Aug. 20, 1940. H. J. KRATZER 2,212,101

COMPENSATING DEVICE FOR CARBURETORS OF INTERNAL COMBUSTION MOTORS

Filed Nov. 8, 1937

Fig. 1.

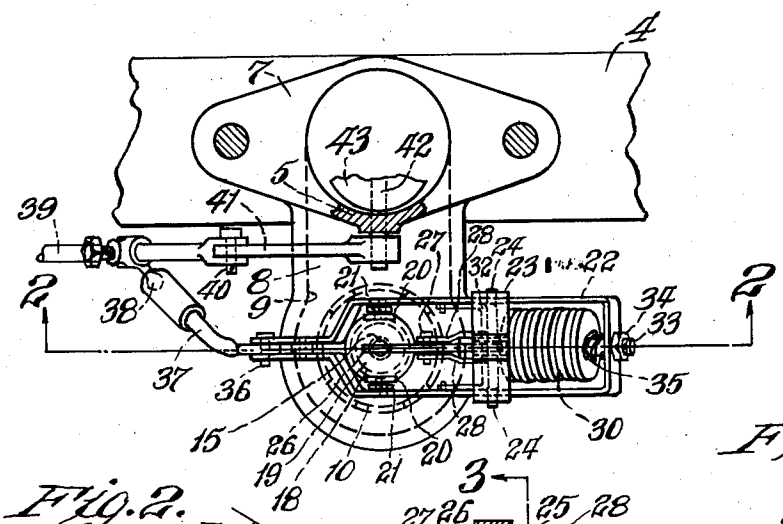


Fig. 2.

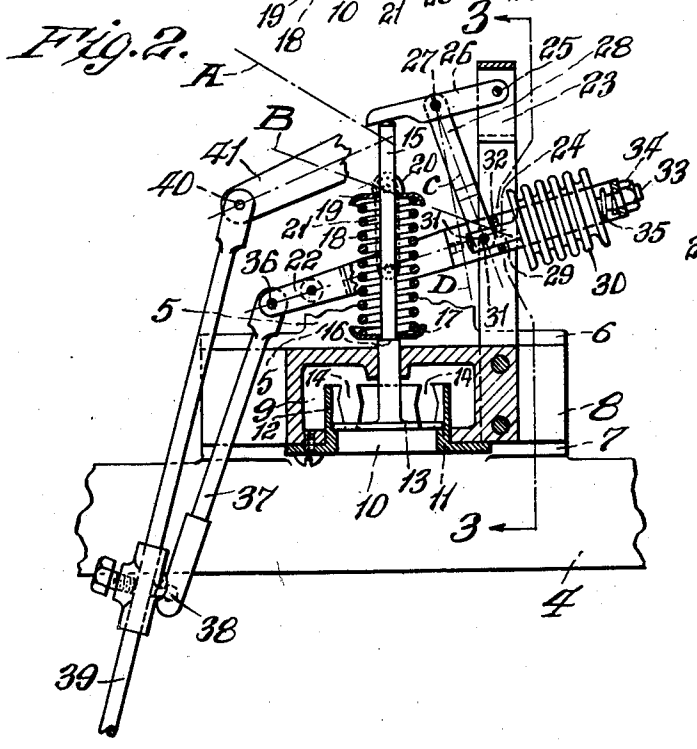
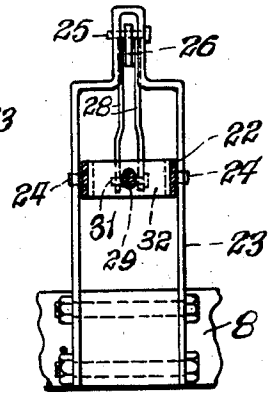


Fig. 3.



Inventor:
H. J. Kratzer.
By Herbert G. Fletcher
Atty.

Patented Aug. 20, 1940 2,212,101

UNITED STATES PATENT OFFICE

2,212,101

COMPENSATING DEVICE FOR CARBURETORS OF INTERNAL COMBUSTION MOTORS

Herbert J. Kratzer, St. Louis, Mo.

Application November 8, 1937, Serial No. 173,346

15 Claims. (Cl. 123—119)

This invention relates to a compensating device for carburetors of internal combustion motors, which is presently adapted to be located between the carburetor and the intake manifold of a motor so as to be effective on the carburetted mixture as it is entrained from the carburetor to the intake manifold.

The invention has for its primary object, the provision of means for admitting auxiliary air at a point between the carburetor and the intake manifold at certain desirable periods of operation of the motor.

Another object is to provide a compensating device in cooperation with a carburetor, with means for proportioning the size of an auxiliary air opening comparable with the effective opening at the carburetor throttle.

