

May 20, 1941.

M. MENNESSON

2,242,832

GOVERNOR DEVICE FOR INTERNAL COMBUSTION ENGINES

Filed June 28, 1937

2 Sheets-Sheet 1

Fig. 1.

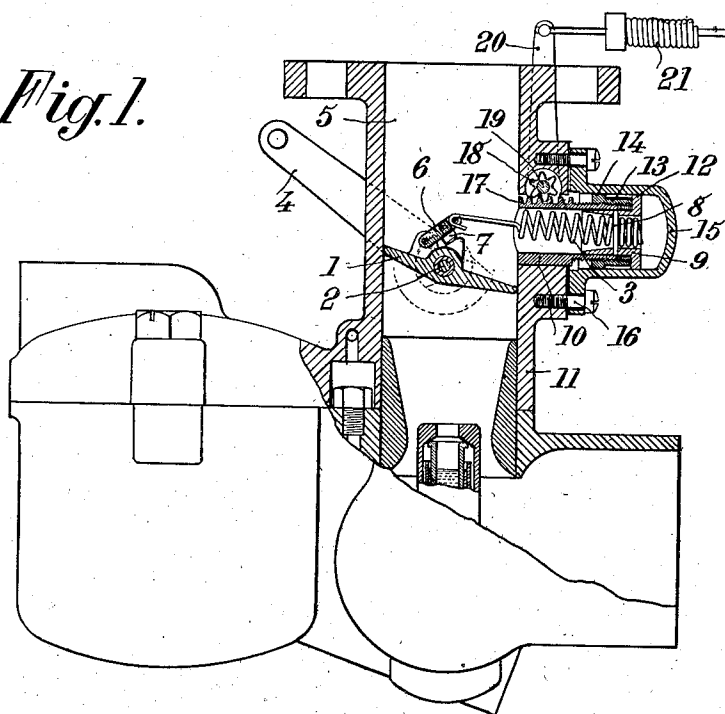
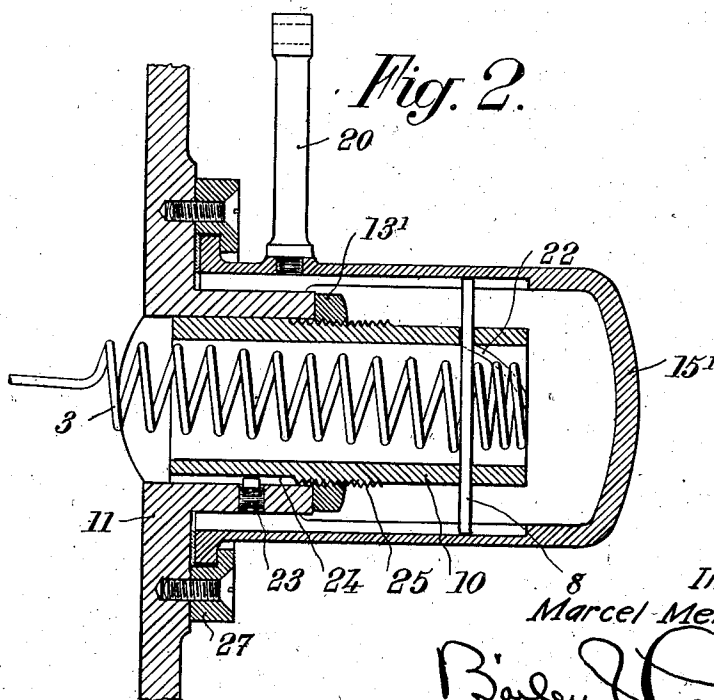


Fig. 2.



Inventor:
Marcel Mennesson,

Barley & Carson
Attorneys

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Fig. 3.

