United States Patent

Glover et al.

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[45] **Mar. 21, 1972**

[54] ENGINE GOVERNORS

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[30] **Foreign Application Priority Data**

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[52] **U.S. Cl.**.....**123/103 B**

[51] **Int. Cl.**.....**F02d 31/00**

[58] **Field of Search**.....123/103 B; 251/250

[56] **References Cited**

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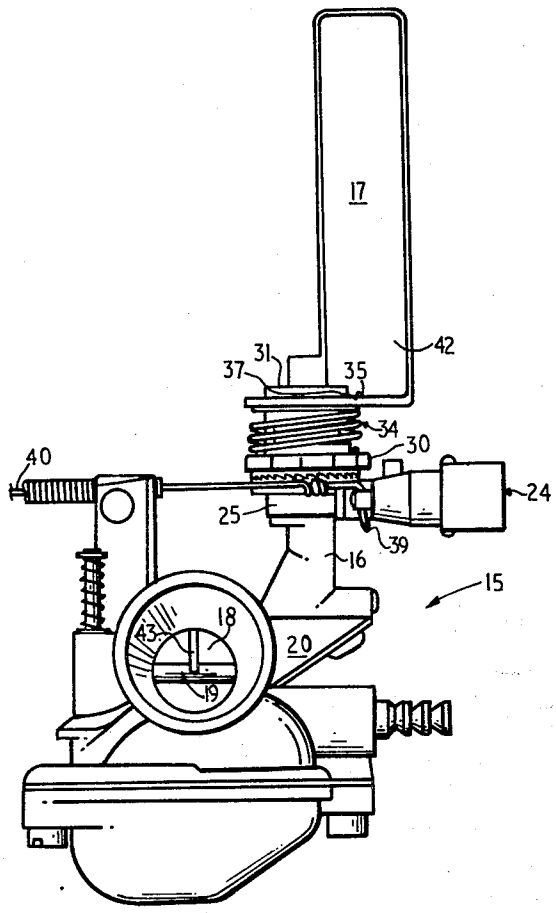
[57] **ABSTRACT**

Means for governing the speed of an engine by providing attached to the carburetor butterfly spindle an air vane deflected by a stream of engine-cooling air produced by the engine to close the butterfly against spring action, and accelerator control means for the engine operating to increase tension on the spring with its advancement and to decrease the tension with retarding of the accelerator.