A further object is to provide a compensating device having an auxiliary air opening with means for decreasing or increasing the size of the opening comparable with atmospheric temperature or with atmospheric pressure changes.

A still further object is in providing a compensating device for a carburetor which is cooperatively connected with the throttling means of the carburetor to permit the admission of auxiilary air to the intake manifold of a motor at times when required by the motor speed for economy of operation, and to prevent flow of auxiliary air to the intake manifold when maximum motor performance torque is desired.

Other objects and advantages will appear as this description progresses and by reference to the drawing, in which:

Figure 1 is a fragmentary plan view partly in section, for showing the adaptation of the invention in a cooperable position between the carburetor and the intake manifold.

Figure 2 is a side elevation partly in section, taken approximately on the line 2—2 of Fig. 1.

Figure 3 is a vertical transverse section taken approximately on the line 3—3 of Fig. 2.

Referring to the several figures of the drawing, 4 designates a portion of the intake manifold of an internal combustion motor and disposed above said manifold is a carburetor 5 having the lower disposed connecting flange 6, and disposed between the carburetor and the intake manifold by securing it to the flange 6 of the carburetor and the flange 7 of the intake manifold, is a housing 8 of this improved compensating device.

The housing 8 is provided with a passageway 9 which is disposed transversely to the intake manifold 4, and the outer extending end of the housing having a valve seat ring 10 to which an air cleaner element (not shown) may be connected, and said ring providing means of communicating through it to the passageway 9, from the air cleaner element.

The valve seat ring 10 is provided with a valve seat 11, and extending upwardly from the seat is a cylindrically ported wall 12 with which the poppet valve 13 is cooperable. The cylindrical wall 12 of the valve seat ring 10 extends into the passageway 9 and the ports 14 of said cylindrical wall are graduated in their formation for inletting cooperation with the periphery of the valve 13. Extending upwardly from the valve 13 is a stem 15 having a shoulder 16 which is disposed outside of the top of the housing 8, and engaged on said shoulder is the lower retaining cup 17 of a coil spring 18 which is mounted over the stem 15 of the valve 13.

Mounted on the upper end of the coil spring 18 and slidable on the valve stem 15, is a retaining cup 19 having a pair of diametrically opposed upstanding ears 20, and pivotally connected to each ear is a depending link 21, the lower ends of said links being connected to respective side members of a yoke 22, said yoke being vertically swingable in a frame 23 by the pivots 24.

Swingably supported in the upper end of the frame 23 by the pivot 25, is a limiting lever 26 having its extending end disposed in vertical alinement with the upper end of the stem 15 of the valve 13, and intermediately connected to the lever 26 on the pivot 27, are a pair of depending links 28 which at their lower ends are pivotally connected to the stem 29 of a Sylphon element 30 by the pin 31.

The stem 29 of the Sylphon element 30 is slidably mounted in a cross bar 32 which is supported at its ends to the side members of the yoke 22, said cross bar being the element from which the pivots 24 for the support of the yoke 22, are projected. The Sylphon element 30 at its opposite end is also provided with a stem 33 which is slidably supported in one end of the yoke 22 and held therein by a lock nut 34, and mounted on said stem between the Sylphon element and the end of the yoke, is a coil spring 35.

The side members of the yoke 22 at their extending ends are shaped into paralleling proximity to one another and inserted therebetween, and held by a pivot 36 is one end of a link 37, said link at its other end having a ball and socket connection 38 with an intermediate portion of the accelerator rod 39 which is pivotally connected at 40 to the throttle lever 41 of the carburetor 5

which is connected to the shaft 42 of the throttle valve 43 of the carburetor.

In operation and when a motor having this improved compensating device applied, is idling, the parts described are in the approximate positions shown, and the pressure of the coil spring 18 on the retaining cup 17 is at the maximum, and the valve 13 is thereby tightly held against the seat 11. When the accelerator rod 39 is actuated to slightly open the throttle valve 43 by movement of the throttle lever 41 towards the angular line A, the link 37 which is connected to the accelerator rod 39 will be simultaneously moved to upwardly swing the yoke 22 towards the angular line B on its pivots 24 in the frame 23, and the coil spring 18 will be permitted to expand by reason of the upward displacement of the spring retaining cup 19, by the upward lift given to the links 21 of the spring retaining cup 19.