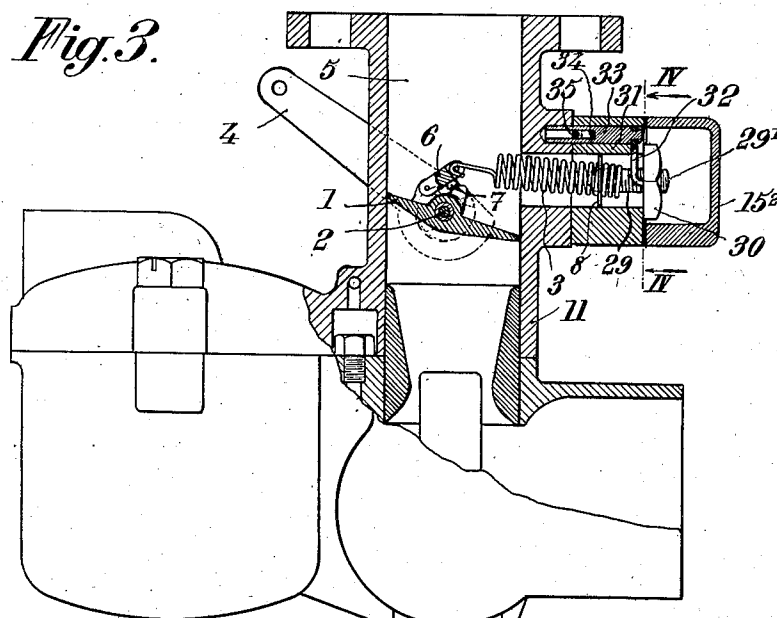


Fig. 4.

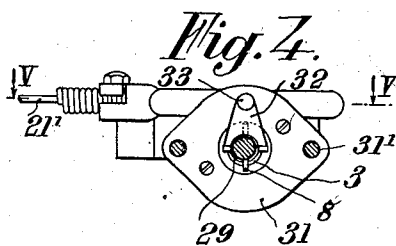


Fig. 5.

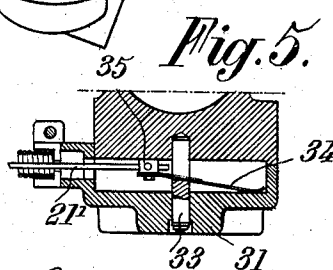


Fig. 6.

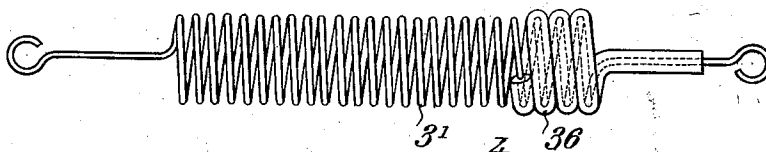
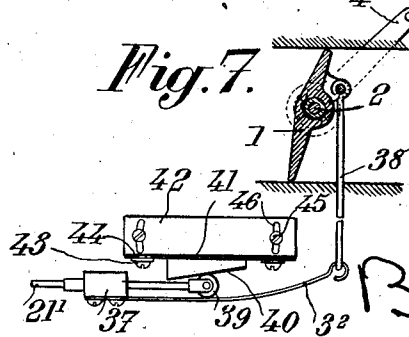


Fig. 7.



Inventor:
Marcel Mennesson,

Bailey & Carson
Attorneys

UNITED STATES PATENT OFFICE

2,242,832

GOVERNOR DEVICE FOR INTERNAL COMBUSTION ENGINES

Marcel Mennesson, Neuilly-sur-Seine, France, assignor to Societe Anonyme Solex, Neuilly-sur-Seine, Seine, France, a French society

Application June 28, 1937, Serial No. 150,836
In France July 9, 1936

1 Claim. (Cl. 137—152)

This invention relates to regulating devices for limiting the maximum speed of internal combustion engines, particularly those for automobiles of the type comprising a throttling member, provided in the induction pipe and influenced, on the one hand, by the suction in this pipe and, on the other hand, by opposing resilient means, so that the said throttling member has a tendency automatically to be moved towards its closing position under the effect of the suction and against the action of the said resilient means, when the speed of the engine exceeds a predetermined maximum value.

The invention has for its principal object so to construct such devices that it is possible to modify, at will, the speed limit which the engine cannot exceed unless the apparatus is dismantled.

According to a principal feature of the invention, such regulating devices include means by which it is possible to modify from a distance and at will, the effect of the resilient means opposed to the suction.

According to a further feature, regulating means are provided which allow the tension or the tension and the flexibility of the resilient means opposed to the suction to be modified by the longitudinal and/or rotary movement of a part capable of being displaced by a remote control and adapted to act on the said resilient means.

