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Albertson

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[54] **SAFETY THROTTLE FOR INTERNAL COMBUSTION ENGINES**

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[52] **U.S. Cl.** ..... **123/198 DC,** 123/98, 123/108, 180/82, 200/61.86, 340/53

[51] **Int. Cl.** .. **F02b 77/08,** B60k 33/00, F02d 11/04

[58] **Field of Search** ..... 123/198 D, 198 DB, 123/198 DC, 108, 98; 180/82, 103; 200/61.86, 61.89, 61.90; 340/53

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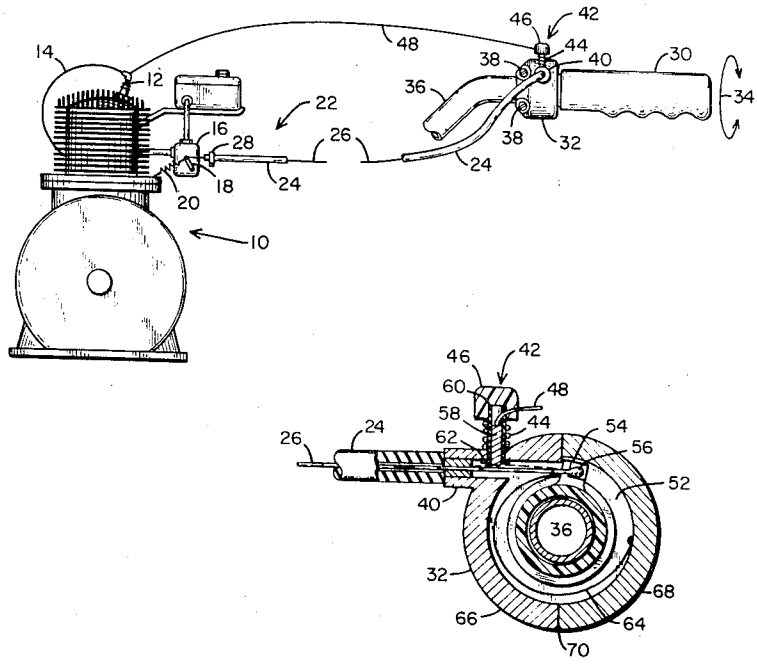
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[57] **ABSTRACT**

A safety device for a throttle of the type which regulates a carburetor gas flow valve by means of a throttle cable fixedly connected at one end to a throttle lever and at its other end to a gas flow control valve and in which the cable normally moves reciprocally in a passageway as the throttle lever moves between open and closed positions. An ignition circuit safety switch is provided and safety switch control means are provided in the passageway out of contact with a cable moving in normal reciprocable fashion. For abnormal cable movement, however, the cable is distorted in the passageway causing the cable to strike the safety switch control means whereupon the safety switch operates to shut off or otherwise disable the engine controlled by the throttle. In one embodiment, the safety switch control means is also manually moveable into contact with the cable irrespective of the cable position or movement to provide for manual shutting off of the engine.

