Sept. 6, 1966 E. J. SWATEK, JR., ETAL 3,270,729

AUTOMATIC THROTTLE CONTROL FOR AIR COMPRESSORS AND THE LIKE

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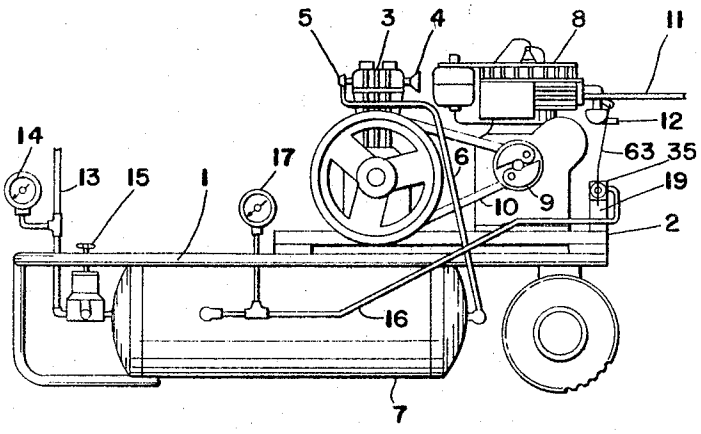


Fig. 1

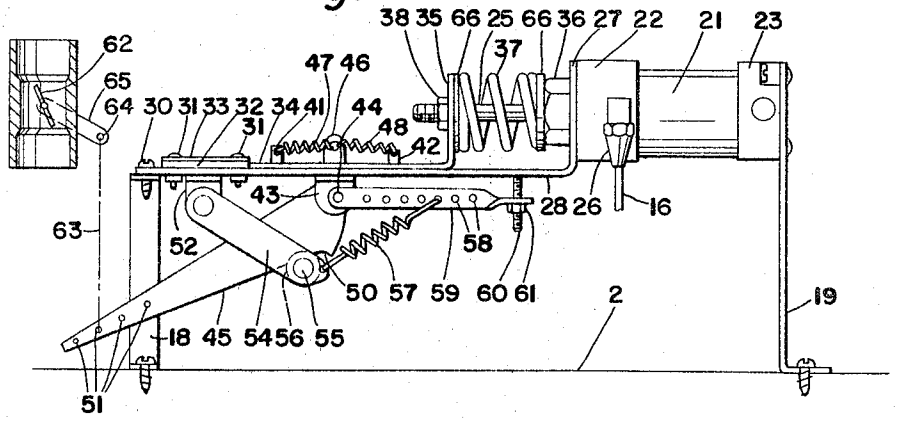


Fig. 2

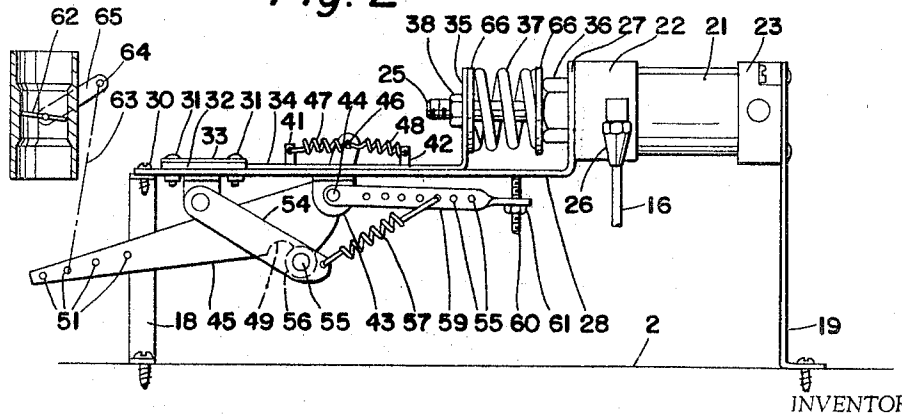


Fig. 3

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AUTOMATIC THROTTLE CONTROL FOR AIR COMPRESSORS AND THE LIKE

