Feb. 17, 1925. 1,526,388

T. D. STANLEY

GOVERNOR FOR INTERNAL COMBUSTION ENGINES

Filed July 23, 1921 2 Sheets-Sheet 1

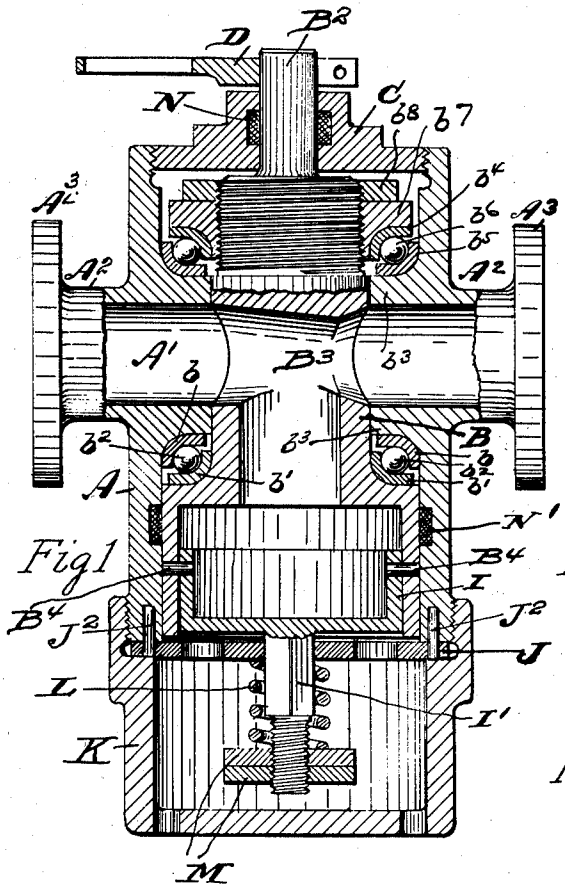


Fig 1

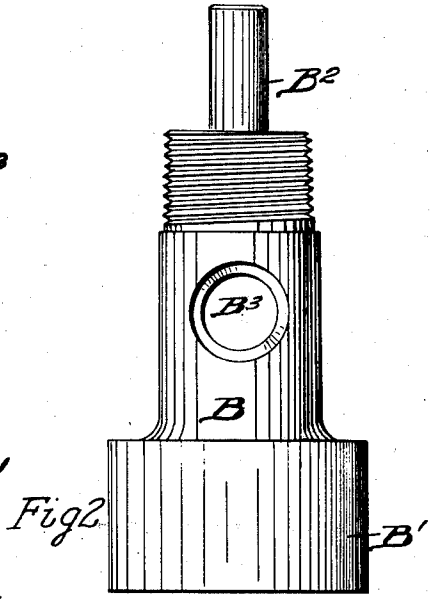


Fig 2

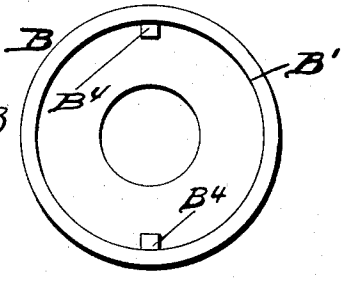


Fig 3

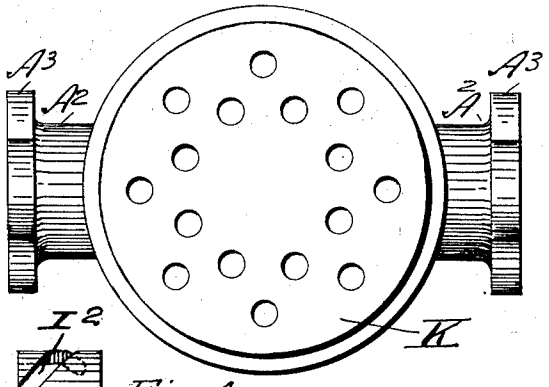


