

United States Patent

[[1]] 3,603,065

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[56]

References Cited

UNITED STATES PATENTS

3,035,386	5/1962	Jepson et al.	56/26
3,321,589	5/1967	Persia et al.	200/42

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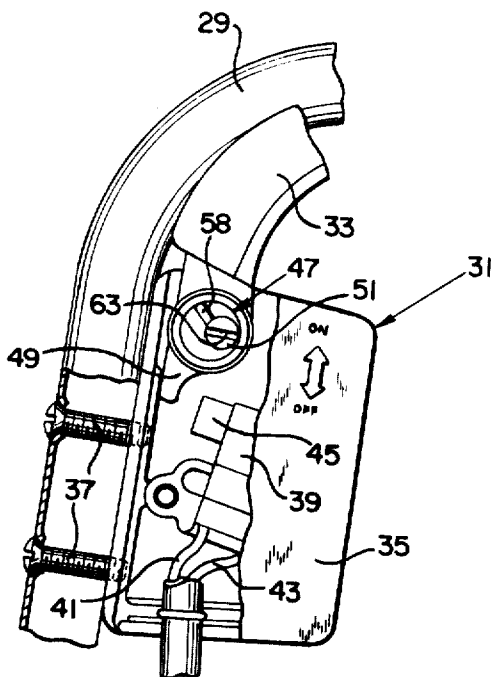
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[54] CAM SAFE SWITCH ACTUATOR
18 Claims, 9 Drawing Figs.

[52]	U.S. Cl.....	56/16.7, 200/157
[51]	Int. Cl.....	A01d 35/24
[50]	Field of Search.....	200/42, 44, 157; 56/26, 16.7

ABSTRACT: A lawnmower having a housing supported for movement along the ground by a plurality of wheels. A motor-powered reel is supported for rotation upon the housing and cooperates with a bedknife to cut grass. A bale handle extends upwardly from the housing and has a lever-operated switch disposed thereon for actuation of the motor. Novel safety means is provided to selectively prevent actuation of the switch by the lever.



