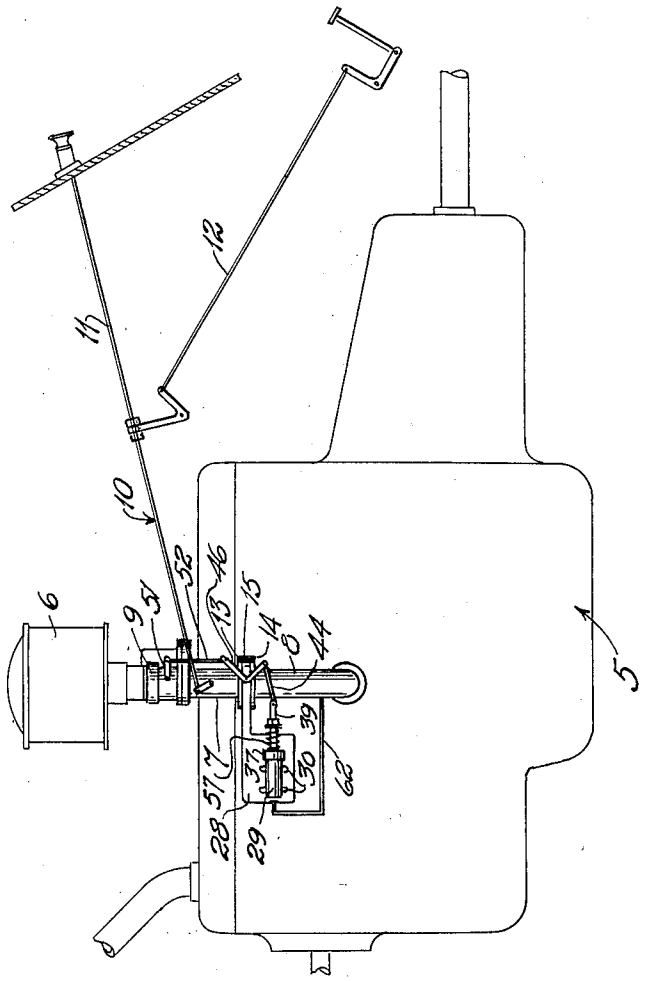
June 28, 1938. A. O. TADEWALD 2,122,331

AUTOMATIC SPEED AND VACUUM CONTROLLING DEVICE

Filed Feb. 15, 1937 2 Sheets-Sheet 1

Fig. 1.



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Fig. 2.