Fig 4

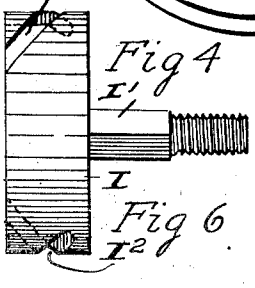


Fig 6

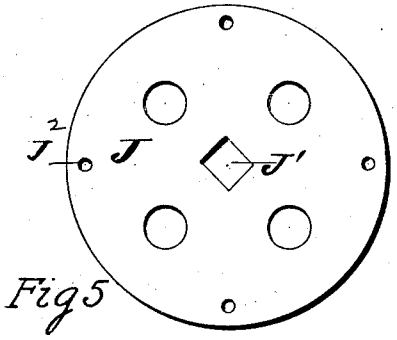


Fig 5

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GOVERNOR FOR INTERNAL COMBUSTION ENGINES

Filed July 23, 1921 2 Sheets-Sheet 2

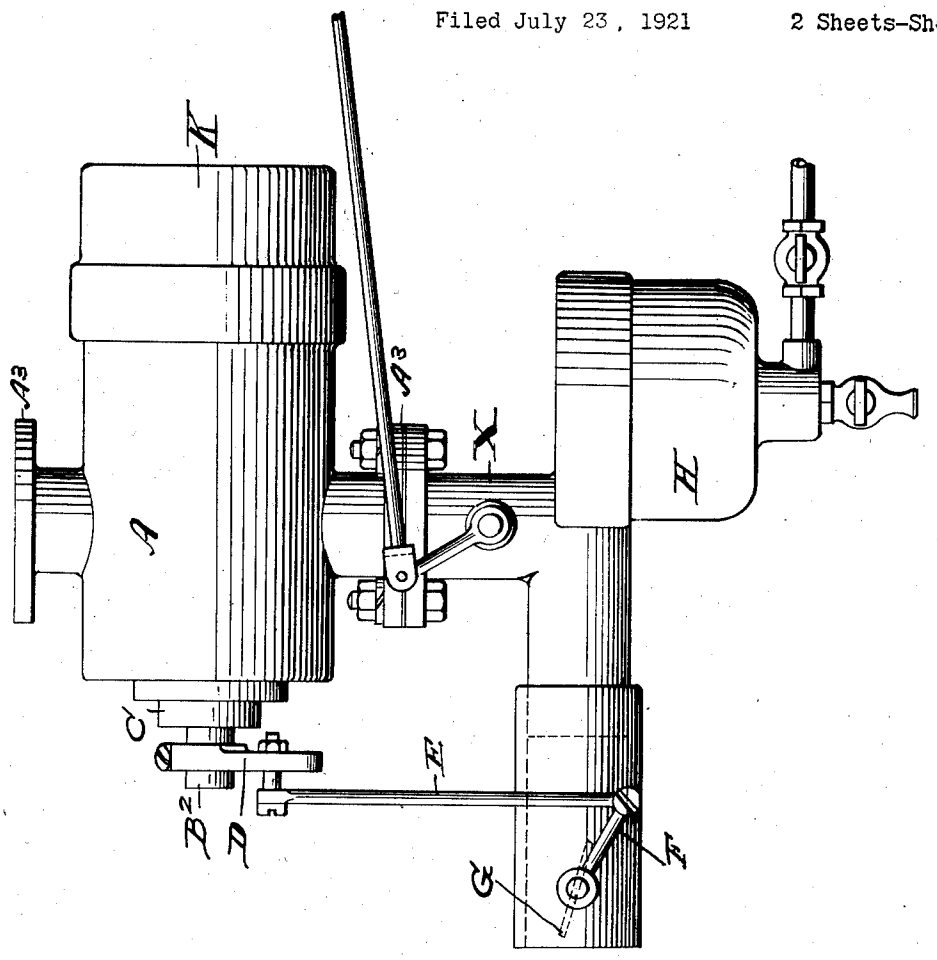


Fig. 7.

