

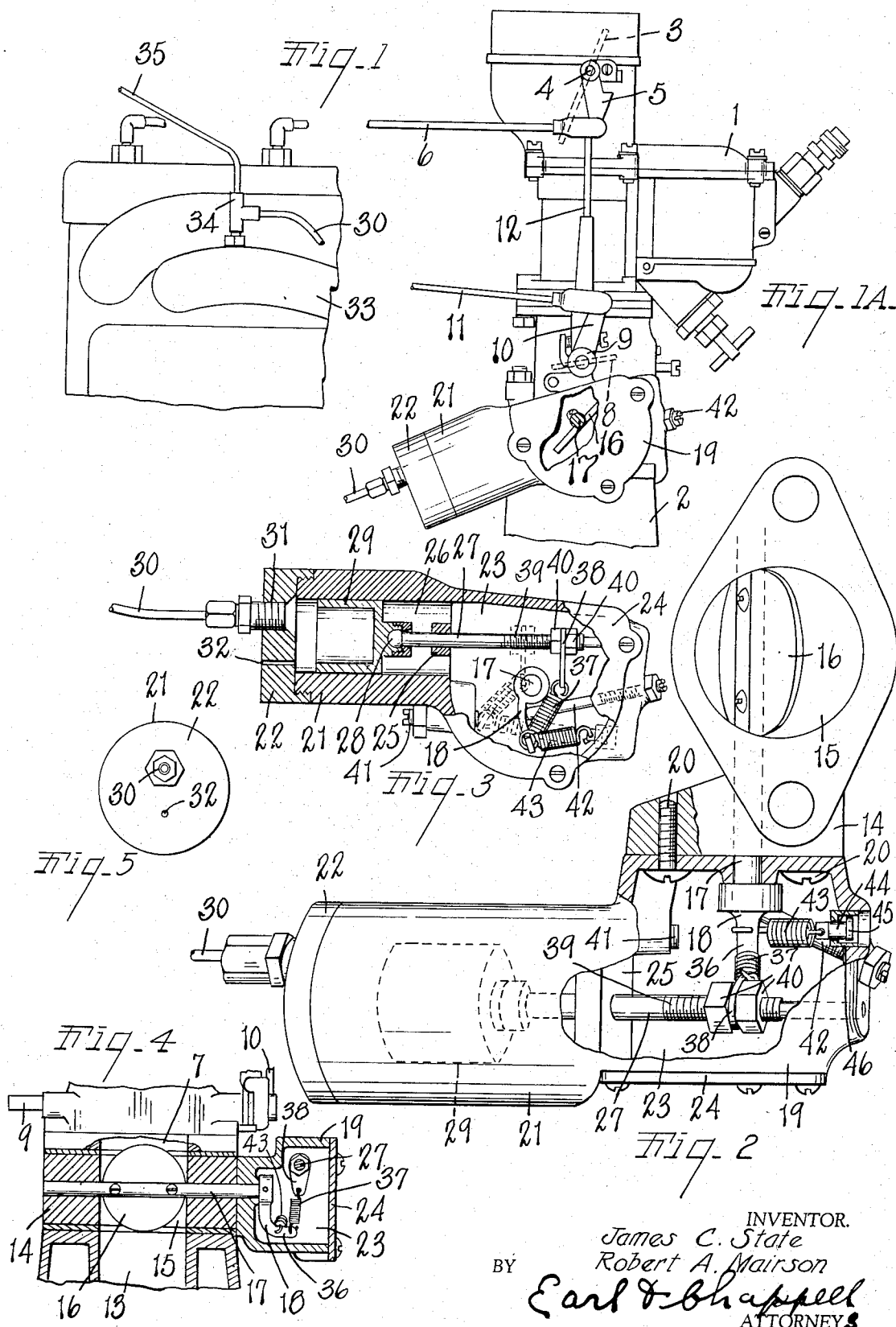
Oct. 25, 1938.