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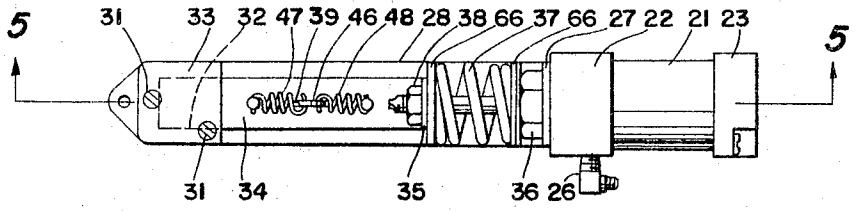


Fig. 4

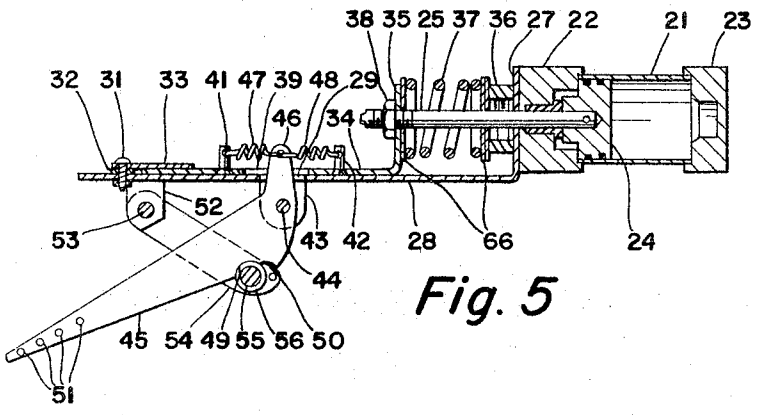


Fig. 5

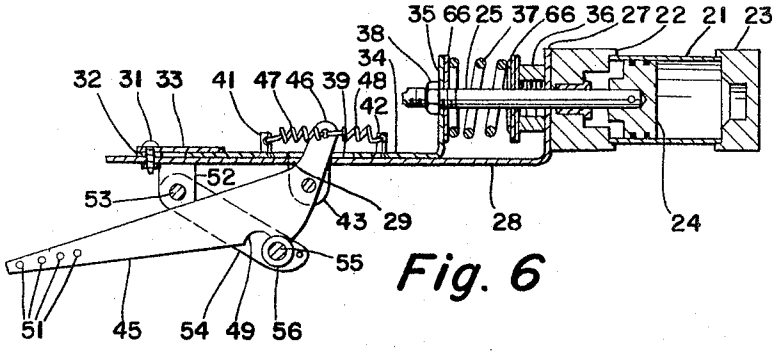


Fig. 6

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AUTOMATIC THROTTLE CONTROL FOR AIR COMPRESSORS AND THE LIKE

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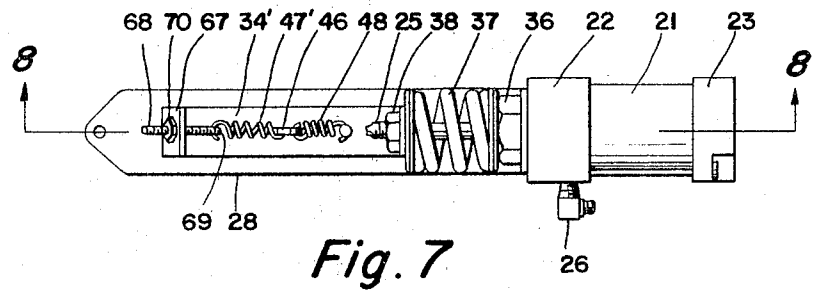