4 Claims, 3 Drawing Figures



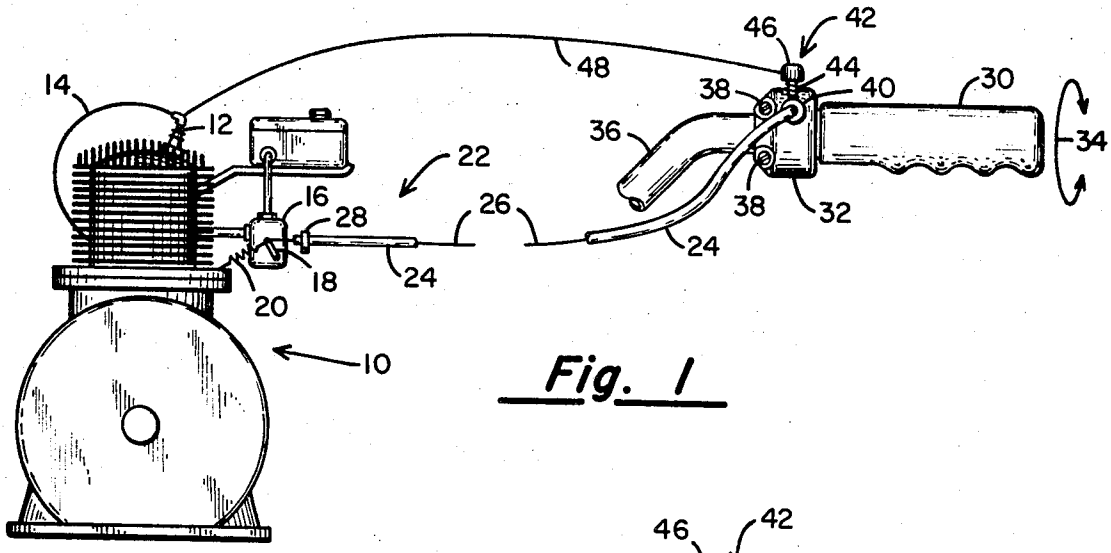


Fig. 1

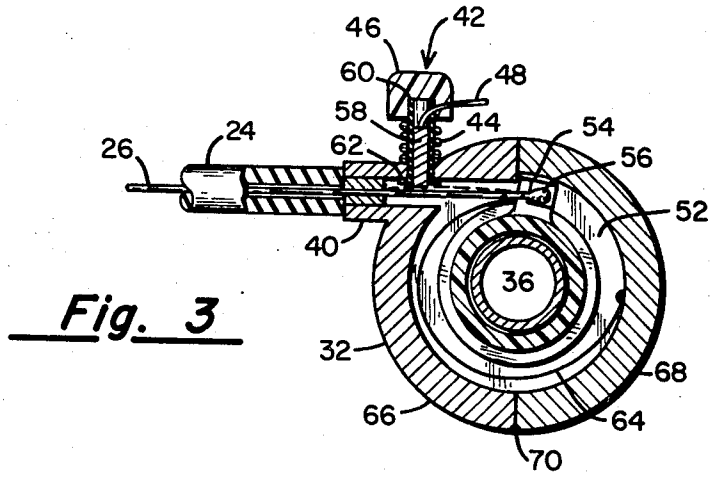


Fig. 3

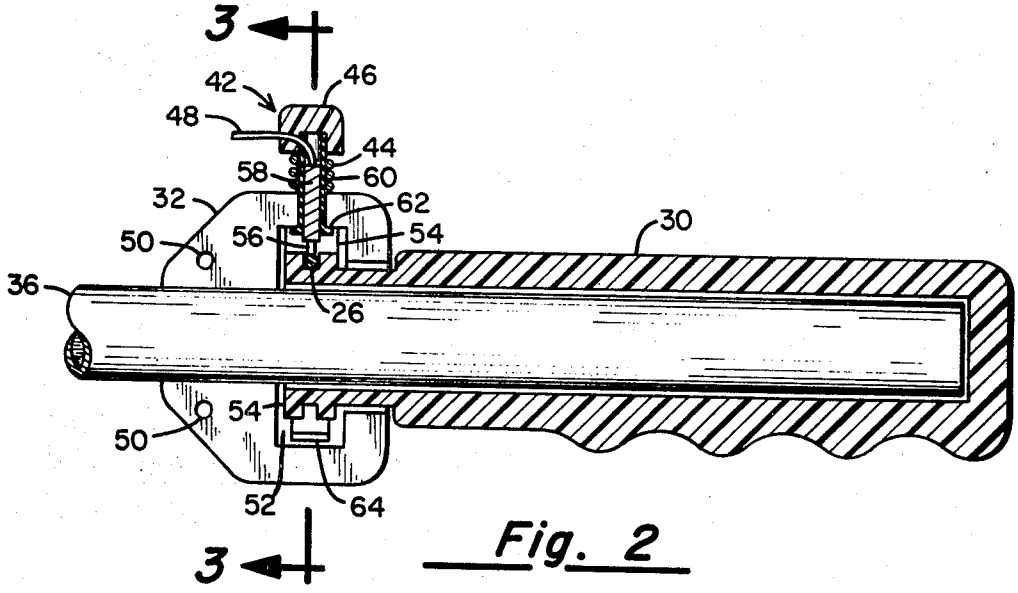


Fig. 2

SAFETY THROTTLE FOR INTERNAL COMBUSTION ENGINES

BACKGROUND OF THE INVENTION

The present invention relates to throttles in general and in particular to safety throttles, i.e., to throttles which turn off or otherwise disable the engine controlled by the throttle upon occurrence of conditions deemed unsafe.

Many vehicles such as snowmobiles, all terrain vehicles, minibikes, etc. have a throttle system including a gas flow control valve on the carburetor, a manually operable rotatable, throttle lever which is usually mounted on a steering handle bar, and a steel cable which connects the throttle lever to the gas flow control valve.