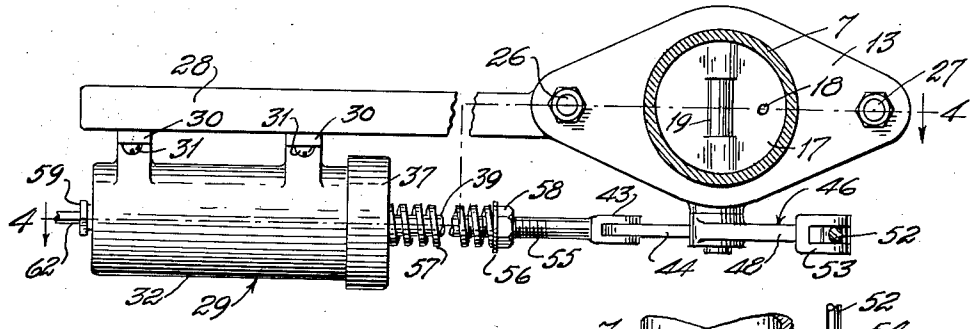


Fig. 3

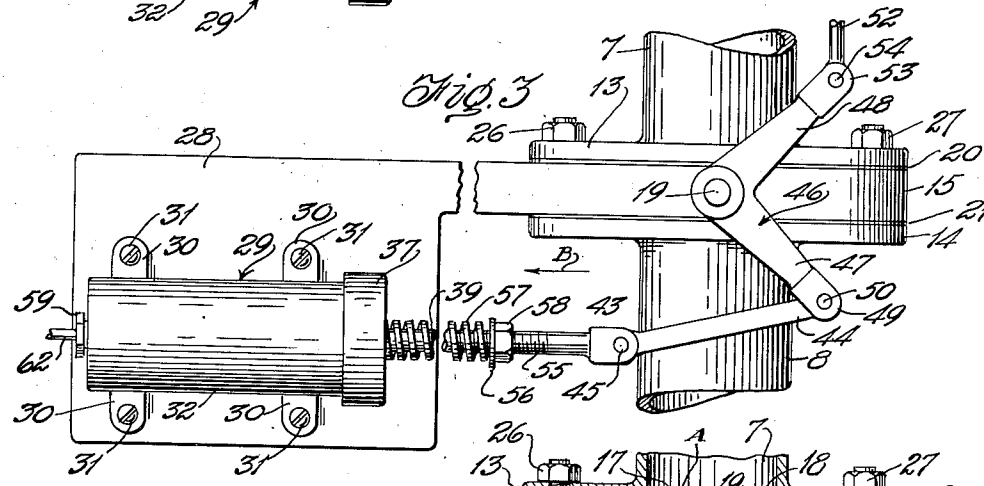
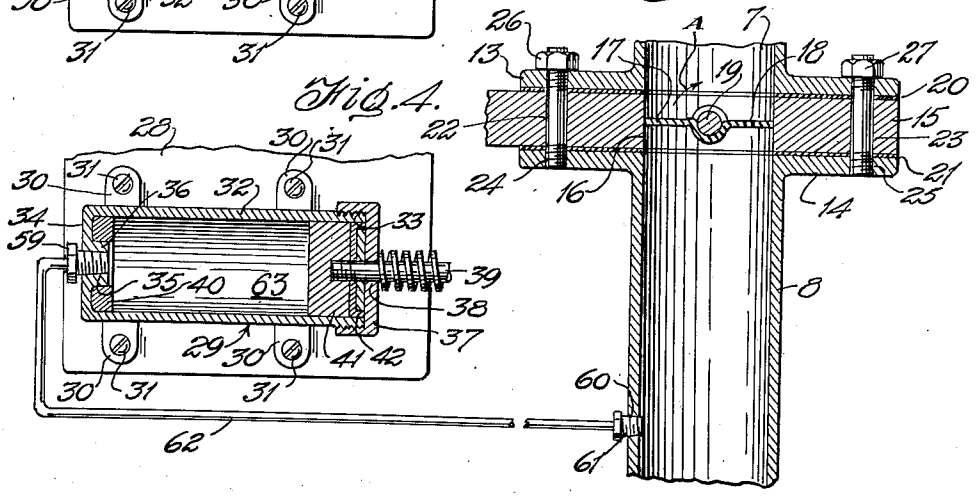


Fig. 4.



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UNITED STATES PATENT OFFICE

2,122,331

AUTOMATIC SPEED AND VACUUM CONTROLLING DEVICE

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6 Claims. (Cl. 123—119)

This invention relates to a speed and vacuum controlling device of that type having as an element thereof a piston and aims to provide, in a manner as hereinafter set forth, a device operated by and dependent upon the intake manifold vacuum which will produce any desired stabilization of the vacuum in the intake manifold for the purpose of automatically controlling by vacuum acceleration and deceleration of the speed of internal combustion engines used in connection with automotive vehicles; also to eliminate the stalling of the windshield wiper due to drop in vacuum of intake manifold; to prevent a too rapid advance or retard on vacuum controlled ignition depending upon its design; improving operation of all vacuum controlled or operated accessories attached to the intake manifold vacuum of an internal combustion engine.

The speed of the engine of an automotive vehicle is regulated by the butterfly valve in the carburetor. When the engine of the vehicle is running normally, there is a vacuum created in the intake manifold which sucks air through the venturi of a carburetor and causes the gasoline to vaporize. If one presses his foot on the accelerator, it moves the butterfly valve in the carburetor so as to increase or decrease the speed of the engine. When the engine is running at a fairly normal speed, the air adjustment of the carburetor works perfectly. However, when the engine is operating at a fairly slow speed and one presses down on the foot throttle, it causes the butterfly valve to open abruptly. By reason of the slow speed of the engine, the vacuum in the intake manifold is so reduced that the windshield wiper stalls, the spark on vacuum controlled distributor advances or retards beyond its proper angle and the gasoline coming into the carburetor is improperly mixed which results in the stalling and sputtering of the engine, which is very objectionable. It is the aim of this invention to provide, in a manner as hereinafter set forth, a device for installation in relation to the carburetor, intake manifold and gasoline pump of the engine of an automotive vehicle for overcoming the objection aforesaid as well as providing a practical vacuum controlled manifold for acceleration and deceleration relative to the speed of the engine.

A further object of the invention is the elimination of dangerous gases by controlling the accelerating pump to eliminate the injection of fuel oil when a high manifold pressure is present.

A further object of the invention is to control the amount of fuel oil injection in proportion to the vacuum in the intake manifold and prevent a too rich mixture.