Fig. 7

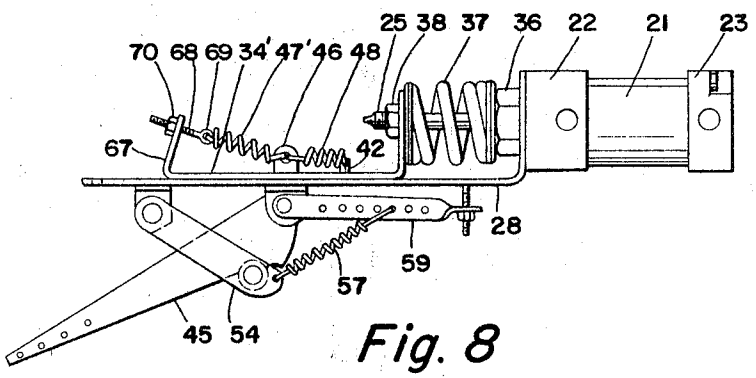


Fig. 8

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United States Patent Office 3,270,729 Patented Sept. 6, 1966

3,270,729

AUTOMATIC THROTTLE CONTROL FOR AIR COMPRESSORS AND THE LIKE

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Filed Mar. 11, 1964, Ser. No. 351,133
6 Claims. (Cl. 123—103)

This invention relates, as indicated, to an automatic throttle control for air compressors and the like, but has reference more particularly to an air actuated control for the throttles of air compressor engines.

A primary object of the invention is to provide a control of the character described, which is particularly adapted for use in connection with small, portable, gasoline-engine powered air compressors, and which is operable entirely independently of any electrical connections or the like.

Another object of the invention is to provide a control of the character described, which is especially useful in conjunction with gasoline engines having an automatic centrifugal clutch.

A further object of the invention is to provide a control of the character described, which is small and compact, and consists of a minimum number of parts which can be readily manufactured and assembled, and sold at a relatively low price.

A still further object of the invention is to provide a control of the character described, which is characterized by the inclusion therein of numerous adjustments which greatly increase the flexibility and range of use of the control.

Other objects and advantages of our invention will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification, and in which like numerals are employed to designate like parts throughout the same,

FIG. 1 is a view illustrating the invention as used in conjunction with an internal combustion engine and an air compressor;

FIG. 2 is a view showing the throttle control of the invention, and with the parts in low pressure position;

FIG. 3 is a view similar to FIG. 2, but with the parts in high pressure position;

FIG. 4 is a top plan view of the control as shown in FIG. 2;

FIG. 5 is a cross-sectional view, taken on the line 5—5 of FIG. 4;

FIG. 6 is a view similar to FIG. 5, but with the parts in high pressure position;

FIG. 7 is a view similar to FIG. 4, but showing a modification, and

FIG. 8 is a cross-sectional view, taken on the line 8—8 of FIG. 7.

Referring more particularly to FIGS. 1 to 6 inclusive of the drawings, there is disclosed a tubular frame 1 upon which is mounted a base or platform 2, which supports an air compressor 3 having a suction inlet 4 and a discharge outlet 5 which carries the discharge air through a conduit 6 to a tank or receiver 7 carrier by the frame 1.

The air compressor 3 is driven by a small internal combustion engine 8 through a centrifugal clutch 9 and endless belt 10. Reference numeral 11 designates the exhaust pipe of the engine 8, and reference numeral 12 the carburetor of the engine.

The compressed air within the tank 7 is discharged through a conduit 13 to equipment, such, for example, as a paint sprayer (not shown), and the pressure in this conduit is indicated by a pressure gauge 14. The pressure in the conduit 14 may be adjusted as by a pressure adjusting valve 15.

The aforesaid equipment, which is of a somewhat conventional character, further includes a conduit 16, which extends from the tank 7 for a purpose to be presently described, and the pressure within this conduit is indicated by a gauge 17.

The present invention is concerned more particularly with means for automatically reducing the speed of the engine 8, when the pressure within the tank 7 has reached a predetermined point, whereby the engine will operate at an idling speed until such time that the pressure within the tank falls to a predetermined point, whereupon the speed of the engine is again restored to its original or working speed.

Such means is illustrated in detail in FIGS. 2, 3, 4, 5 and 6 of the drawings, and comprises a pair of spaced mounting brackets 18 and 19, which are secured to the base or platform 2.