The flexible cable is conventionally encased totally or, at least partially, in a flexible steel sheath which serves to guide and protect the cable. It is well known that these cables must be properly lubricated regularly to prevent undue wear and sticking. However, wear does occur and, eventually, because of either lack of lubrication or otherwise, the cable becomes frayed and may stick or bind. Also, the cable may stick because liquids, e.g., moisture from condensation, from a break in the shroud, or indeed even the lubricant itself, freeze in the cable shroud. Should the cable become stuck in the open position, i.e., in the position in which the gas flow control valve is open, serious injuries to the operator and property damage could result.

In applicant's copending application, Ser. No. 71,600, filed Sept. 11, 1970, now U.S. Pat. No. 3,672,344, and entitled SAFETY DEVICE FOR AN INTERNAL COMBUSTION ENGINE, there is disclosed an invention which overcomes the disadvantages of the piror art throttle control systems by providing a device for grounding the vehicle's electrical ignition circuit whenever the throttle cable sticks in an open position, thus preventing the engine from running and therefore, preventing needless injury to individuals and damage to valuable property. In accordance with the teaching of that invention, disabling of the ignition circuit is accomplished by a pair of cooperating electrical contacts of an ignition circuit safety switch, one of the contacts being fixed to the cable and the other being fixed to the throttle lever. Normally, the cable and throttle lever move in unison and therefore there is no relative movement between the switch contacts. However, when the throttle cable fails to return the gas flow control valve towards a closed position as the throttle lever is moved towards its closed position, the switch contacts move relative to each other and either open or close the switch. For the specific illustrated embodiment the switch is normally open. Should the cable stick, upon return of the throttle towards its closed position, cable and throttle lever movement are no longer in unison. Instead, the throttle lever moves relative to the stuck cable until the cable contact and the lever contact close to ground the engine ignition circuit.

In my copending application, a safety throttle is disclosed which is particularly well suited for a number of different throttles, including certain types of those throttles commonly referred to as "twist-grip" throttles. Certain twist-grip throttles, however, are mounted by means of a collar. The throttle cable passes through a passageway in the collar and is fixedly secured to the

throttle lever, i.e., to the hand grip. These collar mounted throttles permit only very limited relative movement between a stuck cable and the throttle lever. Such a collar mounted type throttle is thus more subject to inadvertent activation of a relative-movement safety switch as disclosed in my copending application than a throttle permitting a relatively large relative movement between the cable and throttle lever.

The collar mounted throttle also has exposed safety switch contacts so that they are either subject to icing or corrosion by the elements or, alternatively, requires a bulky housing for enclosing the switch contacts.

Accordingly, it is an object of the present invention to provide a safety throttle, the operation of which is independent of relative movement between a throttle cable and throttle lever which normally move in unison.

Another object of the present invention is to provide a collar mounted twist-grip safety throttle in which the safety throttle switch components are an integral part of the collar and thus are protected from icing and corrosion by the elements.

Yet another object of the present invention is to provide a simple and reliable safety throttle which includes a twist-grip throttle lever for an internal combustion engine and which grounds the ignition of the engine controlled by the throttle in the event the linkage cable sticks holding the gas flow control valve of the engine carburetor in an open position when an attempt is made to throttle down to an idle position.

It is a further object of the present invention to provide a safety throttle wherein the linkage cable provides an electrical ground contact and the safety switch is an electrical contact coupled to the ignition whereby the ignition is electrically grounded whenever the cable comes into contact with said electrical contact.

It is still another object of the present invention to provide a safety switch on a twist-grip throttle lever wherein both automatic and manual grounding of said ignition is accomplished.

BRIEF DESCRIPTION OF INVENTION

Briefly, the invention comprises the addition of safety switch control means to a throttle in which a throttle cable normally moves reciprocably in a passageway of the throttle. Abnormal movement of the cable, such as is caused by sticking of the cable in its sheath, distorts the cable in the passageway causing the cable to strike the safety switch control means, which control means controls an ignition circuit safety switch in response to such a striking to shut off or otherwise disable the engine controlled by the throttle.

Conveniently, the safety switch control means may be merely an electrical contact accessible from the passageway but disposed out of contact with the cable for normal reciprocal cable movement. The cable and said electrical contact comprise the contacts of a normally open switch. Distortion of the cable in the passageway causing the cable to strike the contact, closes the switch to complete a circuit for grounding an engine ignition circuit.