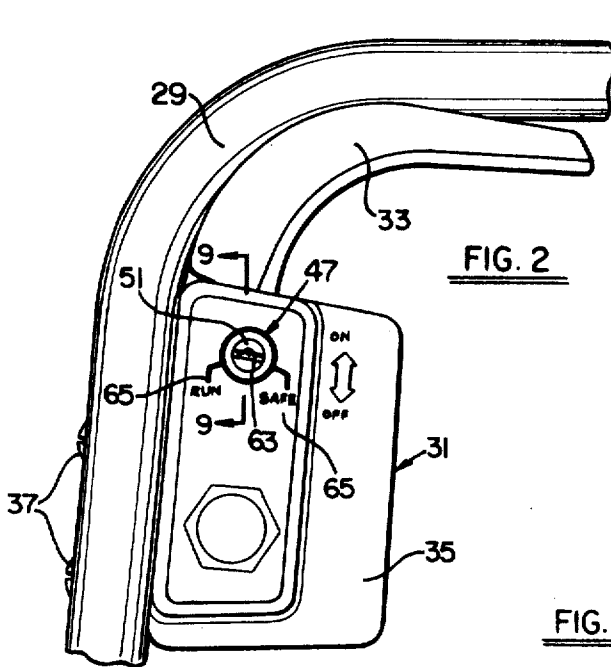


FIG. 2

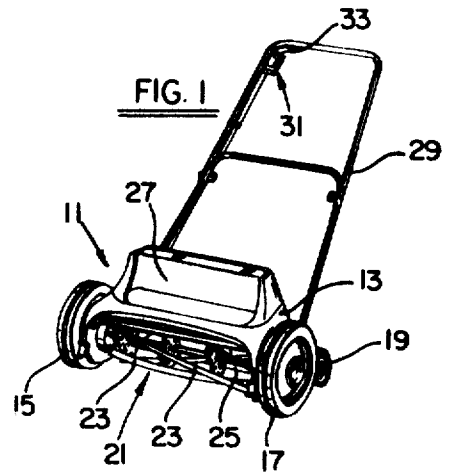


FIG. 1

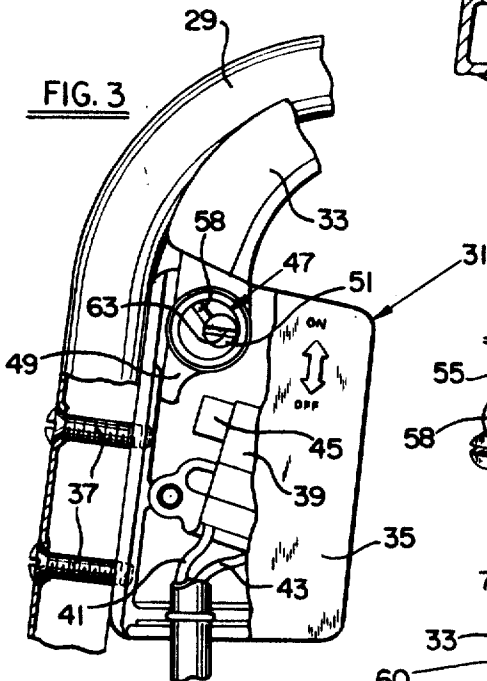


FIG. 3

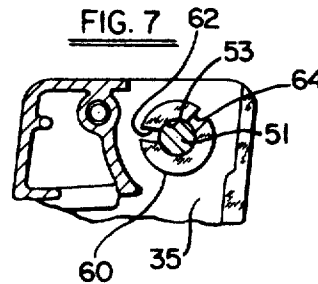


FIG. 7

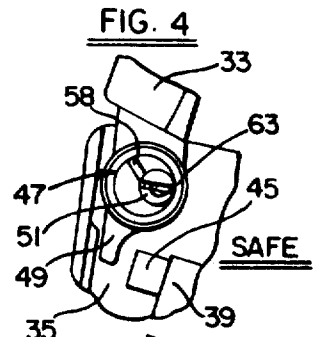


FIG. 4

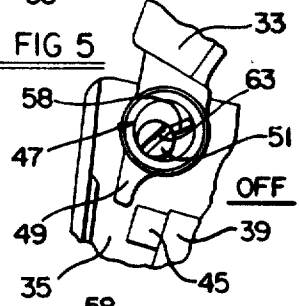


FIG. 5

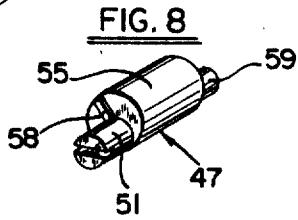


FIG. 8

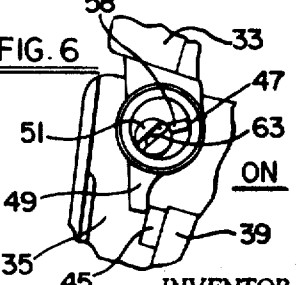


FIG. 6

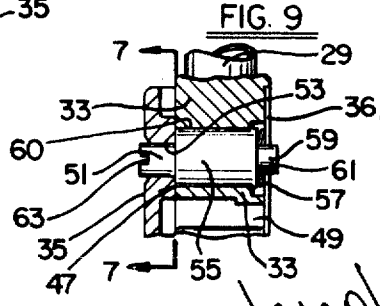


FIG. 9

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CAM SAFE SWITCH ACTUATOR

SUMMARY OF THE INVENTION

The present invention is directed to a movable switch actuator mechanism which includes manually manipulatable means adapted to shift or alter the path of the movement of an actuator whereby to selectively allow or prevent switch actuation even with actuator movement. The novel switch actuator mechanism of this invention embodies simplicity and reliability, and requires a simple but positive act on the part of the operator to effect said path shift or alteration.

Main objects of the present invention, therefore, are to provide a novel movable switch actuator mechanism adapted for use in, for example, an electric switch for a powered tool or the like and which includes means integrated therewith for shifting or altering the path of movement of the actuator so that in one condition, the actuator movement actuates the switch while in another condition, actuator movement cannot actuate the switch.

Further important objects of the present invention are to provide a novel switch actuator of the above character which includes a minimum of parts and is relatively inexpensive to manufacture, is simple to operate but requires a positive act on the part of the operator to change from one condition to the other, and is reliable and safe in operation.