7 Claims, 6 Drawing Figures



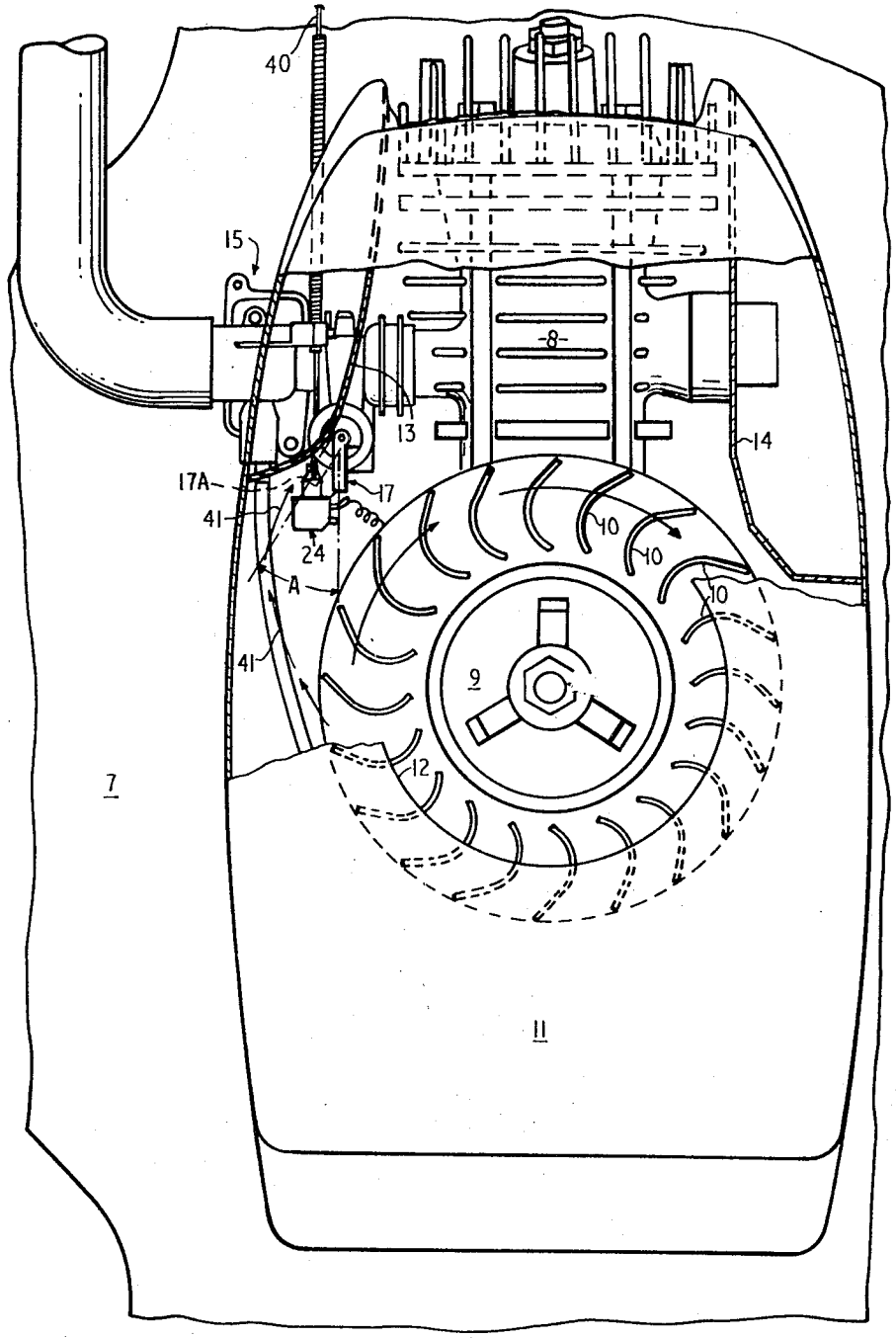


FIG. 1

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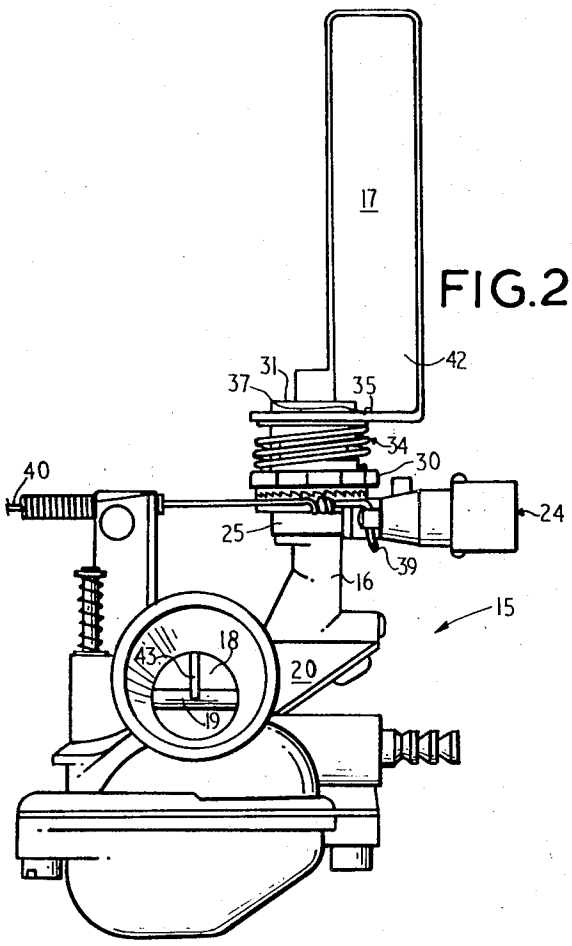