According to a preferred embodiment, the electrical contact of the ignition circuit control means is a push-button switch which may be manually pushed into contact with the cable irrespective of the cable position or movement to provide for manual shut-off or disablement of the engine. It will of course be appreciated that

the converse of this embodiment, i.e., a safety switch control means which is physically moved in response to contact by a cable, comprises a control switch, the normal state of which is either normally open or normally closed to provide safety switches suitable for grounding an ignition circuit and for opening an ignition circuit path, such as the path between a magneto and spark plug.

BRIEF DESCRIPTION OF THE DRAWINGS

Other objects of the invention will become apparent from the following description taken in connection with the accompanying drawings in which:

FIG. 1 is a schematic representation of the novel safety throttle;

FIG. 2 is a cross-sectional view of the twist-grip throttle lever and the novel safety switch control means incorporated therein; and

FIG. 3 is a cross-sectional view of the invention shown in FIG. 2 and taken along the lines 3—3.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIG. 1, there is shown an internal combustion engine indicated generally by numeral 10. The internal combustion engine has a flywheel operated magneto (not shown) which functions to provide high voltage to a spark plug 12 by way of a cable 14. Engine 10 is also provided with a carburetor 16 having an internal gas flow control valve (not shown) operated by an elbow linkage 18. The elbow linkage 18 is normally urged by a spring 20 into a position in which the flow control valve is closed.

Because the motor and associated linkage 18 are often in an inconvenient or inaccessible location, means are provided for adjusting the position of linkage 18, and hence for controlling the flow of gas into the motor from a remote location. In the prior art, it is quite conventional to utilize a coaxial cable 22 having an outer sheath 24 and a central throttle cable 26 passing therethrough. The outer sheath 24 is secured to the motor or framework in which the motor is utilized by means of cable clamps 28. The throttle cable 26 is secured at one end to the elbow linkage 18 and at the other end to a suitable throttle lever, such that when the throttle lever is operated, the throttle cable 26 moves inside the sheath 28 to operate the elbow linkage 18.

In FIG. 1, the throttle lever is illustrated as a twist-grip handle grip 30 mounted by a collar 32 to a handle bar 36 so as to be rotatable as illustrated by the arrow 34. The grip 30 is normally urged by means of spring 20 at carburetor 16 to a position in which the gas flow control valve in carburetor 16 is in a closed or idling position. However, a spring internally located in said grip 30 may be used to return said grip 30 to idle position if desired. Such a spring is shown in FIGS. 2 and 3.

As can be seen in FIG. 1, a collar 32, which may be conveniently constructed in halves, attaches grip 30 to handle bar 36 by means of bolts 38. Collar 32 has an internal annular groove, shown in detail in FIGS. 2 and 3, which receives a flange on the end of said grip 30 and enables said grip 30 to turn freely about said handle bars 36 while being held securely by said collar 32. Throttle cable 26 in sheath 24 enters and passes through a passageway in a projecting neck 40 on said collar 32 and the end of said cable is rigidly secured to said grip 30 as will be shown in detail in FIGS. 2 and 3. Thus, when the operator rotates grip 30, the cable 26 is caused to move thus controlling the gas flow control valve on carburetor 16.

A push-button switch 42 is mounted on neck 40 of collar 32 such that an electrical conductor is projected through collar 32 to within close proximity of said cable 26. Switch 42 includes a spring 44 neck 40 and a head 46. A conductor 48 is secured to head 46 of switch 42 and is electrically connected to an inner conductive contact of said switch 42. This inner conductive contact is electrically insulated from the outer portion of said switch 42 as will be shown in FIGS. 2 and 3.

In FIG. 1, the grounded cable 26 and conductor 48 function as an ignition circuit safety switch under the control of the push-button switch 42. As will become more fully apparent upon reading the following description of FIGS. 2 and 3, the inner electrical contact of push-button switch 42 is operative to effectively close the safety switch in response to distortion of the cable 26 causing the cable to strike the contact and thereby complete an electrical circuit between spark plug 12 and ground.