Other objects and advantages of the present invention will become more apparent from a consideration of the detailed description to follow taken in conjunction with the drawings annexed hereto.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view illustrating an electric lawnmower embodying the present invention;

FIG. 2 is an enlarged view of a portion of FIG. 1 illustrating the switch and switch actuator mounting;

FIG. 3 is a view similar to FIG. 2 but with parts broken away and in section showing the parts in the "safe" position and with the actuator "off";

FIG. 4 is a view similar to FIG. 3 but showing the actuator "on";

FIG. 5 is a view similar to FIGS. 3 and 4 but showing the parts in the "operating" position and the switch "off";

FIG. 6 is a view similar to FIG. 5 but showing the switch "on";

FIG. 7 is a sectional view of FIG. 9 taken along the line 7-7 thereof;

FIG. 8 is a perspective view illustrating the manually manipulatable means of the present invention; and

FIG. 9 is an enlarged sectional view of FIG. 2 taken along the line 9-9 thereof.

BROAD STATEMENT OF THE INVENTION

Broadly described, the present invention relates to a lawnmower of the type having a housing supported for movement over the ground, cutting means supported upon said housing and driven by an electric motor, handle means for controlling and manipulating said mower, and switch means including a switch housing mounted on said handle and having a switch therein for turning said motor on and off; that improvement which comprises actuator means movable through a path to actuate said switch, and means for shifting said actuator means away from said switch whereby movement of said actuator means is ineffective to operate said switch.

In another aspect, the present invention relates to a lawn and garden device of the type having a housing supported for movement over the ground, implement means supported upon said housing and adapted to be driven by electric motor means, a control and manipulation handle on said housing, and electric switch means for turning said motor and said implement means on and off; the improvement wherein said switch includes a pivotal lever movable through an arcuate

path to actuate said switch, and means operable to shift the pivot axis of said lever, whereby to selectively prevent said lever from actuating said switch.

In still another aspect, the present invention relates to a switch assembly comprising a housing having a switch body mounted thereon, a control plunger slidable on said switch body and normally biased in one direction, a lever having one end engageable with and adapted to move said plunger in a direction away from said one direction, means pivotally mounting said lever upon said housing, said mounting means including a pivot pin having an eccentric portion journaling said lever, and means for turning said pivot pin, whereby said eccentric portion shifts said lever laterally relative to said plunger, whereby to selectively prevent engagement of said plunger by said lever one end.

DETAILED DESCRIPTION

Referring now to the drawings, a lawnmower, which is one device with which the present invention finds particular use, is illustrated generally at 11 in FIG. 1 and is seen to include a housing 13 supported for movement along the ground by front wheels 15, 17 and rear wheels 19 (only one of which is shown). A reel 21 is rotatably supported upon the housing 13 between the wheels 15, 17 and includes a plurality of blades 23 which cooperate in scissorlike fashion with a stationary bed knife 25 to cut grass. The reel 21 is powered by an electric motor (not shown) mounted upon the housing 13 beneath a removable shroud 27. A bale handle 29 extends upwardly from the housing 13 and facilitates control and manipulation of the mower 11. An electric switch assembly 31, including an operating lever 33, is provided at the top of the handle 29 for turning the motor on and off. As shown, the operating lever 33 generally follows the contour of the handle 29 so that the operator can manipulate the lever 33 without releasing his grasp of the handle 29.

As shown in FIG. 3, the electric switch assembly 31 includes a two-part, switch housing 35, 36 secured in place on the bale handle 29 by a plurality of screws 37. A switch 39 is suitably secured in place within the housing 35 and is connected to leads 41, 43 which in turn are also connected to the motor (not shown) and to a power source. The switch 39 has a plunger 45 normally biased outwardly toward the position shown in FIG. 3 in which position the switch 39 is "off." However, the plunger 45 is movable away from this position and inwardly of the switch 39 to turn the switch "on."

To this end, the lever 33 is pivotally supported upon the switch housing 35 through a pivot pin 47 and has a projecting ear 49 positioned opposite the switch plunger 45. The pivot pin 47 has a projecting end portion 51 received in an opening 53 formed in the switch housing part 35, and an enlarged, eccentric midportion 55 upon which the lever 33 is journaled. The projecting end portion 59 is also supported in an opening 61 in the housing part 36.

The projecting end 51 of the pivot pin 47 is exposed at the top of the switch housing 35 (as seen in FIG. 2) and is provided with a screw-slot 63 adapted to receive the end of a screwdriver, a coin, or the like. Thus, the pivot pin 47 can be selectively turned about an axis through the end portions 51, 59 which, through the eccentric midportion 55, laterally shifts the position of the pivot for the lever 33.