Another feature consists in interposing in the remote control for the resilient means, supplementary resilient means to modify at the same time the tension and the flexibility of the resilient system thus constituted.

A still further feature relates to the resilient means opposing the suction and comprises forming them from a helical spring, certain turns of which are covered by a sheath having such a thickness (or several successive sheaths having such different thicknesses) that the pitch of the spring between the turns thus covered is greater than that of the non-covered turns. This gives a determined initial tension to the spring, the sheath preferably being able to slide along the turns in such a manner that a more or less great useful length of the helical spring is affected by the said sheath.

In order that the invention may be better understood, it will now be described with reference to the accompanying drawings which are given by way of example and in which:

Figs. 1 and 2 show, in longitudinal section, two carburetors with speed limiting devices con-

structed respectively according to two different embodiments of the invention.

Figs. 3, 4 and 5 show respectively in longitudinal section, in transverse section according to IV—IV Fig. 3 and in horizontal section according to V—V Fig. 4, a carburetor with a speed limiting device constructed according to a third embodiment of the invention.

Fig. 6 shows, in elevation, a member of a speed limiting device constructed according to a variation.

Fig. 7 shows, in elevation (parts in section), a speed limiting device constructed according to another embodiment of the invention.

The carburetor proper can be constituted in any appropriate manner and the speed limiting device is constituted particularly as already indicated in my pending application S. N. 745,350 filed September 22, 1934, by providing it with a throttling member or butterfly valve 1 mounted freely and eccentrically on its axis 2 while it is influenced by a spring 3 which tends to move the butterfly valve towards its position of opening by applying it against an abutment moving with the operating member 4 of the said butterfly valve. By its eccentric mounting the suction effect, existing in the suction piping 5 of the engine and which varies as a direct function of the speed of this latter, exerts on the two faces of the butterfly valve a differential effect which tends somewhat to close the butterfly valve, when a specified speed is exceeded, in order to restore the speed of the engine to the prescribed value, without the driver having to modify the position of the operating member 4.

The spring 3 is coupled, by one of its extremities, to the butterfly valve 1 and this directly or, preferably, through the intermediary of a small connecting rod 6 bearing on the butterfly valve by a removable projection 7, forcibly engaged in its carrier.

In the embodiment according to Fig. 1, there is engaged between two adjacent turns of the other extremity of the spring, a transverse rod 8 which is fixed diametrically in a sleeve 9 in such a way that the said rod 8 constitutes the holding element of this other extremity of the said spring. The sleeve 9 is freely engaged in a tubular part 10, mounted in a fixed housing provided laterally on the body 11 of the carburetor, the larger part of the spring 3 being engaged in the said tubular part 10. The sleeve 9 bears, by a six-sided flange 12 for example, against the said tubular part 10 through the intermediary of a threaded socket 13, with a six-sided flange

14, and the free extremity of the said part 10. When the socket 13 is screwed or unscrewed, the sleeve moves axially in one direction or the other, which permits of modifying the tension of the spring 3 at will. On the other hand, by making the sleeve 9 turn in one direction or the other in the tubular part 10, by acting on its flange 14, the said sleeve is not moved longitudinally as it is retained by the flange 12 but the transverse rod 8 is moved along the turns of the spring 3.

It is thus possible to increase or diminish the active length and, in consequence, the flexibility of the spring 3, by varying the number of turns which come beyond the retaining element, constituted by the rod 8. By making the sleeve 9 and the socket 13 turn at the same time, for example with the aid of the cap 15, the number of turns is varied without substantially changing the tension of the spring 3.

The arrangement such as described therefore permits of regulating, by two independent means, the tension and the flexibility of the spring 3 respectively. When the regulation is effected to give a maximum speed limit, the whole may be covered by a cap 15 which, by being engaged on the six-sided flanges 12 and 14, simultaneously holds the two regulating members 9 and 13 fixed and assures, at the same time, the fluid-tightness of the carburettor, the said cap 15 being kept in place by the screws 16 which can, if necessary, be provided with a lead seal in order to prevent the dismantling of the cap by unauthorized persons, for the purpose of modifying the regulation.