FIG. 2 is a cross-sectional view of the grip 30, collar 32, handle bar 36 and switch 42. In this FIGURE, like numbers will be used for identical components in FIG. 1 for ease of identification. Grip 30 is attached to handle bar 36 by means of collar 32 which is comprised of two halves. Only one half of the collar is shown in FIG. 2. Bolts 38 (shown in FIG. 1) which pass through holes 50 hold the two halves together. It will be seen that collar 32 has an annular internal groove 52 which receives a flange 54 on the end of grip 30. Grip 30 rotates about handle bar 36 but is restrained against movement axially along handle bar 36 by collar 32. Detent 56 on flange 54 rigidly secures the end of throttle cable 26 thus providing movement of the cable 26 in unison with movement (rotation) of the grip 30 to control the gas flow control valve whenever grip 30 is rotated by the operator.

Push-button switch 42 is mounted on said collar 32 such that it projects through collar 32 to within close proximity to cable 26. If the operator desires to manually stop the engine, he depresses pushbutton switch 42 against spring 44 until the inner conductive contact, shown as 58, comes into physical contact with cable 26. Since cable 26 is at ground potential and since conductor 48 is coupled to the spark plug and to inner conductive contact 58, the spark plug is grounded and the engine stops. It should be noted that the inner conductive contact 58 of switch 42 is electrically insulated from the collar 32 by means of an insulator 60. Feet 62 of the lower portion of said switch 42 secure it to collar 32 and prevent the switch 42 from coming out of the collar 32. A spring 64 which may be in the form of a semi-coiled leaf spring biases grip 30 to its idle position; the spring 20 shown in FIG. 1 assists in holding grip 30 in this position. So long as the cable 26 is properly lubricated and in good working order, the spring 20 has sufficient force to move the gas flow control valve to the closed position and move cable 26 to the left when the operator returns grip 30 toward its idle position. However, should the cable 26 become frayed or for any other reason bind within the sheath 25 in a position holding the gas flow control valve on carburetor 16

open, when the 30 is 30is returned toward its idle position, cable 26, which is at ground potential, will tend to distort (as indicated by the dashed line in FIG. 3) since it cannot move in the sheath 24 to strike inner conductive contact 58 of switch 42. This will complete the electrical circuit from ground (the cable 26) through conductor 48 to ground spark plug 12 and shut off the engine.

FIG. 3 is a sectional view of the view of FIG. 2 taken along lines 3—3. Here it can be seen that collar 32 is comprised of two halves, 66 and 68, the two halves meeting at points indicated as 70 and 72. It can also be seen that inner conductive contact 58 of switch 42 is in such close proximity to cable 26 that should cable 26 be prevented from moving in sheath 24, if grip 30 moves towards its closed position (counter-clockwise in FIG. 3) detent 54 will move cable end 56 to the left thus bowing cable 26 as indicated by dotted line 74 causing it to make electrical contact with the inner conductive contact 58 of switch 42 thus stopping the engine by grounding theignition circuit. the ignition

It can thus be seen that the present invention provides a safety throttle through a minor modification of the existing twist-grip throttle, the modification of the illustrated preferred embodiment providing both an automatic engine shut off if the throttle control cable sticks or manual shut off if so desired by the operator.

The foregoing description and drawings clearly disclose preferred embodiments of the invention, but it will be understood that this disclosure is merely illustrative and that changes may be made within the scope of the appended claims.

What is claimed is:

1. In combination with an internal combustion engine having a throttle cable fixedly connected at one end to a throttle control lever and at the other end to a gas flow control valve, and a passageway for said cable having a cross-section larger than said cable and in which the cable normally moves reciprocally as said throttle lever is moved between open and closed positions, an improved safety switch for enabling and disabling an ignition circuit of the engine comprising:

a. switch control means having an electrical conductor mounted adjacent to and accessible from said passageway but disposed out of contact with said cable during normal reciprocal movement of said cable in said passageway but contactable by said cable when, upon movement of said throttle lever toward the closed position, movement of said cable in said passageway is inhibited to produce cable distortion which urges said cable into contact with said conductor, and

b. means coupling said ignition circuit to said conductor whereby said ignition is grounded when said distorted cable is urged into contact with said conductor.

2. A safety switch as in claim 1 further comprising:

a. means mounting said switch control means adjacent said passageway such that said conductor is moveable transverse to said passageway between a first position permitting striking of said conductor by said cable upon distortion of the cable and a second position wherein said conductor is manually projected into contact with said cable whereby grounding of said ignition can be manually effected by movement of said conductor from said first to said second position.

3. A safety switch as in claim 2 further comprising:

a. means for electrically insulating said conductor from ground potential except through striking said cable.

4. A safety switch as in claim 3 further comprising:

a. bias means urging said conductor to its first position whereby said conductor must be manually moved to its second position.

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