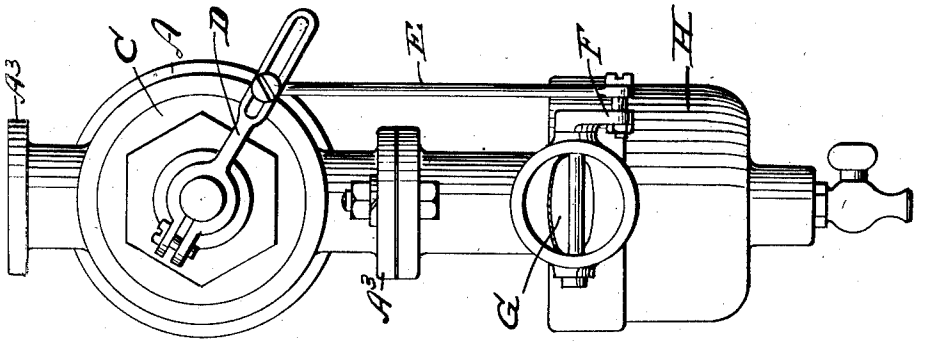


Fig. 8.

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UNITED STATES PATENT OFFICE.

THEODORE D. STANLEY, OF DETROIT, MICHIGAN.

GOVERNOR FOR INTERNAL-COMBUSTION ENGINES.

Application filed July 23, 1921. Serial No. 487,162.

To all whom it may concern:

Be it known that I, THEODORE D. STANLEY, citizen of the United States, residing at Detroit, county of Wayne, State of Michigan, have invented a certain new and useful Improvement in Governors for Internal-Combustion Engines, and declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to a method of governing internal combustion engines through the agency of a vacuum or local drop in pressure adjacent the column of fuel drawn by the motor from the carburetor or other fuel forming device, and to a governor for the engine adapted to carry out this method.

The invention consists in the matters hereinafter set forth, and more particularly pointed out in the appended claims.

In the drawings,

Figure 1 is a view in longitudinal section of a governor embodying features of the invention.

Figure 2 is a view in detail of a closure.

Figure 3 is a view in end elevation of the closure.

Figure 4 is a view of one end of the fitting.

Figure 5 is a view in detail of a piston stem guide plate.

Figure 6 is a view in detail of a piston for operating the valve closure.

Figure 7 is a view in elevation showing the governor mounted in operative relation to the carburetor of an internal combustion motor.

Figure 8 is a view in end elevation of the governor and carburetor.

In general terms the method consists of inducing a local drop in pressure adjacent the incoming current of fuel drawn from the carburetor or like fuel supplying means into the intake manifold of the engine and in operating the throttle of the carburetor or fuel supplying means through the agency of this induced vacuum whereby the desired result is obtained in the operation of the engine. As one means for carrying out this method, a generally cylindrical fitting A has a transverse passage A′ extending through lateral bosses A^2 that are provided with flanges A^3 whereby the fitting may be secured between the delivery pipe of a carburetor or other fuel vaporizing means and an engine manifold. A valve closure B is journaled in the fitting and is preferably mounted on suitable anti-friction radial bearings to secure ease of operation. One end portion B′ of the closure is in the form of a hollow cylinder corresponding to an enlarged portion of the bore of the fitting and opposed raceways b and b' with interposed balls b^2 between the shoulder formed by this cylindrical portion B′ and a corresponding inner flange b^3 of the fitting, provide for one thrust bearing while another pair of opposed raceways b^4 and b^5 with interposed balls b^6 are likewise secured between the flange b^3 and an adjustable collar b^7 screw-threaded on the closure with a check nut b^8 or otherwise adjustably secured thereon. The stem B^2 of the closure extends through a removable cap C and carries an adjustable rocker arm D whereby any rotation of the stem may be translated through a connecting link E to the operating arm F of a butterfly valve G in the air intake passage of a carburetor H. The bore of the enlarged portion B′ of the closure opens into a restricted passage B^3 through the closure adapted to register with the transverse passage A′ of the fitting. In order to obtain the best results, the restriction of the passage B^3 is effected by giving the latter a Venturi shape. A piston I is longitudinally reciprocatable in the cylinder B′ of the closure, being held from rotation by means of a square, polygonal or spined stem I′ extending through a suitably dimensioned guide aperture J′ in a perforated guide plate J which is clamped between the end face of the fitting and a lower apertured head or housing K, screw-threaded on to the fitting or otherwise detachably mounted thereon, nonrotation of the guide plate resulting from the use of dowel pins J^2 or the like.