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2,134,156

SPEED GOVERNOR FOR INTERNAL COMBUSTION ENGINES

Filed Oct. 1, 1937



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2,134,156

SPEED GOVERNOR FOR INTERNAL COMBUSTION ENGINES

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Application October 1, 1937, Serial No. 166,852

16 Claims. (Cl. 123—103)

The main objects of our invention are:

First, to provide a speed governor for internal combustion engines adapted to prevent operation of said engines above predetermined engine speeds.

Second, to provide an engine speed control device of the type described which is positive, highly effective, and quick in action.

Third, to provide a device of the type described which is characterized by its simplicity of construction and small number of parts and may be easily applied to or embodied in widely used types of internal combustion engines.

Fourth, to provide a device of the type described which is readily adapted for use as an attachment for temporary use with an internal combustion engine during the wearing-in or breaking-in period of the latter.

Fifth, to provide a speed governor of the type described having in combination a vacuum operated control element and snap action means associated therewith, the said element being shifted in response to changes in engine speed above and below a predetermined maximum in accordance with the extent of vacuum in the engine intake manifold, the actuation of a control valve by said element being rendered quick and positive by the aforesaid snap means.

Sixth, to provide a governor device of the type described including a control valve which is vacuum operated by connection to the intake manifold of an internal combustion engine, in combination with snap acting means for improving the operation of the governor.

Further objects relating to details and economies of the invention will appear from the description to follow. The invention is defined in the claims.

A structure embodying the features of the invention is illustrated in the accompanying drawing, in which:

Fig. 1 is a fragmentary view in side elevation illustrating conventionally a portion of an internal combustion engine and operative connections for the device thereto.

Fig. 1A is a fragmentary view similar to Fig. 1, illustrating the engine carburetor and manifold with the governor device of the invention operatively associated therewith, and partially broken away to illustrate details of construction.

Fig. 2 is an enlarged top plan view partially broken away and in section illustrating details of the governor device.

Fig. 3 is a side view partially broken away and

in section, further illustrating details of construction of the device.

Fig. 4 is a fragmentary view partially broken away and in vertical section, illustrating details of the device and the manner of associating the same with the main valve and intake manifold of an internal combustion engine.

Fig. 5 is a view in end elevation of the device as illustrated in Fig. 3, looking from the left of the latter figure.

This invention relates to a speed governing device and more particularly to a governing device adapted to control engine speed in accordance with the rise and fall of the said engine speed above and below a desired predetermined maximum. For this purpose, we have associated an auxiliary throttle valve, in addition to the main manually controlled throttle valve, between the carburetor and intake manifold, the said auxiliary throttle valve being adapted to be either fully opened or fully closed, depending on the engine speed. For actuating the said auxiliary valve from fully open to fully closed position, we rely on a plunger operated by vacuum in the engine manifold and connected to the auxiliary throttle valve by a rod. With the aforementioned structure, we employ a snap acting means whereby the same will be substantially instantaneously actuated from fully open to fully closed position or vice versa at the time when the engine speed rises above or falls below a predetermined maximum. It has been found that a structure as above set forth is fully effective for the purpose desired, the combination of the vacuum operated actuating means and snap connecting means being particularly effective to control flow of combustion vapor in a quick and positive manner.

Referring to the drawing, the reference numeral 1 indicates a carburetor of the down-draft type, which is in alignment with the intake or neck portion 2 of the manifold. The association of these devices in the manner described is well known to those familiar with the art.

The carburetor 1 is provided with a choke valve 3, the spindle 4 of which is provided with an arm 5 to which the operating rod 6 is connected. The discharge passage 7 of the carburetor (see Figs. 1A and 4) is provided with a main throttle valve 8 of the butterfly type on a spindle 9 which has an arm 10 on one end thereof connected to the manual control rod 11. The choke 3 and throttle valve 8 are illustrated as being operatively connected by means of a link 12 whereby opening of the choke is accompanied by a slight opening

of the throttle valve. However, this feature forms no part of the invention.