Further objects of the invention are to provide, in a manner as hereinafter set forth, a device for the purposes referred to which is simple in its construction and arrangement, strong, durable, compact, thoroughly efficient in its use, readily set up, conveniently installed with respect to an internal combustion engine, and comparatively inexpensive to manufacture.

With the foregoing and other objects in view, the invention consists of the novel construction, combination and arrangement of parts as will be more specifically referred to and are as illustrated in the accompanying drawings wherein is shown an embodiment of the invention, but it is to be understood that changes (such as attaching directly to original throttle of carburetor, variations and modifications may be resorted to which fall within the scope of the invention as claimed.

In the drawings:

Figure 1 is a side elevation of an internal combustion engine provided with a down draft carburetor and showing the adaptation therewith of the speed controlling device in accordance with this invention,

Figure 2 is a top plan view of the device,

Figure 3 is a side elevation of the device installed relative to the carburetor and intake manifold of the engine, and

Figure 4 is a section on line 4—4, Figure 2.

Referring to the drawings, 5 generally indicates an internal combustion engine which includes an air filtering means 6 communicating with the carburetor 7. The intake manifold of the engine 5 is designated at 8 and the oil pump which communicates with the carburetor 7 is indicated at 9. The pump, its operating means and its injecting element may be of any well-known form. The device, in accordance with this invention, is to have as hereinafter referred to, an actuating link for and adapted to be connected to the injecting element of the pump. The construction of the pump, its operating means and its injecting element form no part of this invention. The operating means for the butter-fly valve of the carburetor is designated generally at 10 and includes a manually operated pull rod 11 and a foot operated mechanism 12 which is connected with rod 11 for the purpose of shifting it. The arrangement of the means 10 is such that the butter-fly valve or what may be termed the throttle valve can be operated by a manual pull or foot pressure.

The carburetor 7 is of the down-draft type and is flanged as at 13 at its lower end. The intake

manifold 8 is flanged at its upper end as at 14. Flanges 13 and 14 are arranged in aligned spaced relation. Interposed between the flanges 13 and 14 is the outer end of an arm 15 formed with an opening 16 having its wall aligning with the inner faces of the lower end of the carburetor 7 and upper end of the manifold 8. The arm 15 provides a mounting for a butter-fly valve 17 which is formed with an idling port 18. The valve 17 is fixed to a shaft 19 which is journaled in and projects laterally from one side of the arm 15. Interposed between the arm 15 and flange 13 is a packing 20. Interposed between the flange 14 and the arm 15 is a packing 21. The flange 13 and packing 21 are formed with two sets 22, 23 of registering openings. The flange 14 is provided with an opening 24 having a threaded wall. The opening 24 registers with the lowermost opening of the set 22. The flange 14 is provided with an opening 25 having a threaded wall. The opening 25 registers with the lowermost opening of the set 23. Extending through the sets of openings and threadedly engaging with the openings 24, 25 are holdfast means 26, 27 which function to clamp the carburetor, the intake manifold, the arm 15 and the packings 20 and 21 together.

The arm 15 and butter-fly valve 17 form elements of the speed controlling device in accordance with this invention. The arm 15 is integral with and extends from one side of a supporting plate 28 which is anchored to one side of the engine 5 in proximity to the intake manifold 8.

Opposing the plate 28 and disposed lengthwise thereof is a cylinder 29 provided at each end with a pair of oppositely extending apertured spacers 30 through which extend holdfast devices 31 acting to anchor cylinder 29 to and in spaced relation with respect to plate 28. The cylinder 29 includes an annular body part 32 which is open at its inner end. Body part 32 at its inner end is formed with peripheral threads 33. The outer end of body part 32 merges into a head 34 formed with an axial opening 35 and an inwardly extending collar 36 having its inner face registering with the wall of the aperture. The inner face of the collar 36 and wall of the aperture 35 are threaded. Threadedly engaging with the threads 33 is a cap-like head 37 for closing the inner end of cylinder 32. The head 37 has an axial opening 38 through which extends a piston rod 39. Encompassing the collar 36 and bearing against the inner face of the body part 32 is an annulus 40 preferably formed of leather or other suitable material. The annulus 40 bears against the inner face of the head 34 and extends inwardly from the inner end of the collar 36 and provides a seat for a piston 41 which is carried by the inner end of the rod 39. Piston 41 has secured thereto a packing means 42 which is arranged against that face of the piston into which the piston rod 39 extends.