On the exterior face of the tubular part 10 there is provided a toothed rack 17 which meshes with a pinion 18 the axis 19 of which is mounted in the fixed wall 11 of the carburettor and which is controlled from a distance by any appropriate means, for example by an arm 20 which the driver can move angularly by an appropriate remote control, such as a Bowden cable, an assembly of rods or links articulated between themselves, or otherwise.

The operating member of this control is placed within reach of the driver and may be a knob, handle, or a small lever or otherwise, mounted on the dash-board. By displacing the tubular part 10 by sliding, in consequence of the rotation of the pinion 18, in one direction or the other, there is obtained at the same time the movement by translation of the sleeve 9; which thus modifies the tension of the spring 3 from a distance.

By increasing the tension of the spring, the butterfly valve 1 is moved in the direction of closing, at a higher engine speed, in such a way that the maximum speed of the engine is consequently modified. On the other hand, by diminishing the tension of the spring 3, the speed limit of the engine is diminished.

In the embodiment described above, if the minimum speed is regulated for example at 2,000 R. P. M. at full load, it will rise for example to 2,100 R. P. M. when running light, but when it is desired, by acting on the remote control, that the minimum speed shall be 3,000 R. P. M. at full load, this speed can rise to 3,500 R. P. M. when running light, for the reason that the remote control only acts on the tension of the spring 3. In order that the margin of play of the speeds can be limited, it is necessary to be able to modify, by this control, both the tension and the flexibility of the spring 3.

The embodiment according to Fig. 2 permits

such a result to be obtained. In this case the sleeve 9 is eliminated and the extremities of the transverse rod 8 are engaged in helical grooves 22 located in the tubular part 10. This latter is capable of sliding in its housing provided on the fixed wall 11 of the carburettor while being prevented from turning in the said housing by a screw 23 engaged in a longitudinal groove 24 of the part 10. This latter carries, on its exterior face, a thread 25 on which is engaged a nut 13¹ bearing against the free edge of the housing of the said part 10. It results therefrom that if the nut 13¹ is caused to turn in one direction or the other, a modification of the tension of the spring 3 is obtained, similar to the regulation obtained with the threaded socket 13 of Fig. 1.

In order to be able to modify the number of turns and, consequently, the flexibility of the spring 3, the said helical grooves 22 open at the free edge of the tubular part 10 in such a way that it is sufficient to disengage the transverse rod 8 from the said grooves and to move it along the turns of the spring 3 so that it is possible to reduce the active length of this latter at will. After regulation the rod 8 is again inserted into the said grooves 22. The effect obtained is therefore similar to that with the sleeve 9 of Fig. 1.

In order to be able to regulate the tension and the flexibility of the spring 3 simultaneously and from a distance with the aid of the arm 20, on which the driver acts by the remote control 21 (Fig. 1), the said arm can be mounted on a cap 15¹ capable of turning with respect to the fixed wall 11 while being retained by a ring 27. In the internal face of the cap 15¹ longitudinal (or helical) grooves are provided in which the extremities of the rod 8 penetrate. It results therefrom that when the cap 15¹ is turned through the intermediary of the arm 20, there is obtained the movement by translation and by rotation, of the rod 8 along the grooves 22, which modifies the tension of the spring 3 and the useful length of this latter, the pitch of the grooves 22 being greater than the pitch of the turns of the spring.

A similar result is obtained by the embodiment according to Figs. 3 to 5, in which the rod 8 is engaged transversely in a stem 29 carrying a nut 30 bearing against a part 31 mounted by screws 31¹ (Fig. 4) on the body 11 of the carburettor. By turning the nut 30 in one direction or the other, the tension of the spring 3 can be modified. By turning the stem 29 in the nut 20, for example with the aid of a screw-driver which is engaged in its kerfed end 29¹, the transverse rod 8 is moved along the turns and the number of useful turns is modified without substantially changing the tension of the spring 3.

The nut 30 is moved by a fork 32 integral with a push-piece 33 sliding in the part 31. This push-piece is in contact with a spring blade 34, inclined with respect to the said push-piece and fixed by one extremity to a member 35. This latter is movable transversely with respect to the push-piece 33 through the intermediary of a remote control for example a Bowden cable 21¹ on which the driver acts. The whole can be covered by a cap 15² which assures the fluid-tightness and which can be sealed.