Reference to Fig. 4 indicates that the carburetor passage 7 is aligned with the passage 13 in the neck 2 of the manifold. Between the carburetor and manifold, is interposed a throttle valve housing in the form of an adapter 14 connecting the manifold and carburetor and having a passage 15 in alignment and connecting passages 7 and 13. An auxiliary throttle valve 16 is arranged in passage 15 on a spindle 17 extending through the said housing or adapter and having an actuating arm 18 on its outer end. This actuating arm is enclosed in the governor housing 19 which is mounted by screws 20 on the housing 14. The said arm is connected with means to be hereinafter described so that the auxiliary valve 16 is normally in fully open position as illustrated in Figs. 2 and 4, being held in that position by suitable spring means, and valve 16 is adapted to be pivoted to fully closed position when the engine speed reaches and passes a predetermined maximum. The auxiliary throttle valve 16 actuated independent of the main throttle valve, has full control of the engine for all speeds above a predetermined maximum, while all speeds below the said maximum are under the control of the main throttle valve 8.

The governor housing 19 consists of a vacuum cylinder portion 21 closed at one end by a head 22 threaded thereon and a valve actuating chamber 23 having a side thereof closed by a removable plate 24. A cross piece 25 extends transversely of the cylinder 26 between portion 21 and chamber 23 and forms a guide slidably receiving the plunger rod 27, which is connected by a ball joint 28 to a plunger 29 having a close but free sliding fit in cylinder 26. The said cylinder is communicated with a suitable source of vacuum through a tube 30 tapped in an opening 31 in the head 22. A vent 32 is drilled in the head for a purpose to be hereinafter referred to.

The source of vacuum mentioned above is preferably the intake manifold 33 and connection is preferably made therewith by connecting the tube 30 with a fitting 34 tapped in the manifold and leading through a tube 35 to the usual vacuum operated windshield wiper. However, the tube 30 may be directly connected with the manifold 33 if desired as this particular feature of construction forms no part of the invention.

In the valve actuating chamber 23, the actuating arm 18 is provided with an extension 36 bent at right angles and the arm is connected to the rod 27 through a coil spring 37 between the extension 36 and a shifter plate 38 embracing the rod 27, the said plate being adjustable along a threaded portion 39 of the rod through the agency of a pair of nuts 40 thereon. It will be noted that in fully open position the spring 37 and plate 38 lie to one side of the pivotal axis of the stem 17 and that when the rod 27 is fully actuated to the left, as indicated in dotted lines in Fig. 3, it carries the plate 38 and spring 37 past the center of stem 17. Accordingly the valve is instantaneously actuated from fully open to fully closed position with a snap action.

For the purpose of determining the fully open and fully closed position of throttle valve 16, we have provided a pair of adjustable stops in chamber 27 in the form of screws 41, 42 threaded in housing 19 and adjustable as desired. The said screws engage the arm 18 in either of its extreme positions to limit movement of the same beyond that point. In order to supplement the action

of the spring 37 in maintaining the auxiliary valve 16 fully open at speeds below the predetermined speed and to insure that it is returned to that position at the proper time, we provide an auxiliary or supplemental coil spring 43 connected to extension 36 of the arm 18 and to an anchoring pin 44 having an enlarged head 45. The said pin is loosely mounted in a sleeve-like insert 46 in the wall of the housing 19, there being a slight space between the pin and insert 10 serving to communicate the member 23 with the atmosphere.

It will be apparent that the plunger 29 is actuated to the left as viewed in Figs. 2 and 3 in accordance with the vacuum existing in cylinder 23 to the left of the plunger. This vacuum is in turn determined by the vacuum condition of the intake manifold, so that at speeds in excess of a predetermined maximum, for instance, 35 miles per hour, enough vacuum exists in the 20 cylinder to draw the plunger and parts associated therewith sufficiently far to the left that auxiliary valve 16 snaps from fully open to fully closed position as described. When the engine speed drops below the predetermined maximum, 25 instantaneous return of the auxiliary throttle valve to fully open position is effected by the mechanisms and in the manner described.