Segmental spiral grooves I^2 are formed in the periphery of the piston I and are engaged by inwardly extending guide pins B^4 or the like in the cylinder B so that the reciprocation of the piston produces rotation of the closure. Upward movement of the piston caused by pressure of air against the outer end because of the reduction in pressure at the Venturi throat is opposed by a spring L in compression between the guide plate J and a stop adjacent the form of

check nuts M on the stem I' of the piston. Packing rings N and N' prevent leakage around the closure into the interior of the fitting.

As a result of the construction, a local drop in pressure is set up in the incoming current of fuel and variations in this drop cause inward movement of the piston against the regulated pressure of the spring and thereby turn the closure so that the throttle valve controlling the air supply of the carburetor is moved to a greater or less extent while at the same time the turning of the closure partially increases the normal restriction through which the fuel must pass into the manifold. Therefore, the engine is held within a certain range of movement, dependent upon the spring tension and the proportion of the various ports or openings through the fitting which of course are arranged for the particular type of engine to which the governor is attached.

It will be obvious that changes in the details of construction may be made without departing from the spirit of the invention, I therefore do not care to limit myself to any particular form or arrangement of parts.

Having thus described my invention what I claim is:

1. A governor for internal combustion engines including a casing provided with a fuel passage and mounted adjacent the fuel inlet passage of the engine, and open to the atmosphere adjacent its outer end, a device rotatably mounted in the casing to control the area of the fuel passage, said device having a bore, a piston in said bore for reciprocation therein and adapted to be reciprocated by variations in pressure in the fuel passage and having communication with said control device to rotate the latter upon reciprocation of the piston.

2. A governor for internal combustion engines comprising a fitting adapted to be secured between the fuel supplying means outlet and the fuel intake of an engine and provided with a fuel passage forming communication between the fuel supply means and the intake, a closure controlling this passage and forming a restriction therein, reciprocating means confined partly in the fitting and partly in said closure controlled by variations in the drop in pressure at the restriction with relation to the outside atmospheric pressure and actuated by the said atmospheric pressure and means adapted to operatively connect the reciprocating means to a throttle valve of a carburetor.

3. A governor for internal combustion engines comprising a fitting adapted to be secured between the outlet of the fuel supplying means and the fuel intake of an engine and provided with a fuel passage forming a connection between the fuel supply means and the intake, a closure controlling this passage and forming a restriction therein, journaled in the fitting, the closure having a bore in connection with the restricted portion of the fuel passage and a piston non-rotatable in the fitting and reciprocatable in the closure bore adapted to be operated by variations in pressure in the restricted passage and connected to the closure to turn the latter when reciprocated.

4. A governor for internal combustion engines including a casing provided with a fuel passage and mounted adjacent the fuel inlet passage of the engine and open to the atmosphere adjacent its outer end, a device rotatable mounted in the casing to control the area of the fuel passage, said device having a bore, a piston in said bore for reciprocation therein and adapted to be reciprocated by variations in pressure in the fuel passage, means to prevent rotation of the piston, the piston having a groove in its periphery and a device on the rotatable control member operative in said groove of the piston whereby to effect rotation of the control device upon reciprocation of the piston.