In order to do away with the regulations indicated above, the remote control 21¹ forces the member 35 to the end (to the position shown on Fig. 5) in such a way that the push-piece 33

rests on the spring blade 34 near the point of connection of this latter. If, from his seat, the driver pulls on the control 21¹, the spring 34 forms an incline and the push-piece 33 is forced back by the spring 34 towards the exterior and pushes the stem 29 by the fork 32. As the flexibility of the spring 34 increases in proportion as the point of support of the push-piece 33 moves away from the point of connection 35 of the spring, everything takes place as if the flexibility of the spring 3 were increased when one passes to higher speeds of the engine. For an increase of the possible maximum speed of the engine, the whole of the system 3-34 therefore has a greater flexibility and there is therefore less play in the range of speeds of an engine operating at full load and an engine running light.

In Fig. 6 a helical spring 3¹ has been shown which can replace the spring 3, more especially that shown by Fig. 1, of the embodiments described above. Certain turns of the said spring carry a sheath 36 of a more or less resilient material, for example of rubber, a ductile metal or a mouldable material. This sheath has such a thickness that it compels the covered turns of the spring to separate, which gives an initial tension to the spring in its part engaged by the sheath. By this means, the flexibility of the spring will be the minimum as long as the load applied to the spring remains lower than that necessary to overcome the initial tension of the covered part, for the free turns undergo an elongation in themselves. Under a greater load, all the turns will come into play and the flexibility of the spring will be increased.

The flexibility of the spring 3¹ can be modified by varying the length of the covered part or the number of turns covered by the sheath. To this end the sheath 36 is constituted in such a way that it can be easily engaged on a more or less large number of turns of the spring 3¹, which permits of regulating the flexibility of the resilient assembly at will. There can also be utilised for the covering of the spring 3¹, several successive sheaths having different thicknesses, which permits of obtaining several degrees of resiliency. The arrangement such as described above is therefore very suitable for modifying the flexibility or the initial tension of a helical spring and can be applied, in a general manner, in all the cases where it is advantageous or necessary to employ springs having this quality.

In the embodiment according to Fig. 7, the helical spring 3 or 3¹ of the preceding examples has been replaced by one or several resilient

blades 3² one extremity of which is fixed to a member 37 whilst its free extremity is connected to the butterfly valve 1 through the intermediary of a rod 38. Along the blade 3² can be moved a roller 39, remotely controlled by a Bowden cable 21¹, a rod or the like. This roller rolls along an incline or cam 40 carried by a plate 41 itself mounted on a support 42. The incline 40 is capable of being moved with respect to its support 42 by being mounted on this latter through the intermediary of two screws 43 engaged in elongated slots 44 provided in the plate 41. In this way the mean position of the incline and of the roller is determined with respect to the spring blade 3² and in consequence the flexibility of the said spring. The support 42 is itself carried by fixed pins 45 respectively engaged in elongated slots 46 in such a way that it is possible, at will, to modify the position of the said support and, consequently, the tension and the flexibility of the blade for a determined displacement of the roller 39.

By the above it will be appreciated there is obtained a remote control device for speed limiting devices, by which it is possible to vary the maximum speed of the engine without influencing the initial regulation at starting and by which any fresh regulation at starting can be effected without the members forming part of the supplementary control hindering this latter operation by their presence.

What I claim is:

In a speed regulating device for an internal combustion engine having an induction pipe, an offset pivoted throttle valve arranged in the suction pipe of the engine and subjected to the suction of the engine acting in a direction to tend to move the valve to its closed position, resilient means tending to open said valve against the action of the suction, means to adjust said resilient means, supplementary remote control means separate from said adjusting means to modify the effect of said resilient means, and control means for actuating said throttle valve during the operation of the engine, said resilient means comprising a helical spring connected at one end to said valve, a support on said induction pipe, a member movably mounted on said support, the other end of said spring being connected to said member, a toothed rack on said member, said remote control means comprising a pinion engageable with said rack and means for moving said pinion to move said member with respect to said support, whereby to modify the effect of the spring.

MARCEL MENNESSON.