vertical or other type of engine if desired. The engine has a bed-plate 1 from which rise supports 2 and 3 for the cylinder 4 and the main shaft 5 respectively. The shaft 5 carries a fly wheel 6 and a grooved pulley 7. A governor or speed-responsive device of any suitable construction is mounted on a casing 8 which is bolted to the cylinder, and is driven by a belt 9 which passes round the pulleys 7 and 10. The pulley 10 is fixed to a hollow column 11 which rotates on a cylindrical projection 12 extending from the top of the casing 8. The screw 13, which secures the pulley to the column, extends through the column and engages a groove in the projection 12 to hold the governor in position. Between two oppositely disposed members 14 at the top of the column are mounted the arms 15 and 16 which carry at their lower ends the balls or weights 17 and 18. Pins 19 and 20 mounted in the members 14 furnish bearings for the governor arms. Centrally mounted to slide within the column 11 and the projection 12 is a shaft 21 having a pin 22 at its upper end, with which the ends of the governor arms have a sliding connection. The lower portion of shaft 21 is reduced at 23 to receive the forked end of a lever 24 pivotally mounted upon the casing. The other end of the lever has a slotted connection with the upper end of a valve spindle to be described.

For the purpose of controlling the admission of air and fuel or combustible to the cylinder, a cylindrical valve 25, Fig. 3, is mounted in a correspondingly-shaped portion of the casing 8 which forms a seat for the valve. Air enters through the upper part of this portion of the casing while fuel from any suitable source of supply is admitted by pipe 26 at the bottom. Two sets of ports are provided, one for air and the other for combustible or fuel. The cylindrical wall of the casing has a series of ports 27 and the valve 25 has a corresponding series of ports 28 through which the air may pass. The valve also has a series of ports 29 through which gas passes to other ports 30 contained in a series of rings 31 surrounding the lower portion of the valve and held in place by a distance piece 54. These rings, as shown, are five in number but this number may be varied to suit the size of the engine and the desired range of adjustment of fuel to air in the entering charge. The ports 30 are formed between segments of the ring 31 and these segments are joined by V-shaped ribs 32 which offer but little resistance to the flow of gas or fuel. Both sets of ports 27 and 30 open into a passage 33 which leads from the valve to the engine cylinder. Upon a portion of the periphery of each ring 31 is a series of teeth 34, Fig. 4, which engage a worm 35 upon a shaft 36 mounted in the wall of the casing and having a head 37 which is so shaped that it may be engaged by a screw-driver or wrench to turn the worm and there-

by rotate a ring 31 to vary the effective area of the ports 29 and 30.

The valve 25 has a central hub 38 in the upper end of which is mounted a stud or spindle 39 having a pin 40 which engages the slots 41 in the forked end of the lever 24. The pin 40 is held in place by means of a set-screw. The upper end of the spindle 39 is guided in a bearing formed in a spider 42 which is bolted to the casing. A horizontal partition 43, extending across the middle portion of the valve separates the air from the gas and the valve is further strengthened by a series of radial ribs 44 at its lower end.

In the modification shown in Fig. 6, a flat slide valve 45 is used in place of the cylindrical valve 25, shown in Fig. 3. The valve is held to its seat by springs and has a connection 52 to the governor. A series of manually-operated cocks 46 is used to control the effective area of the ports 47 through which gas or fuel is supplied to the chamber 48. A passage 53 leads from the chamber to the engine cylinder. Air enters through the ports 49 and 50 in the casing and valve respectively.

In Figs. 3 and 6, the valves and the governor are in their lowest position with the ports all open. This is the position for maximum or heavy load. When running under a light load, the valve 25 or 45 will be raised toward its upper limit of movement by the governor. Assuming that the load is such that the valve has been moved upward to cover all except the upper one of the rings 31 or ports 47, then the first or upper ring 31 or valve 46 may be adjusted to secure the proper opening for combustible under these conditions. When the load has increased so that the next or second ring is uncovered, the effective area of the ports may be adjusted to secure the proper opening under the new conditions by turning the second ring or valve without disturbing the adjustment of the first ring 31 or valve 46, and so on with the whole series of rings or valves. In this manner the ratio of combustible to air may be varied to secure any desirable mixture.

In accordance with the provisions of the patent statutes, I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof; but I desire to have it understood that the apparatus shown is only illustrative, and that the invention can be carried out by other means.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. In an internal combustion engine, means for supplying a mixed fuel charge including a speed-responsive device for varying the quantity of the charge supplied to the engine, and means independent of the device for regulating the ratio of the constituents of the charge in each of several different quantities supplied to the engine under the action of the device, each regulation being made without disturbing that for any of the other quantities.

2. In an internal combustion engine, means for supplying a charge of air and combustible including a speed-responsive device for controlling the quantity of the charge, and means independent of the device for regulating the amount of one of the constituents of the charge for each of several positions of the device without disturbing the regulation for any of the other positions.

3. The combination with an internal combustion engine, of a valve having a plurality of sets of ports, a casing in which the valve is mounted having a plurality of sets of ports coöperating with the first named ports, one of said sets being arranged in a series, and means for independently adjusting the capacity of each port of the series.

4. The combination with an internal combustion engine, of a valve, a casing for the valve having a plurality of ports, means for moving the valve to open and close the ports, and rotary means for individually adjusting the capacity of certain of the ports which are arranged in a series.

5. The combination with an internal combustion engine, of a valve having air and fuel ports, a casing in which the valve is movably mounted and which has air ports and fuel ports, one set of said ports being arranged in a series, and means for independently adjusting the capacity of each port of the series.

6. The combination with an internal combustion engine, of a valve, a seat for the valve having a plurality of ports, a speed-responsive device for moving the valve relative to the ports, and means for individually adjusting the capacity of certain of the ports.

7. The combination with an internal combustion engine, of a speed-responsive device, a cylindrical valve controlled thereby, a seat for the valve including a series of rings having ports therein, and means for moving each ring to vary the effective capacity of its ports.

8. The combination with an internal combustion engine, of a speed-responsive device, a cylindrical valve controlled thereby, a seat for the valve including a series of rings having ports therein and teeth upon their peripheries, gearing engaging said teeth, and means for operating the gearing to turn the rings and thereby vary the effective capacity of the ports.

9. The combination with an internal combustion engine, of a cylindrical valve having upper and lower ports, a cylindrical seat for the valve including a series of rings adjacent the lower ports, ports in the upper portion of the seat and in each of said rings, and a

speed-responsive device for moving the valve over its seat.

10. The combination with an internal combustion engine, of a cylindrical valve having upper and lower ports, a cylindrical seat for the valve including a series of rings adjacent the lower ports, ports in the seat adjacent the upper ports of the valve and other ports in each of the rings, means for turning each of the rings to vary the effective capacity of its ports, and a speed-responsive device for moving the valve over its seat to regulate the flow of fluid through the ports in said seat.

11. The combination with an internal combustion engine, of a cylindrical valve having upper and lower ports, a partition extending across the valve between said ports, a cylindrical seat for the valve including a series of ported rings surrounding the valve adjacent the lower ports, ports in the seat adjacent the upper ports of the valve, means for turning each of the rings to vary the effective capacity of its ports, a speed-responsive device for moving the valve over its seat to regulate the flow of fluid through the ports in the seat, a casing of which the seat forms a part, an engine cylinder to which the casing is secured, and a passage in the casing connecting the seat ports with the cylinder.

In witness whereof, I have hereunto set my hand this third day of August, 1906.

SANFORD A. MOSS.

Witnesses:

JOHN A. MCMANUS, Jr.,

HENRY O. WESTENDARP.