5. A governor for internal combustion engines comprising a fitting adapted to be secured to the outlet of a carburetor and provided with a transverse fuel passage leading from such outlet, a closure journaled in the fitting and provided with a restricted port controlling the passage, a piston non-rotatable in the fitting and reciprocatable in the closure adapted to be operated by variations in pressure in the restricted port and means for connecting the closure operatively to the air intake valve of a carburetor.

6. A governor for internal combustion engines comprising a fitting having a transverse passage adapted to register with the outlet of a carburetor to which the fitting may be attached, a closure rotatable in the fitting on an axis transverse to the passage, having a restricted port controlling the flow through the passage, a piston reciprocatable in an axial bore of the fitting that communicates with the restricted port, means interconnecting the piston and closure to turn the latter when the piston is moved longitudinally, means for locking the piston against rotation in the fitting and regulatable spring pressure means for controlling the thrust of the piston.

7. A governor for internal combustion engines comprising a fitting having a transverse fuel passage therethrough, a closure journaled in axial co-incidence with the fitting and provided with a restricted port controlling the fuel passage, an enlarged cylinder on one end portion of the closure, a piston longitudinally reciprocatable in the cylinder of the closure, interlocked with the

closure to turn the latter when the piston is reciprocated, guiding means in the fitting for the piston preventing rotation of the latter, a regulating spring member for controlling the longitudinal movement of the piston and means for translating the movement of the closure to an air regulating valve of a carburetor.

8. A governor for internal combustion engines comprising a fitting having a transverse fuel passage therethrough, a closure journaled in the fitting and provided with a transverse Venturi port controlling the fuel passage and with an enlarged hollow cylindrical head in communication with this port, a spirally grooved piston reciprocatable in this cylinder, a guide plate in the fitting non-rotatable in the casing, a stem for the piston non-rotatably reciprocatable through the guide plate, a regulating spring controlling the movement of the piston, projections on the closure engaging the spiral grooves of the piston and turning the closure when the piston shifts and means for translating the movement of the closure to the air throttling means of the carburetor.

9. A governor for internal combustion engines comprising a fitting having a transverse fuel passage, a closure rotatable in the fitting having a Venturi port controlling the passage and an enlarged cylindrical portion, the bore of which is in communication with the Venturi port at the throat thereof, a piston reciprocatable in the cylinder provided with spiral peripheral grooves, projections on the cylinder wall entering the grooves, an apertured guide plate non-rotatably secured in the fitting, a stem for the piston non-rotatable and longitudinally reciprocatable in the guide plate, an adjustable spring stop on the stem, a spring around the stem in compression between the stop and the guide plate, a stem for the closure, and means for adjustably connecting the closure stem to a carburetor air intake valve to shift the latter.

10. A method of controlling internal combustion engines which consists of providing a piston in a governor casing adjacent an unobstructed fuel passage whereby fuel passing therethrough exerts an entraining action on the air on one side of the piston, maintaining atmospheric pressure on the other side of the piston to move the piston toward the passage proportionately to the drop in pressure due to such entraining action, and connecting the piston to a member embracing the same and controlling the amount of fuel admitted to the inlet passage.

11. A method of controlling internal combustion engines which consists of providing a piston in a governor casing adjacent an unobstructed fuel passage whereby fuel passing therethrough exerts an entraining action on the air on one side of the piston, maintaining atmospheric pressure on the other side of the piston to move the piston toward the passage proportionately to the drop in pressure due to such entraining action, providing adjustable means to resist such movement and return the piston toward normal position as the pressure on opposite sides of the piston is equalized, and connecting the piston to a member embracing the same and controlling the amount of fuel admitted to the inlet passage.

