DEVICE FOR LIMITING THE SPEED OF AN ENGINE

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REFERENCES CITED

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2,215,406 9/1940 Paxman 92/84

ABSTRACT: A wall and a flexible diaphragm are connected to provide a closed air chamber. An inlet is provided in the wall for supplying air having a pressure that is proportional to the speed of the engine. A compression spring engages the diaphragm to set the air pressure required in the air chamber to move the diaphragm. A link is attached to the diaphragm for limiting the engine speed in response to diaphragm movement.
DEVICE FOR LIMITING THE SPEED OF AN ENGINE

BACKGROUND OF THE INVENTION

My invention relates to a device for limiting the speed of an engine, and particularly to such a device that is operated by air pressure which varies as a function of the engine speed.

Speed limiting devices or governors have been frequently provided for engines, particularly internal combustion engines for automobiles. While such governors have been satisfactory in some respects, such governors have also had certain disadvantages. For example, such governors have been relatively complex devices, or have been relatively difficult to install due to the complexity of the devices and the difficulty of installation result in added cost.

Accordingly, a main object of my invention is to provide an improved speed limiting device or governor.

Another object of my invention is to provide an improved governor that is relatively simple in structure, and that is relatively easy to install.

Another object of my invention is to provide an improved engine governor that operates on air pressure that can be easily provided by an air pump which can be positioned on the engine at a convenient point for power, and which can be easily connected to the governor by means of flexible tubing or hose.

Another object of my invention is to provide a relatively simple single engine governor that can be conveniently mounted near the engine carburetor or element to be controlled, and that can be easily and simply connected to a suitable air pump that supplies air whose pressure is proportional to engine speed.

SUMMARY OF THE INVENTION

Briefly, these and other objects are achieved in accordance with my invention by a device comprising a wall and a flexible diaphragm that form a closed air chamber. An air inlet is provided in the air chamber, and this inlet is adapted to be connected to a pump that supplies air whose pressure varies as a function of the speed of the engine. The device can be positioned near the desired speed control element of the engine, such as the carburetor, and a link is connected between the diaphragm and the speed control element. A spring element engages the flexible diaphragm and is arranged to urge the diaphragm into the air chamber. As the engine speed increases, the air pressure in the air chamber also increases until the diaphragm is moved outward against the spring. This diaphragm movement is transferred through the link to the speed control element which then limits the engine speed. The spring element is preferably adjustable, so that the air pressure required to move the diaphragm may be set to limit the engine speed to the desired magnitude.

BRIEF DESCRIPTION OF THE DRAWING

The subject matter which I regard as my invention is particularly pointed out and distinctly claimed in the claims. The structure and operation of my invention, together with further objects and advantages, may be better understood from the following description given in connection with the accompanying drawing, in which:

FIG. 1 shows a side view, partly in cross section, of a preferred embodiment of a governor in accordance with my invention; and

FIG. 2 shows a cross-sectional view of the governor taken along the line 2-2 of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the embodiment shown in FIGS. 1 and 2, I have assumed that my speed limiting device or governor is to be used with the internal combustion engine of a conventional automobile. However, it is to be understood that my governor may be used with any type of engine whose speed is to be limited. My governor comprises a closed, hollow structure 10 that is generally cylindrical in shape. The structure 10 is formed by two substantially similar halves 11, 12 which are formed of metal and provided with respective circular flanges 11a, 12a for joining the two halves 11, 12. A flexible rubber diaphragm 14 is positioned between the two halves 11, 12, preferably between the flanges 11a, 12a. The diaphragm 14 is made from a piece of flexible rubber that is generally circular in shape and that is depressed or dished toward the half 11 as shown in FIG. 1. The half 11 and the diaphragm 14 are arranged and constructed so that they form an airtight chamber 15. This air chamber 15 is provided with an air inlet 17 which is arranged to be connected to a source of air whose pressure varies as a function of the speed of the engine to be controlled. This air pressure is preferably arranged to be directly proportional to the engine speed. This source of air can be provided by any suitable means, such as by an air pump connected to the engine distributor, or to the engine crankshaft, or to some other convenient power takeoff point. The air from this pump or source is supplied to a suitable hose or pipe 20 which is connected to the air inlet 17. I prefer that the hose or pipe 20 be provided with an air bleeder valve 21 which can vent any desired amount of air from the hose 20 in order to provide an adjustment for the air pressure supplied to the air chamber 15.

The half 12 is provided with a central circular opening in which a cylindrical bushing 24 is slidably positioned. The bushing 24 is provided with a cylindrical hole for receiving a link 25. The link 25 is slidably positioned in the bushing 24, and has one end 25a attached to the face of the diaphragm 14 away from the air chamber 15. The link 25 may have a threaded adjustment portion 25b so that the length of the link 25 may be adjusted. The other end 25c of the link 25 is connected to a suitable speed control mechanism for the engine. This connection at 25c might be a pin and slot arrangement such as shown as f and g of U.S. Pat. No. 702,090 to Duryea in his FIGS. 1 and 2 so as to give a unidirectional control for governor purposes. This speed control mechanism may include a butterfly valve 28 which is positioned in the air intake of the engine carburetor. Or, the speed control element may be some other engine control element, such as the gas feed or the accelerator pedal.