We have found that the vent 32 in the cylinder head 22 greatly improves the operation of 30 the device, since it insures a quick valve cut-off or release, i. e., return of the valve 16 to fully open position when the engine speed decreases or when the engine stops. That is, it serves to bleed off the vacuum in the cylinder 26 immediately. By the same token, the provisions of vent 32 allows smaller size springs 35, 43 to be used for a given engine vacuum. The size of this vent opening 32 should be proportioned for most effective operation of the governor device 40 and if desired a suitable adjustable regulating valve may be associated therewith.

We believe that a vacuum operated control means responsive to changes in vacuum in the intake manifold in accordance with the engine 45 speeds in excess of a predetermined maximum, in combination with snap acting means connecting said control means to an auxiliary throttle valve to be novel with us. The construction is one which is quickly operative and highly effective for its intended purpose. Moreover, it is one which requires an absolute minimum of parts, moving or otherwise, and it lends itself to ready installation and removal whereby it may be mounted on automobiles during the period of 55 breaking-in thereof and removed when such period has been passed. Operation of the engine above a predetermined maximum is effectively prevented regardless of the wheel speed or actual traveling speed of the vehicle.

We have illustrated and described our improvements in an embodiment which is very practical. We have not attempted to illustrate or describe other embodiments or adaptations as it is believed this disclosure will enable those skilled 65 in the art to embody or adapt our improvements as may be desired.

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

1. In combination with an internal combustion engine including a carburetor having a discharge passage and a manually controllable valve therein, a speed governing device associated with said engine comprising an adapter having a pas- 75

sage in alinement with said discharge passage, an auxiliary control valve in said adapter passage, an actuating arm for said auxiliary valve, a vacuum cylinder operatively mounted relative to said adapter, a plunger reciprocable in said cylinder and having a rod connected thereto, resilient means connecting said arm to said rod whereby upon reciprocation of the rod the auxiliary valve is actuated from fully open position to fully closed position and vice versa, means resiliently urging said auxiliary valve to open position, and stops determining the extent of movement of the arm, said cylinder being in communication with a source of vacuum varying with the engine speed whereby the plunger is caused to move in accordance with said variations, said cylinder having a vent therein to relieve the vacuum in the cylinder.

2. In combination with an internal combustion engine including a carburetor having a discharge passage and a manually controllable valve therein, a speed governing device associated with said engine, an adapter having a passage in alinement with said discharge passage, an auxiliary control valve in said adapter passage, an actuating arm for said auxiliary valve, a vacuum cylinder operatively mounted relative to said adapter, a plunger reciprocable in said cylinder and having a rod connected thereto, resilient means connecting said arm to said rod whereby upon reciprocation of the rod the auxiliary valve is actuated from fully open position to fully closed position and vice versa, and means resiliently urging said auxiliary valve to open position, said cylinder being in communication with a source of vacuum varying with the engine speed whereby the plunger is caused to move in accordance with said variations, said cylinder having a vent therein to relieve the vacuum in the cylinder.

3. In combination with an internal combustion engine including a carburetor having a discharge passage and a manually controllable valve therein, a speed governing device associated with said engine comprising an auxiliary valve controlling flow of vapor in said passage, an actuating arm for said auxiliary valve, a vacuum cylinder operatively mounted relative to said engine, a plunger reciprocable in said cylinder and having a rod connected thereto, resilient means connecting said arm to said rod whereby upon reciprocation of the rod the auxiliary valve is actuated from fully open position to fully closed position and vice versa, and means resiliently urging said auxiliary valve to open position, said cylinder being in communication with a source of vacuum varying with the engine speed whereby the plunger is caused to move in accordance with said variations, said cylinder having a vent therein to relieve the vacuum in the cylinder.