Simultaneously with the upward swing of the yoke 22 on the pivots 24, the limiting lever 26 will be swung upwardly on its pivot 25 by movement applied to it through the links 28 which connect the lever 26 with the yoke 22. If however, the opening of the throttle valve 43 is not sufficient to speed the motor enough to develop a vacuum in the manifold 4 to overcome the pressure of the expanded coil spring 18 on the poppet valve 13, said valve will not open or be moved from its seat 11. However, when the load torque permits a greater motor speed to be attained at a given throttle setting, then a vacuum strong enough to overcome the pressure of the spring 18 on the valve 13 will be developed in the manifold 4, whereby the valve 13 will be lifted from its seat 11, and auxiliary air will be entrained into the passageway 9 and manifold 4 through the valve ring 10 and the ports 14, beneath the valve 13, the ultimate size or height of the valve uncovered ports 14 being governed by the location of the valve limit lever 26 against which the upper end of the valve stem 15 abuts when the valve 13 is lifted from its seat 11 by the vacuum attained in the manifold 4, the uncovered size of the ports 14 being commensurate with the volume of carburetted air determined by the opened or partially opened position of the throttle valve 43 of the carburetor 5.

At varying points between idling and wide open throttle speeds, the pressure of the spring 18 is progressively decreased and the valve limit lever 26 is progressively raised away from the valve stem 15 with a consequent progressive opening of the valve 13 with respect to the ports 14 of the valve seat ring 10. While the motor is in operation, a sudden movement of the throttle valve 43 to a more open position will always result in dropping the vacuum a greater degree than the amount of the simultaneous decrease of the pressure of the spring 18 on the valve 13 which inherently provides to instantaneously cause the valve 13 to close wherein a rich performance mixture of fuel will be entrained to the manifold 4 during the period of time necessary to accelerate the motor speed.

Cooperatively effective at all times on the valve limit lever 26 is the Sylphon element 30 which, with its linkage contributes for allowing the valve 13 to uncover longer areas of the ports 14 as required, due to the decreased density of warmer air or to lighter air at altitudes. In the drawing disclosure and particularly Fig. 2, the Sylphon element 30 is contracted in its length which for purposes of explanation, may be caused by sea level atmospheric conditions and low temperatures, and in this contracted position, the connecting links 28 of the stem 29 of the Sylphon element and the valve limiting lever 26 are disposed on the angular line C which is but a short distance outwardly from the pivots 24 of the yoke 22, and in this location of the links 28, a shorter swinging arc will be effected at the connecting pin 31 at the lower ends of the links 28 as the yoke 22 is swung on its pivots 24 in a direction towards the angular line B, and consequently the valve limit lever 26 will be swung upwardly on its pivot 25 a distance commensurate with the distance of upward swing of the yoke 22.

During travel of a motorcar at higher altitudes or in warmer atmosphere, the Sylphon element 30 will enlarge by lengthening or expanding and the stem 29 thereof which is slidable in the cross bar 32 will be moved outwardly, thereby carrying the connecting pin 31 of the links 28 toward the angular line D, wherein the distance between the pin 31 and the pivots 24 of the yoke 22 will be increased so that a larger swinging arc will be effected on the pin 31 as the yoke 22 is swung towards the angular line B, thus causing the valve limit lever 26 to be swung farther upwardly on its pivot 25 than it was when the Sylphon element 30 was contracted, the larger upward swing of the valve limit lever 26 obviously permitting the valve 13 to uncover the ports 14 of the valve seat ring 10 a greater length so that a maximum of auxiliary air will be entrained in the passageway 9, and to the intake manifold 4 at times when required, due to traveling through lighter or warmer atmospheric conditions.

Obviously, temperature and atmospheric pressure conditions attendant with climatic changes govern the expanding and contracting action of the Sylphon element 30, and the movement of the links 28 on the pivot 27 of the valve limit lever 26 is gradual, and consequently a nicety of governing operation is provided this improved compensating device wherein the varying fluel mixture requirements for motor performance is inherent and whereby a saving in fuel is an additional result.

With further regard to the ports 14 and the cylindrical wall 12 of the valve seat ring 10, these ports may be graduated in width for increasing or decreasing the inlet areas as determined by opened positions of the valve 13, as may be required to permit a correct volume of auxiliary air to enter the carburetted air charge as delivered by various carburetors having varying mixture characteristics to be compensated.

While I have described one embodiment of my invention with some particularity, obviously many other embodiments thereof will occur to those skilled in the art to which it appertains. I, therefore, do not limit myself to the precise details described, but claim as my invention all variations and modifications coming within the scope of the subjoined claims.

What I claim is:

1. A compensating device for an internal combustion motor having an accelerating element, an intake manifold, an auxiliary air passageway leading to the manifold, a spring actuated valve controlling said passageway, controllable tensioning means cooperable with the spring of said valve and the accelerating element of the motor, and automatically adjustable means for limiting the opening movement of said valve.

2. A compensating device to be inserted between the intake manifold and the carburetor of an internal combustion motor comprising a hous-

ing having a passageway in communication with the entraining passageway from the carburetor to the manifold, a spring actuated valve controlling the inlet end of said housing passageway, and automatically adjustable means for limiting the opening movement of said valve.