FIG.2

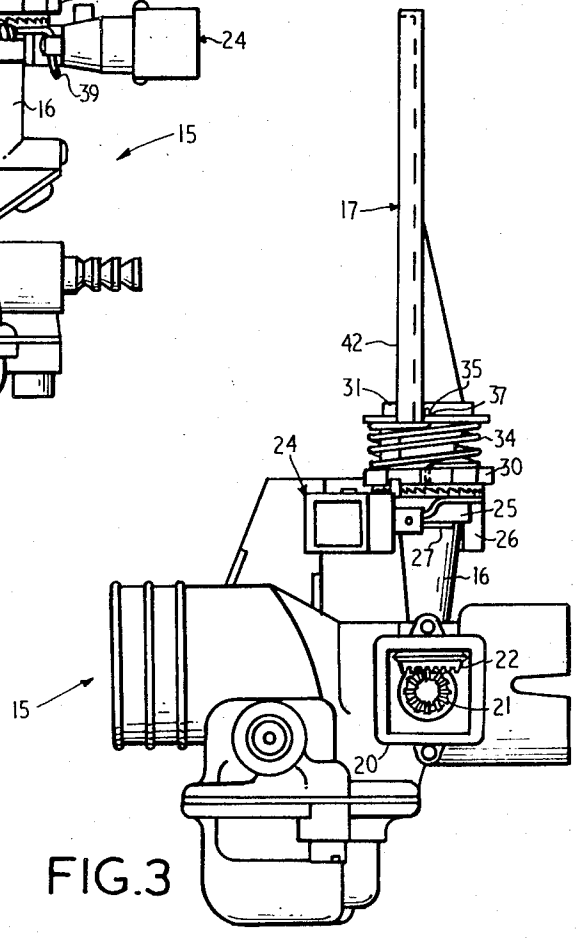

FIG.3

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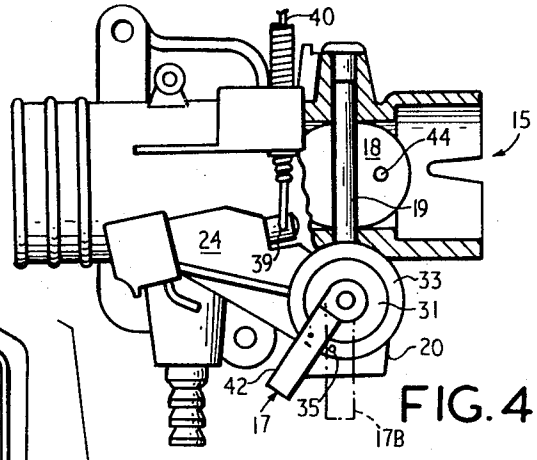

FIG. 4

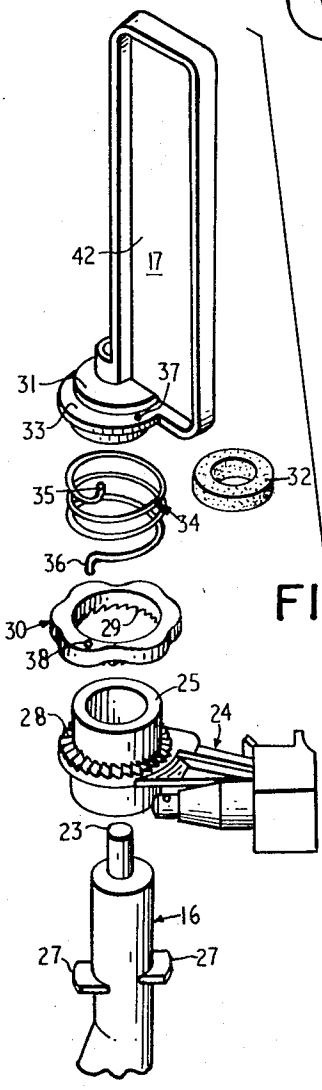

FIG. 5

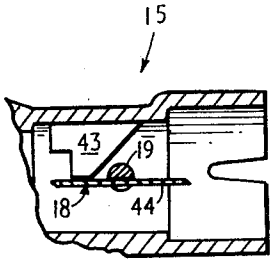

FIG. 6

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ENGINE GOVERNORS

This invention relates to speed governors for gas engines and more particularly to an air vane governor for use with a butterfly throttle carburettor.

It is the main object of the invention to provide an air vane governor for control of a butterfly throttle carburettor which is relatively inexpensive and reliable in operation.