The outer end of the piston rod 39 is provided with a yoke 43. A link 44 has one end thereof extending into the yoke 43 and such end is pivotally connected to the yoke 43 as at 54. Fixed to the outer end of the shaft 19 is a bell crank lever 46 having its arms indicated at 47, 48. The arm 47 has its outer end provided with a yoke 49 into which extends the other end of the link 44 and the said other end is pivotally connected to the yoke 49 as at 50. The injecting means for the pump 9 is indicated at 51 (Figure 1) and suitably connected therewith is the upper end of an upstanding actuating link 52 therefor. The outer end of the arm 48 of the bell crank 46 is provided with a yoke 53. Extending into the yoke 53 is the lower end of the link 52 and such lower end is pivotally connected to the yoke 53 as at 54.

The piston rod 39 intermediate its ends is threaded as at 55. Positioned on the piston rod 39 is a washer 56. Encompassing the piston rod 39 and interposed between the washer 56 and the head 37 is a coiled spring 57. Engaging with the threads 55 of the piston rod 39 is an adjusting nut 58. The spring 57 is a calibrating spring and the nut 58 is a calibrating nut.

Threadedly engaging with the wall of opening 35 and inner face of collar 36 is a flanged nipple 59. The intake manifold 8 has a threaded opening 60 in which is secured a flanged nipple 61. Connected to and extending from the nipple 59 and connected to the nipple 61 is a pipe line 62 for establishing communication between the chamber 63 provided by the cylinder 29 and the intake manifold 8. The showing in Figure 3 represents the device in a position when engine is not running. When the motor is started the vacuum from the intake manifold pulls the piston 41 against the seat provided by the annulus 40 and closes the nipple 59. As the piston 41 moves toward the annulus 40 the piston rod 39 is carried therewith and provides for the shifting, in the direction of the arrow A of the butter-fly valve 17 which is disposed between the carburetor and the intake manifold and permits the carburetor being free to operate, as normal when intake manifold vacuum is above three to four inches, with this exception that the fuel oil accelerating pump 9 is in its injecting position and controlled by the device, instead of it being operated manually by the foot feed. When the driver steps on the foot operated mechanism 12, with a great deal of force, the throttle valve which is above the valve 17 opens completely and the vacuum in the intake manifold drops rapidly, but cannot go below the vacuum at which the calibrated nut and spring is set. It will be assumed that the calibrated spring has been set to hold the valve 17 at an angle to maintain the manifold vacuum above zero or three to six inches. Now, when the driver steps on the mechanism with force, the piston rod partly closes the valve 17 and keeps the intake manifold vacuum above zero, at the same time, due to the action of the piston rod the injecting means of the accelerating pump is operated for the purpose of injecting combustible fuel oil into the manifold needed for quick acceleration, and as there is a vacuum in the manifold the fuel oil will be absorbed immediately.

By preventing the vacuum in the intake manifold to drop to zero it prevents the stalling and stuttering of the engine.

The air enters the cylinder 29 through the opening 38 in the head 37. The arrow B indicates the direction of movement of rod 39 when a vacuum is in the intake manifold 8 after the motor is started.

The nipple 59 constitutes a vacuum inlet for chamber 32 and the nipple 61 a vacuum intake to the line or conduit 62 from the manifold 8.

The spring and nut constitutes a means for limiting the shifting of the piston rod in a direction to which it is moved by the vacuum in the cylinder 29 and such vacuum is caused by the communication of the conduit 62 with the cylinder and with the intake manifold when the engine is operating. The spring and nut further constitutes a means for adjusting the piston rod.

The spring and nut further constitutes a means for adjusting the desired manifold pressure at heavy loads or slow speeds and also determines when the fuel oil is to be injected.

The device also provides for the elimination of dangerous gases due to the unnecessary injection of fuel oil on the manual operation of the accelerating pump. The dangerous gases are eliminated by the control of the accelerating pump in a manner to eliminate the injection of fuel oil when there is a high manifold vacuum. The device also controls the amount of fuel oil injected in proportion to the vacuum of the intake manifold and prevents too rich a mixture.

What I claim is:

1. In a speed controlling device for internal combustion engines of automotive vehicles, a carburetor having a throttle, an operable valve controlling manifold vacuum adapted to be interposed between the carburetor and intake manifold of the engine, an actuating link for and adapted to be connected to and for controlling the injecting means of a fuel oil accelerating pump, operating means for and common to said valve and said link, and a vacuum controlled structure having means for establishing communication between it and the intake manifold of the engine, said structure including a reciprocatory mechanism travelling in one direction, when the engine is started, for moving said operating means in a direction to open said valve and for shifting said link in a direction to make inactive the injecting means of the accelerating pump and travelling in an opposite direction, when the throttle of the engine is completely opened, for moving said operating means in a direction to shift said valve in a closing direction and said link in a direction to make active the injecting means of the acceleratng pump, said mechanism including means for limiting the extent of the closing movement of the valve to prevent the vacuum in the manifold dropping to a point in proximity to zero.