12. A governor for internal combustion engines including a casing mounted adjacent the fuel inlet passage of the engine and open to the atmosphere adjacent its outer end, a piston slidable in the casing intermediate its ends, and rotatable means connected with the piston and embracing the latter for controlling the amount of fuel passing through the inlet passage, the inner extremity of the casing having an opening leading into the fuel in the passage, whereby the flow of fuel through the inlet passage will tend to exhaust the air on the inner side of said piston.

13. A governor for internal combustion engines, including a casing having adjacent one extremity an opening leading laterally into the passage for conducting the combustible mixture into the engine and adjacent its opposite extremity an opening to the atmosphere, a piston slidable in the casing in accordance with the variations in pressure on its opposite sides, and means in axial alignment with the piston and rotated by the movements of the piston to vary the amount of combustible mixture admitted to the engine.

14. A governor for internal combustion engines, including a casing having adjacent one extremity an opening leading laterally into the passage for conducting the combustible mixture into the engine and adjacent its opposite extremity an opening to the atmosphere, a piston slidable in the casing in accordance with the variations in pressure on its sides, a spring for resisting the movement of the piston toward said passage and for returning the piston toward normal position as the pressure on its sides approach equalization, and means disposed in axial alignment with the piston and operated by the movements of the piston to vary the amount of combustible mixture admitted to the engine.

15. A governor for internal combustion engines, including a casing mounted adjacent the fuel inlet passage of the engine and open to the atmosphere adjacent its outer end, a piston slidable in the casing intermediate its ends, and means connected with the piston for controlling the amount of fuel passing through the inlet passage, including a throttle valve disposed in axial alignment

with the piston, and means for rotating the valve when the piston is reciprocated, the inner extremity of the casing having an opening leading into the fuel in the passage, whereby the flow of fuel through the inlet passage will tend to exhaust the air on the inner side of said piston.

16. A governor for internal combustion engines including a casing provided with a fuel passage for connection with the inlet fuel passage of the engine, the casing being open at one end to the atmosphere, a device rotatably mounted in the casing and having a Venturi port intersecting the fuel passage, and a piston in the casing connected to the rotatable device to rotate the latter upon reciprocation of the piston.

17. A governor for internal combustion engines including a casing provided with a fuel passage for connection with the inlet fuel passage of the engine, the casing being open at one end to the atmosphere, a device rotatably mounted in the casing and having a Venturi port intersecting the fuel passage, and a piston in the casing connected to the rotatable device to rotate the latter upon reciprocation of the piston, the rotatable device and piston being arranged in axial alignment.

18. A governor for internal combustion engines including a casing provided with a fuel passage for connection with the inlet fuel passage of the engine, the casing being open at one end to the atmosphere, a device rotatably mounted in the casing and having a Venturi port intersecting the fuel passage, and a piston in the casing connected to the rotatable device to rotate the latter upon reciprocation of the piston, the rotatable device and piston being arranged in axial alignment, and said Venturi port being disposed in the longitudinal axis of the rotatable member and the piston.

19. A governor for internal combustion engines including a casing provided with a fuel passage for connection with the inlet fuel passage of the engine, the casing being open at one end to the atmosphere, a closure member mounted in the casing and having a Venturi port adapted for alignment with the fuel passage, the closure member being constructed and arranged to move relatively to the fuel passage under variations in subatmospheric pressure due to the engine to automatically restrict or increase the effective area of the Venturi port.

20. A governing for internal combustion engines including a casing provided with a fuel passage for connection with the inlet fuel passage of the engine, the casing being open at one end to the atmosphere, a closure member mounted in the casing and having a Venturi port normally aligning with the fuel passage, and a piston in the casing connected to the closure member to move the latter upon reciprocation of the piston to restrict or increase the effective area of the Venturi port.

In testimony whereof I sign this specification in the presence of two witnesses.

THEODORE D. STANLEY.

Witnesses:

HOMER W. AIKENS,

B. D. YORK.