Secured to the bracket 19 is an air cylinder comprising a cylinder 21 and heads 22 and 23. Disposed within the cylinder 21 is a piston 24, from which a piston rod 25 extends through the head 22. The head 22 is provided with an inlet fitting 26 through which air from the conduit 16 is conducted into the space between the head 22 and the left end of the piston 24, as viewed in FIG. 5.

Secured to the head 22 of the air cylinder is the base 27 of an L-shaped frame member 28 having an elongated slot 29 therein. The member 28 is secured, as by a screw 30, to the bracket 18, and has secured in spaced relation thereto, as by screws 31, a slide guide 32 and guide cover 33.

Mounted for slidable movement in the guide 32 is an L-shaped slide 34, the base 35 of which is in spaced parallel relation to the base 27 of the member 28.

The base 27 of the member 28 is retained against the head 22 of the air cylinder by means of a nut 36, and compression coil spring 37 is interposed between this nut and the base 35 of the slide 34. The base 35 of the slide 34 is retained against the spring 37 by means of a nut 38, which is threadedly secured to the piston rod 25.

The slide 34 is provided with an elongated slot 39, which is in registry with the slot 29, but is somewhat longer than the latter. The slide 34 is also provided with pins 41 and 42 spaced from the ends of the slot 39 and which serve a purpose to be presently described.

Secured to the lower surface of the member 28 at points adjacent the slot 29 is a pair of brackets 43, in which pin 44 is mounted, and on which pin a bell-crank lever 45 is mounted for pivotal movement. The lever 45 has an arm 46 which extends through the slots 29 and 39, and has secured thereto one end of extension coil springs 47 and 48, the other end of the spring 47 being secured to the pin 41, and the other end of the spring 48 being secured to the pin 42.

The lever 45 is further provided in its lower edge with recesses 49 and 50, and at one end thereof with a series of spaced holes 51, these recesses and holes serving a purpose to be presently described.

The lower surface of the member 28 has also secured thereto a bracket 52 in which a pin 53 is mounted. Mounted on the pin 53 for pivotal movement about the pin is a pair of spaced links or levers 54, which support a pin 55 on which a cam follower 56 is mounted.

The cam follower is retained in one or the other of the recesses 49 or 50 by means of an extension coil spring 57, one end of which is tethered to the levers 54, and the other end of which is secured in one of the openings 58 in a tension adjusting lever 59. The lever 59 is pivoted at one end to the pin 44, and is secured at its other end to a post 60, extending from the member

28, this latter end of the lever 59 being adjustable along the post by means of an adjusting nut 61.

The lever 45 is secured to the throttle plate 62 of the carburetor 12 of the engine 8 by means of a carburetor control rod diagrammatically represented by reference numeral 63, one end of which is connected to one of the openings 51 in the lever, and the other end of which is connected, as at 64 to the throttle plate lever 65.

The operation of the throttle control may now be described as follows:

The engine 8 is started, is allowed to warm to operating temperature, and then brought up to operating speed, this being accomplished manually. The compressor 3, which has been at rest, due to the centrifugal clutch 9, then begins to operate.

During this operation of the compressor, the parts of the control are in the position shown in FIGS. 2, 4 and 5, with the bell crank lever 45 in what may be termed the "low pressure position," in which position it is retained by the cam follower 56 seated in the recess 49, the cam follower being retained in this recess by the tension exerted by the spring 57 acting on the levers 54. In this position of the parts, it may also be noted that the piston 24 is at the left end of the cylinder 21, that the spring 37 is exended, and that the throttle plate 62 is almost fully open. It will be further noted that the arm 46 of the lever 45 is at a position in which the tension on the springs 47 and 48 is equalized, so that there is little or no tendency for the cam follower 56 to be displaced from the recess 49.