4. In combination with an internal combustion engine including a carburetor having a discharge passage and a manually controllable valve therein, a speed governing device comprising an adapter having a passage in alinement with said discharge passage, an auxiliary control valve in said adapter passage, a vacuum cylinder operatively mounted relative to said adapter, a plunger reciprocable in said cylinder and having a rod connected thereto, snap acting means connecting said arm to said auxiliary valve whereby upon reciprocation of the rod the auxiliary valve is actuated from fully open position to fully closed position and vice versa, said cylinder being in communication with a source of vacuum varying with the engine speed whereby the plunger is

caused to move in accordance with said variations, said cylinder having a vent therein to relieve the vacuum in the cylinder.

5. In combination with an internal combustion engine including a carburetor having a discharge passage and a manually controllable valve therein, a speed governing device comprising an adapter having a passage in alinement with said discharge passage, an auxiliary control valve in said adapter passage, a vacuum cylinder operatively mounted relative to said adapter, a plunger reciprocable in said cylinder and having a rod connected thereto, and snap acting means connecting said arm to said auxiliary valve whereby upon reciprocation of the rod the auxiliary valve is actuated from fully open position to fully closed position and vice versa, said cylinder being in communication with a source of vacuum varying with the engine speed whereby the plunger is caused to move in accordance with said variations.

6. In combination with an internal combustion engine including a carburetor having a discharge passage and a manually controllable valve therein, a speed governing device comprising an auxiliary valve controlling flow of vapor in said passage, a vacuum cylinder operatively mounted relative to said engine, a plunger reciprocable in said cylinder and having a rod connected thereto, and snap acting means connecting said arm to said auxiliary valve whereby upon reciprocation of the rod the auxiliary valve is actuated from fully open position to fully closed position and vice versa, said cylinder being in communication with a source of vacuum varying with the engine speed whereby the plunger is caused to move in accordance with said variations, said cylinder having a vent therein to relieve the vacuum in the cylinder.

7. In combination with an internal combustion engine including a carburetor having a discharge passage and a manually controllable valve therein, a speed governing device comprising an auxiliary valve controlling the flow of vapor in said passage, a vacuum cylinder operatively mounted relative to said engine, a plunger reciprocable in said cylinder and having a rod connected thereto, and snap acting means connecting said arm to said auxiliary valve whereby upon reciprocation of the rod the auxiliary valve is actuated from fully open position to fully closed position and vice versa, said cylinder being in communication with a source of vacuum varying with the engine speed whereby the plunger is caused to move in accordance with said variations.

8. A governing device for an internal combustion engine comprising an auxiliary valve insertable between the carburetor and intake manifold of the engine, means normally urging said valve to fully open position, and means for actuating said valve from fully open to fully closed position when the engine speed exceeds a predetermined maximum, comprising a vacuum cylinder, means communicating said cylinder with a source of vacuum variable with the engine speed, and a plunger reciprocable therein and carrying a rod, and adjustable snap acting means connecting said rod to said auxiliary valve whereby predetermined movement of the rod in response to vacuum in the cylinder causes the valve to snap from fully open to fully closed position, said cylinder having a vent therein for facilitating return of the valve to open position under the influence of said return means.

9. A governing device for an internal combustion engine comprising an auxiliary valve insertable between the carburetor and intake manifold of the engine, and means for actuating said valve from fully open to fully closed position when the engine speed exceeds a predetermined maximum, comprising a vacuum cylinder, means communicating said cylinder with a source of vacuum variable with the engine speed, a plunger reciprocable therein and carrying a rod, and adjustable snap acting means connecting said rod to said auxiliary valve whereby predetermined movement of the rod in response to vacuum in the cylinder causes the valve to snap from fully open to fully closed position, said cylinder having a vent therein for facilitating movement of the valve to open position.

10. A governing device for an internal combustion engine comprising an auxiliary valve insertable between the carburetor and intake manifold of the engine, means normally urging said valve to fully open position, and means for actuating said valve from fully open to fully closed position when the engine speed exceeds a predetermined maximum, comprising a vacuum cylinder, means communicating said cylinder with a source of vacuum variable with the engine speed, a plunger reciprocable therein and carrying a rod, and snap acting means connecting said rod to said auxiliary valve whereby predetermined movement of the rod in response to vacuum in the cylinder causes the valve to snap from fully open to fully closed position.