A helical compression spring 30 is positioned around the link 25 near its end 25a, between the diaphragm 14 and the bushing 24. The compression spring 30 is preferably positioned between two washers 31, 32 so that when the link 25 is urged inward against the compression spring 30 by the bushing 24. The bushing 24 in turn is urged inward against the washer 32 by a speed change arm 34. As shown in FIG. 2, the speed change arm 34 has two pieces which pass around the link 25. The speed change arm 34 is pivoted at its lower end 34a on a pivot 35 attached to the half 12. The arm 34 is held at its upper end 34b by a pin 36 which can fit in one of a plurality of adjustment holes 39a through 39i. The holes 39a through 39e are provided in a bracket 39 which is also attached to the half 12. The upper end 34b of the speed change arm 34 is shown with its pin 36 positioned in the hole 39d. If the speed change arm 34 is moved to the left as viewed in FIG. 1 (this being the high speed direction), the compression spring 30 is compressed. If the speed change arm 34 is moved to the right as viewed in FIG. 1 (this being the low speed direction), the compression spring 30 is released to some extent. Thus, the force on the compression spring 30 is fixed in accordance with the position of the speed change arm 34. However, the link 25 can move in its bushing 24 for any position of the arm 34, so that when sufficient pressure exists in the air chamber 15, the diaphragm 14 will be flexed or pushed outward against the force of the compression spring 30. This motion of the diaphragm 14 also moves the link 25 to the right as viewed in FIG. 1. This movement of the link 25 can be used to cause the butterfly valve 28 to be closed, thus limiting the speed of the engine or other device. FIG. 2 shows how two pieces of the speed change arm 34 are spaced from the link 25, but press...
against the bushing 24 so as to position the bushing 24 against the compression spring 30.

It will thus be seen that my invention provides a device which, although relatively simple in construction, provides an effective and reliable device for limiting the speed of an engine. My device is powered by air which can be supplied under a pressure proportional to engine speed by any suitable means. This permits flexible hose or tubing to be used between the source of air and my governor, so that the governor can be mounted at any desired location on the engine, such as by the bracket 40. While my device is relatively simple in operation and construction, it provides an effective speed limiting. And, my device is easy to mount, requires relatively few brackets, and can be positioned close to the speed control element of the engine. While I have shown only one embodiment of my device, persons skilled in the art will appreciate that modifications may be made. For example, the structure 10 may be made of other materials and may have other shapes, although I prefer the two metallic halves 11, 12 which are substantially similar. Other means can be provided for providing the compression force, although I prefer the helical compression spring 30 which is shown. In addition, the bleeder valve 21 may be omitted if desired. And, the speed adjustment holes may be omitted, and different sizes of compression springs used instead. Therefore, while my invention has been described with reference to a particular embodiment, it is to be understood that modifications may be made without departing from the spirit of the invention or from the scope of the claims.

I claim:

1. A device for governing the speed of an internal combustion engine for an automobile or the like, comprising:
   a. a wall and a flexible diaphragm forming a closed air chamber, said wall being adapted to be held in a fixed position;
   b. an air inlet provided for said air chamber, said air inlet being adapted to supply air to said air chamber that has a pressure which is directly proportional to the speed of the engine to be governed;
   c. a link connected at one end to said flexible diaphragm and extending in a direction away from said diaphragm and said air chamber, the other end of said link being adapted to be connected to a speed control device which controls the air intake through the carburetor of the engine to be governed;
   d. a spring element engaging said flexible diaphragm, said spring element being arranged to urge said diaphragm toward said air chamber with a selected force so that a selected air pressure indicative of engine speed is required to overcome the force of said spring element in order to move said link connected to said flexible diaphragm;
   e. a lever support means having a plurality of mounting locations therein and attached to said device; and
   f. a lever pivotably attached at one end to said device and having means for selectively attaching its other end to any of said plurality of locations, an intermediate portion of said lever being connected with said spring element whereby the positioning of said other end of said lever determines said selected force.

2. The device of claim 1, and further comprising an air bleeder valve connected to said air inlet.

3. A device for limiting the speed of an internal combustion engine for an automobile or the like, comprising:
   a. a closed, generally cylindrical, hollow structure formed by substantially similar first and second halves joined together;
   b. a generally circular, flexible diaphragm positioned between said first and second halves and arranged to form an airtight chamber between said diaphragm and said first half;
   c. said first half having an air inlet adapted to be connected to a source of air having a pressure which is directly proportional to the speed of the engine to be limited;
   d. said second half having a generally circular opening therethrough;
   e. a cylindrical bushing slidably positioned in said circular opening in said second half, said bushing having a circular hole therethrough;
   f. a link having one end attached to said diaphragm, said link extending from its end of attachment slidably through said bushing hole and terminating at the other end, said other end of said link being adapted to be connected to an element of the internal combustion engine for limiting the speed of the internal combustion engine;
   g. a compression spring mounted on said link between said diaphragm and said bushing;
   h. and a lever pivotably attached at one end to said device and having means for selectively attaching its outer end to any of said plurality of locations, an intermediate portion of said lever being connected with said spring element whereby the positioning of said other end of said lever determines said selected force.

4. The device of claim 3 wherein said means attached to said hollow structure comprise a speed change arm pivotally attached at one end to said second half and extending around said link, at the outer face of said bushing to its other end, and adjustable means for fixing the position of said other end of said speed change arm.

5. The device of claim 3 wherein said link is adjustable in length.

6. The device of claim 5 wherein said means attached to said hollow structure comprise a speed change arm pivotally attached at one end to said second half and extending around said link at the outer face of said bushing to its other end, and adjustable means for fixing the position of said other end of said speed change arm.

7. The device of claim 6, and further comprising a bleeder valve connected to said air inlet.

8. The device of claim 6 wherein said speed change arm comprises two pieces which pass around said link, said two pieces being spaced from said link but engaging said outer face of said bushing.