3. A compensating device for an internal combustion motor comprising a housing having a passageway with an inlet, means for controlling the inlet of said passageway, a carburetor and an intake manifold between which said housing is located, throttling means for said carburetor having cooperable connection with said controlling means of said passageway, and atmospherically actuated means cooperable with said controlling means.

4. A compensating device for an internal combustion motor having an accelerating element and an intake manifold, an auxiliary air passageway leading to the manifold, a spring actuated valve controlling said passageway, tensioning means cooperable with the spring of said valve and the accelerating element of the motor, and an atmospherically controlled element cooperable to limit the opening movement of said valve.

5. A compensating device to be inserted between the intake manifold and the carburetor of an internal combustion motor comprising a housing having a passageway in communication with the entraining passageway from the carburetor to the manifold, a spring actuated valve controlling the passageway of said housing, tensioning means cooperable with the spring of said valve and an accelerating element of the motor, and progressively actuated means cooperable with said valve for limiting the opening movement thereof.

6. A compensating device for the fuel mixture intake of an internal combustion motor comprising a housing having a valve controlled passageway, resilient means cooperable to hold the valve in closed position, progressively actuated tensioning means cooperable with the resilient means of said valve, and means cooperable with said progressively actuated tensioning means for limiting the opening movement of said valve.

7. A compensating device for the fuel mixture intake of an internal combustion motor comprising a housing having a valve controlled passageway, resilient means cooperable to hold the valve in closed position, progressively actuated tensioning means cooperable with the resilient means of said valve, and atmospherically actuated means cooperable with said progressively actuated tensioning means for limiting the opening movement of said valve.

8. An internal combustion motor having an intake manifold and a carburetor with a cooperable throttle actuating rod, said manifold having an auxiliary air passageway leading thereto, a spring actuated valve controlling said passageway, means connected to said throttle actuating rod for tensioning the spring of said valve, and a lever cooperable with said valve and said spring tensioning means for limiting the opening movement of said valve.

9. An internal combustion motor having an intake manifold and a carburetor with a cooperable throttle actuating rod, said manifold having an auxiliary air passageway leading thereto, a spring actuated valve controlling said passageway, means connected to said throttle actuating rod for tensioning the spring of said valve, a lever cooperable with said valve and said spring tensioning means for limiting the opening movement of said valve, and a Sylphon element cooperable with said lever.

10. An internal combustion motor having an intake manifold and a carburetor with a cooperable throttle actuating rod, said manifold having an auxiliary air passageway leading thereto, a spring actuated valve controlling said passageway, linkage cooperably connected to said throttle actuating rod and said spring of said valve for changing the tension of said spring, and a valve abutting element cooperatively connected to said linkage.

11. An auxiliary air supplying device for the intake manifold of an internal combustion motor comprising an auxiliary air passageway leading to the manifold, a spring actuated valve controlling said passageway, a carburetor having a cooperable throttle actuating rod, linkage cooperatively connected to said throttle actuating rod and said spring of said valve for changing the tension of said spring, a valve abutting element cooperatively connected to said linkage, and a Sylphon element having cooperable connection with said valve abutting element.

12. Means for supplying auxiliary air to the fuel mixture intake of an internal combustion motor comprising a carburetor having a cooperable throttle actuating rod, a passageway leading from said carburetor, a valve cooperable with said passageway and having a stem and a coil spring mounted thereover, a linkage cooperatively connected to said throttle actuating rod and one end of said valve spring, a lever in alinement with the stem of said valve and having cooperable connection with said linkage, and an atmospherically actuated element having cooperable connection with said lever.

13. Means for supplying auxiliary air to the fuel mixture intake of an internal combustion motor comprising a passageway leading to the fuel mixture intake and having a cooperable throttle setting element, a spring actuated valve cooperable to admit free air to said passageway, means cooperable with the spring of said valve and said element for varying the tension of said spring to cause said valve to restrict air flow at times of closed throttle setting of said element, and an atmospherically controlled element cooperable with said valve.

14. Means for supplying auxiliary air to the fuel mixture intake of an internal combustion motor comprising a carburetor having a cooperable throttle actuating element, a passageway leading from said carburetor, a spring actuated valve cooperable to admit free air to said passageway, means cooperable with the spring of said valve and said element for varying the tension of said spring to cause said valve to restrict air flow at times of closed throttle setting of said element, and an atmospherically controlled element cooperable with said valve.

15. Means for supplying auxiliary air to the fuel mixture intake of an internal combustion motor comprising a passageway leading to the fuel mixture intake, a spring actuated valve controlling said passageway, a throttle setting element, linkage cooperatively connected to said element and the spring of said valve for varying the tension of the spring, a valve abutting element cooperatively connected to said linkage, and a Sylphon element having cooperable connection with said valve abutting element and said linkage.

HERBERT J. KRATZER.