11. A speed governing device of the type described comprising an adapter insertable between the carburetor and intake manifold of an internal combustion engine and having a passage in alignment with the carburetor discharge passage, an auxiliary control valve pivotally mounted in said adapter, a control housing secured to said adapter, said housing comprising a vacuum cylinder and a control chamber, a valve control arm in said chamber connected to said valve, and means for actuating said arm whereby to shift said valve from fully open to fully closed position and vice versa in response to variations in engine speed, comprising a plunger in said cylinder movable in accordance with vacuum existing therein, said plunger being operatively connected to said arm through a snap over-center mechanism, and means to communicate said cylinder with a source of vacuum varying in accordance with engine speed, said cylinder having a head thereon provided with a vent for bleeding the vacuum in the cylinder and thereby facilitating return of the valve to fully open position.

12. A speed governing device of the type described comprising an adapter insertable between the carburetor and intake manifold of an internal combustion engine and having a passage in alignment with the carburetor discharge passage, an auxiliary control valve pivotally mounted in said adapter, a control housing secured to said adapter, said housing comprising a vacuum cylinder and a control chamber, a valve control arm in said chamber connected to said valve, and means for actuating said arm whereby to shift said valve from fully open to fully closed position and vice versa in response to variations in engine speed, comprising a plunger in said cylinder movable in accordance with vacuum existing therein, said plunger being operatively connected to said arm

through a snap over-center mechanism, and means to communicate said cylinder with a source of vacuum varying in accordance with engine speed, said cylinder having a vent for bleeding the vacuum in the cylinder and thereby facilitating return of the valve to fully open position.

13. A speed governing device of the type described comprising an adapter insertable between the carburetor and intake manifold of an internal combustion engine and having a passage in alignment with the carburetor discharge passage, an auxiliary control valve pivotally mounted in said adapter passage, a control housing secured to said adapter, said housing comprising a vacuum cylinder and a control chamber, a valve control arm in said chamber connected to said valve, and means for actuating said arm whereby to shift said valve from fully open to fully closed position and vice versa in response to variations in engine speed, comprising a plunger in said cylinder movable in accordance with vacuum existing therein, said plunger being operatively connected to said arm through a snap over-center mechanism, and means to communicate said cylinder with a source of vacuum varying in accordance with engine speed.

14. The combination with an internal combustion engine including a carburetor and throttle valve thereof, of an auxiliary valve disposed at the rear of the throttle valve, a vacuum cylinder connected to the intake of the engine at the rear of the auxiliary valve, a vacuum actuated plunger in said cylinder, and snap-acting connections for said plunger to said auxiliary valve whereby the auxiliary valve is, on the actuation of said plunger, actuated to fully open or to fully closed position.

15. A speed governing device adapted for association with an internal combustion engine having a passage connecting a carburetor and an intake manifold, comprising a valve disposed between said carburetor and intake manifold to regulate the vapor flowing to the intake manifold, means normally resiliently urging said valve to open position relative to the passage, snap acting, vacuum-operated means for actuating said valve to closing position relative to the passage when the engine exceeds a predetermined speed, comprising a vacuum operated member, means for operatively connecting said member with the valve, a vacuum chamber for said member, and means for communicating said chamber with a source of vacuum varying in accordance with engine speed, said chamber being provided with a bleeding vent for facilitating return of the valve to original position.

16. A speed governing device adapted for association with an internal combustion engine, comprising a valve to regulate the vapor flowing to the intake manifold of said engine, snap acting, vacuum-operated means for actuating said valve to closing position when the engine exceeds a predetermined speed, comprising a vacuum operated member, means for operatively connecting said member with the valve, a vacuum chamber for said member, and means for communicating said chamber with a source of vacuum varying in accordance with engine speed, said chamber being provided with a bleeding vent for facilitating return of the valve to original position.

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