2. In a speed controlling device for internal combustion engines of automotive vehicles, a carburetor having a throttle, an operable valve controlling manifold vacuum adapted to be interposed between the carburetor and intake manifold of the engine, an actuating link for and adapted to be connected to and for controlling the injecting means of a fuel oil accelerating pump operating means for and common to said valve and said link, a vacuum controlled structure having means for establishing communication between it and the intake manifold of the engine, said structure including a reciprocatory mechanism travelling in one direction, when the engine is started, for moving said operating means in a direction to open said valve and for shifting said link in a direction to make inactive the injecting means of the accelerating pump and travelling in an opposite direction, when the throttle of the engine is completely opened, for moving said operating means in a direction to shift said valve in a closing direction and said link in a direction to make active the injectng means of the accelerating pump, said mechanism including means for limiting the extent of the closing movement of the valve to prevent the vacuum in the manifold dropping to a point in proximity to zero.

3. In a speed controlling device for internal combustion engines of automotive vehicles, a carburetor having a throttle, an operable valve controlling manifold vacuum adapted to be interposed between the carburetor and intake manifold of the engine, an actuating link for and adapted to be connected to and for controlling the injecting means of a fuel oil accelerating pump operating means for and common to said valve and said link, and a vacuum controlled structure having means for establishing communication between it and the intake manifold of the engine, said structure including a reciprocatory mechanism travelling in one direction, when the engine is started, for moving said operating means in a direction to open said valve and for shifting said link in a direction to make inactive the injecting means of the accelerating pump and travelling in an opposite direction, when the throttle of the engine is completely opened, for moving said operating means in a direction to shift said valve in a closing direction and said link in a direction to make active the injecting means of a fuel oil accelerating pump, said mechanism including means for limiting the extent of the closing movement of the valve to prevent the vacuum in the manifold dropping to a point in proximity to zero, the said means of said mechanism being resilient and adjustable.

4. In a speed controlling device for internal combustion engines of automotive vehicles, the combination with the throttle valve, carburetor, and intake manifold of an engine, of a pivoted butter-fly valve controlling manifold vacuum, a mounting for said valve interposed between said carburetor and intake manifold, an actuating link for and adapted to be connected to and for controlling the injecting means of a fuel oil accelerating pump, a shifting means for and common to said valve and link, a vacuum cylinder, a pipe connection between one end of said cylinder and the intake manifold, a vacuum operated piston within said cylinder and closing at the extent of its movement in one direction the pipe to the cylinder, a piston rod carried by the piston extended through the other end of the cylinder and pivotally connected to said shifting means, and an adjustable tensioning means carried by said rod and abutting the said other end of the cylinder.

5. In a speed controlling device for internal combustion engines of automotive vehicles, the combination with the throttle valve, carburetor, and intake manifold of an engine, of a pivoted butter-fly valve controlling manifold vacuum, a mounting for said valve interposed between said carburetor and intake manifold, an actuating link for and adapted to be connected to and for controlling the injecting means of a fuel oil accelerating pump, a shifting means for and common to said valve and link, a vacuum cylinder, a pipe connection between one end of said cylinder and the intake manifold, a vacuum operated piston within said cylinder and closing at the extent of its movement in one direction the pipe to the cylinder, a piston rod carried by the piston extended through the other end of the cylinder and pivotally connected to said shifting means, an adjustable tensioning means carried by said rod and abutting the said other end of the cylinder, and a support to which said cylinder is anchored, said mounting being an integral extention on said support.

6. In a device for the purpose set forth, a pivoted butterfly valve controlling manifold vacuum, a mounting for the valve adapted to be interposed between and anchored to the carburetor and intake manifold of an internal combustion engine, a vacuum cylinder having means

to provide a vacuum inlet at one end, a line anchored at one end in said inlet, opening into said cylinder and adapted to have its other end anchored to and open into the intake manifold of the engine, a piston arranged in the cylinder and acting at the extent of its movement in one direction to abut said seat and close said outlet, an actuating link for and adapted to be connected to and for controlling the injecting means of a fuel oil accelerating pump the accelerating fuel pump of the engine, a shifting means for and common to said valve and link, a piston rod carried by the piston extended through the other end of the cylinder, a link pivotally connected to the outer end of said rod and to the said shifting means, a combined spring adjusting and abutment member threadedly engaging with said piston, and a coiled spring encompassing said rod and interposed between said abutment and the said other end of said cylinder.

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