In one general form the invention provides a speed governor for an engine controlled by a butterfly throttle carburettor and producing a stream of air dependent upon engine speed for engine cooling purposes, comprising a displaceable air vane, linkage means connectable to the carburetor butterfly throttle and movable by displacement of the vane to alter the adjustment of the throttle, said vane being angularly deployed with respect to the cooling air stream of the engine so as to be increasingly exposed to the air stream with increasing velocity thereof and movement of said linkage means responding to increasing exposure of the vane to the air stream to progressively close said throttle, a manually controlled accelerator element for selective adjustment of said throttle, and resilient means connecting said manual control with said air vane to impose resilient pressure resisting said increased exposure of the vane to the air stream and operating to increase said resilient pressure on said vane with manual advancement of said accelerator element.

A preferred form of the invention is illustrated in the accompanying drawings, in which:

FIG. 1 is a fragmentary plan view of a mowing machine with portion of its upper cowling cut away to show the engine cylinder and carburettor with the air vane governor of the invention attached;

FIG. 2 is an outer end elevation of the carburettor only, showing the air vane governor in the throttle closed position;

FIG. 3 is a side elevation of the carburettor and air vane in the same position as shown in FIG. 2, but with the cover removed from the bevel drive housing;

FIG. 4 is a plan view of the carburettor and air vane in the throttle open position, a portion of the carburettor body being cut away to show the throttle butterfly valve;

FIG. 5 is an exploded perspective view of the component parts of the air vane governor and throttle control arm mechanism; and,

FIG. 6 is a fragmentary section of the carburettor throat showing the fin which limits the wide open setting of the butterfly valve.

The mowing machine 7 to which the governing mechanism is fitted has a horizontal finned cylinder 8 which is surmounted by a rotating magneto housing 9 which is provided with a series of air impelling vanes 10. The engine cylinder 8 and air impeller are covered with a cowling 11 which has an air intake aperture 12 concentric with the air impeller. The air from the vanes 10 is directed to the finned cylinder by internal vertical duct walls 13 and 14. A carburettor 15 is mounted on the engine cylinder 8 directly below the duct wall 13. The upper cover of the carburettor is provided with an integral vertically extending hollow post 16. upon which is mounted a governor vane 17 which is adapted to rotate with the throttle butterfly valve 18.

The butterfly valve 18 is mounted on a horizontal shaft 19 which extends into a housing 20 on the side of the carburettor 15. A bevel pinion 21 is mounted on the end of the shaft 19, within the housing 20 and meshes with a bevel gear 22 secured to a shaft 23 (see FIG. 5) which extends vertically up through the post 16 formed integrally with the roof of the housing 20.

A throttle control arm 24 is provided with an enlarged boss 25 which is rotatably mounted over the upper end of the post 16. A striking pin 26 (see FIG. 3) extends downwardly from boss 25 and contacts stops 27 (see FIG. 5) extending radially from the post 16 so that the angular movement of the arm 24 is limited to approximately 90 degrees.

Ratchet teeth 28 are formed on a medial flange on the boss 25 and engage similar teeth 29 on a disc 30 which is rotatably mounted on the upper end of said boss 25. The vane 17, preferably plastic moulded, is secured to the top of the shaft 23 emerging from the post 16, a cylindrical housing 31 being formed in the base 33 of the vane to enclose a foamed plastic seal 32 (see FIG. 5) which engages the top of the post 16 and excludes dust from the interior bearing surface of the post 16.

A torsion spring 34 is interposed between the base 33 of the vane 17 and the disc 30. The ends 35 and 36 of the spring 34 are turned at right angles and engage holes 37 and 38 in the vane base 33 and disc 30, respectively.

The end 39 of a lever operated bowden cable 40 is secured to the throttle control arm 24, which may be moved thereby through an angle of approximately ninety degrees. The vane 17 and butterfly valve 18 can only move through an angle of approximately thirty degrees as indicated by the angle "A" in FIG. 1. There is, therefore, a considerable amount of lost motion which is taken up by the spring 34 which is the only direct link between the arm 24 and the vane 17 and butterfly valve 18. The relationship between the moving parts just described can be adjusted by lifting, rotating and releasing the disc 30 to control the torsion in the spring 34. The ratchet teeth 28 and 29 permit this adjustment.

From FIG. 1 it will be seen that the vane 17 extends up alongside the wall of the duct 13 and into the airstream 41 from the impeller vanes 10. When the control arm 24 is moved to the position shown in FIG. 4 the throttle butterfly valve 18 will be in the fully open position, with a degree of torsion in the spring 34 due to the lost motion in the system. The vane 17 will be held near the wall of the duct 13 as shown in dotted line 17A in FIG. 1. The engine will speed up so that the velocity of the air striking the side 42 of the vane 17 will increase. The vane will be forced towards the position shown in dotted lines 17B in FIG. 4, and in full lines in FIG. 1.