As the air pressure in the receiver tank 7 rises, the air pressure in the conduit 16 enters the space between the head 22 and the piston 24 of the air cylinder, causing the piston rod 25, as viewed in FIGS. 2, 4 and 5, to move to the right, pulling the slide 34 to the right and compressing the spring 37. This, in turn, increases the tension of the spring 48, until a point is reached at which the tension of the spring 48 overcomes the tension of the spring 57 and at this point, the cam follower 56 will snap out of the recess 49 and into the recess 50, as shown in FIGS. 3 and 6, that is to say, into what may be termed the "high pressure position" of the parts.

In this high pressure position of the parts, the lever 45 has moved to a position in which the throttle plate 62 of the carburetor 12 is virtually closed or in an idling position, and the engine speed will decrease to an idling speed, and the compressor 3 will stop.

When the pressure within the tank 7 drops to a predetermined low point, the pressure on the piston 24 is relieved, permitting the spring 37 to restore the slide 34 and lever 45 to the position shown in FIGS. 2, 4 and 5, thus commencing a new cycle.

The proper functioning of the throttle control is regulated by the tension of the spring 57. This tension may be adjusted by connecting the end of the spring to different holes 55 along the lever 59, or by adjusting the position of the end of the lever 59 along the post 60 by means of the adjusting nut 61, or by a combination of such adjustments.

The pressure settings, that is to say, the settings at which the positions of the lever 45 change, may be adjusted by adjusting the position of the nut 38, or by interposing spacers, such as spacers 66 between the ends of the spring 37 and the adjacent parts of the control.

Further adjustments may be made by connecting the control rod 63 to one or the other of the holes 51 in the lever 45.

In FIGS. 7 and 8, a modification is illustrated in which a somewhat improved means is provided for adjusting the pressure settings.

In this case, the elements 31, 32, 33 and 41 are omitted, and instead, the slide 34' is provided with an inturned flange 67, in which an eye bolt 68 is mounted. The spring 47', corresponding to the spring 47 in FIG. 2, is connected to the eye 69 of the bolt 68, and the bolt 68 may be adjusted relatively to the flange 67 by means of an adjusting nut 70, to thereby vary the tension of the springs 47' and 48.

It is to be understood that the forms of our invention, herewith shown and described, are to be taken as preferred examples of the same, and that various changes may be made in the shape, size and arrangement of parts thereof, without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described our invention, we claim:

1. An automatic throttle control for internal combustion engines, said control comprising an air cylinder, a piston in said cylinder, a piston rod extending from said cylinder, a frame member secured to one end of said cylinder, a slide operatively connected to said piston rod and movable along said frame member, a compression coil spring interposed between said frame member and said slide, a lever operatively connected to said slide and mounted for pivotal movement on said frame member, and means for resiliently maintaining said lever in at least two different pre-selected positions, said means comprising a member mounted for pivotal movement relatively to said frame member and having a cam follower thereon, said lever being provided with recesses defining the pre-selected positions of the lever, and into which said cam follower is adapted to snap.

2. An automatic throttle control, as defined in claim 1, in which said lever is provided with an arm extending through said frame member and slide, said slide is provided with spaced pins, and a pair of extension springs is provided, one of which interconnects one of said pins with said arm, and the other of which interconnects the other of said pins with said arm.

3. An automatic throttle control, as defined in claim 2, including a second lever mounted for pivotal movement relatively to said frame member, and an extension spring interconnecting said second lever with said member.

4. An automatic throttle control, as defined in claim 3, including a threaded post extending from said frame member, said second lever slidably connected at one end to said post, and a nut for sliding said one end of said second lever along said post.

5. An automatic throttle control, as defined in claim 4, including a control rod interconnecting said first-named lever with the throttle.

6. An automatic throttle control for internal combustion engines, said control comprising an air cylinder, a piston in said cylinder, a piston rod extending from said cylinder, a frame member secured to one end of said cylinder, a slide operatively connected to said piston rod, a compression coil spring interposed between said frame member and said slide, a lever operatively connected to said slide and mounted for pivotal movement on said frame member, and means comprising a member independent of the throttle mounted for pivotal movement relatively to said frame member and resiliently coacting with said lever to maintain said lever in at least two different pre-selected positions.

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