This movement will close the throttle butterfly valve 18 against the action of the spring 34 and slow down the engine. The speed of the engine will thus be governed to an r.p.m. determined by the tension in the spring 34.

It will be seen that the vane 17 is oriented in the air stream 41 so that it presents a greater projected area of its face 42 as the throttle is closed. Thus the force on the vane increases as the throttle closes. This enables a relatively stiff torsion spring 34 to be used with attendant advantages of dimensional stability and ease of manufacture. Also the increasing obstruction by the vane 17 to the increasing flow of cooling air tends to maintain a more uniform temperature of the engine. The torsion spring 34 balances the force of the air on the vane 17 and thus controls the governing characteristic of the carburettor which is set by the ratchet adjustment of the disc 30.

Because of the lost movement in the angular displacement of the throttle butterfly valve 18 with respect to the arm 24, it is necessary to provide a stop for said valve 18 in the fully open position. This stop takes the form of a radial fin 43 formed integrally in the carburettor throat as shown in FIGS. 2 and 6. The trailing side of the throttle butterfly valve 18 strikes the fin 43 when fully open as shown in FIG. 6. The said valve 18 is also adapted to fully close the carburettor throat when at the opposite extreme of its travel. In order to provide a metered air supply for engine idling, an air bleed hole 44 is provided in the leading edge of the valve 18 as shown in FIG. 4.

What we claim is:

1. A speed governor for an engine controlled by a butterfly throttle carburetor and producing a stream of air dependent upon engine cooling purposes, comprising a shaft rotatably mounted upon the carburetor and protruding therefrom, means connecting said shaft with the butterfly throttle for throttle control of the carburetor, an air vane fixed to the end of the protruding portion of said shaft, said vane being angularly deployed with respect to the cooling air stream of the engine so as to be increasingly exposed to the air stream with increasing velocity thereof to rotate said shaft in response to increasing exposure of said vane to the air stream to progressively close said throttle, a manually controlled accelerator element rotatable about said shaft for selective adjustment of said throttle, and a torsion spring encircling said shaft and inter-

connecting the manual control and the air vane to impose resilient pressure resisting said increased exposure of the vane to the air stream and operating to increase said resilient pressure on said vane with manual advancement of said accelerator element.

2. An engine speed governor according to claim 1, wherein said shaft is rotatably supported in a hollow extension of the carburetor housing, and said air vane has a base portion fixed to the end of said shaft, and a resilient seal is provided between the base portion and the housing extension to exclude foreign matter from the interior of the housing extension.

3. An engine speed governor according to claim 1, having a ring on the shaft connected to one end of the torsion spring for adjustment of the tension therein, and being connected with selective adjustment to the manual control by coacting ratchet teeth.

4. In a butterfly throttle carburetor for use on an internal combustion engine of a kind producing an engine-cooling air stream dependent in velocity upon the speed of the engine, a housing, a butterfly control valve, a spindle therefor rotatable within the housing, a bevel gear on one end of the spindle, a further bevel gear meshing therewith, a shaft secured to the further gear and extending normal to the spindle, a hollow extension on the housing through which the shaft extends, an offset air vane on the end of the shaft for positioning in the path of the engine cooling air stream and movable to and from a maximum projected position at which the butterfly control valve is closed, a manually actuated accellerator member positioned for rotation over an intermediate portion of the shaft, control linkage attached thereto, and a torsion spring connected between the accellerator member and the air vane, the control linkage and spring being connected so that manual advancement of the accellerator increases the tension in the spring to urge the air vane away from its said maximum projected position.

5. An engine speed governor according to claim 4, wherein the accellerator member comprises a hollow boss surrounding the shaft and a radial arm integral with said boss to which is attached an end of a control cable.

6. An engine speed governor according to claim 4, wherein a fin is provided in the carburetor throat to serve as a limit stop for opening movement of the butterfly throttle.

7. An engine speed governor according to claim 4, having a ring adjacent the accelerator member and coacting ratchet teeth therebetween, said torsion spring being connected between the air vane and said ring so that an adjustment is provided of the extension in said torsion spring which is exerted between the air vane and the accelerator member.

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