A spring washer 57 is positioned on the end portion 59 and bears against the housing part 36 thereby biasing the pivot pin 47 toward the left, as seen in FIG. 9. This biases a lug 58, formed on a radial face of the eccentric midportion 55, against a boss 60 formed on the housing part 35. The boss has a pair of arcuately spaced recesses 62, 64 formed therein which receive the lug 58 in detentlike fashion and releasably hold the pivot pin 47 selectively in two rotated positions.

In the position shown in FIG. 3 and 4, the lug 58 is located in the recess 64 and the pivot pin 47 is positioned so that the pivot axis of the lever 33 is displaced toward the left. At rest, the lever 33 is positioned as shown in FIG. 3 and the switch 39

is "off." When the operator grasps the lever 33 and pivots it in a counter clockwise direction, as seen in FIGS. 3 and 4, the upper part of the lever 33 engages the handle 29 before the projecting ear 49 can engage the switch plunger 45 (see FIG. 4) and the switch 39 remains "off." This position of the pivot pin 47, then, is known as the "safe" position and is used during mower storage or when it is desired to prevent the mower from accidentally being turned "on."

In the position of the pivot pin 47 illustrated in FIGS. 5 and 6, known as the "run" position, the pivot pin lug 58 is located in the recess 62 and the pivot axis of the lever 33 is shifted toward the right relative to that shown in FIGS. 3 and 4. At rest, the lever 33 is positioned as shown in FIG. 5 and the switch 39 is "off." When the lever 33 is grasped by the operator (who has his hands on the handle 29), counterclockwise pivotal movement of the lever brings the ear 49 into contact with and moves the plunger 45 inwardly of the switch 39 to turn it "on." (See FIG. 6). When the operator releases his hand from the lever 33, it moves by gravity back to the FIG. 5 position and the plunger 45 likewise returns to the FIG. 5 position under the force of the switch-biasing means. To help identify the "safe" and "run" positions for the pivot pin 47, suitable indicia 65 printed on the switch housing 35 aligns with, for example, the cross slot 63 in the pivot pin end 51.

As described above, the projecting end 51 of the pivot pin 47 is slotted at 63 to receive a screwdriver, coin, and the like for turning the pivot pin 47 from the "safe" position to the "run" position. When the operator inserts the screwdriver, coin, or the like into the slot 63, he presses axially against the pivot pin 47 and releases the lug 58 from its slot 62, 64 so that the pivot pin 47 can be turned. It will be appreciated that while this is relatively easy, it does require a positive act by the operator to make the change from "safe" to "run." Thus, the likelihood that the pivot pin 47 will be shifted from the "safe" to the "run" position accidentally is virtually eliminated.

While a preferred embodiment of the invention has been set forth herein, various additions, substitutions, modifications and omissions may be made thereto without departing from the spirit thereof.

I claim:

1. In a lawn and garden device of the type having a housing supported for movement over the ground, implement means supported upon said housing and adapted to be driven by electric motor means, a control and manipulation handle on said housing, and electric switch means for turning said motor and said implement means on and off; the improvement wherein said switch includes a pivotal lever movable through an arcuate path to actuate said switch, and means operable to shift the pivot axis of said lever, whereby to selectively prevent said lever from actuating said switch.

2. The improvement of claim 1 wherein said shifting means includes a rotatable cam supported upon said switch and pivotally mounting said lever.

3. The improvement of claim 1 wherein said switch includes a switch housing fixed to said handle, said lever being closely disposed to said handle and shaped to generally follow the contour thereof, said arcuate path of said lever being limited by engagement thereof with said handle, whereby the operator can grasp said lever and said handle during mower operation.

4. The improvement of claim 3 wherein said lever pivot axis is shiftable from a first position where pivotal movement of said lever through said arcuate path actuates said switch, to a second position where pivotal movement of said lever is stopped by engagement between said lever and said handle before actuation of said switch.

5. A switch assembly comprising a housing having a switch body mounted thereon, a control plunger slidable on said switch body and normally biased in one direction, a lever having one end engageable with and adapted to move said plunger in a direction away from said one direction, means pivotally mounting said lever upon said housing, said mounting means

including a pivot pin having an eccentric portion journaling said lever, and means for turning said pivot pin, whereby said eccentric portion shifts said lever laterally relative to said plunger, whereby to selectively prevent engagement of said plunger by said lever one end.

6. The assembly of claim 5 wherein said pivot pin is rotatably supported upon said body and has one end thereof exposed for manual manipulation.

7. The assembly of claim 6 wherein said pivot pin end has a transverse slot therein adapted to receive a screwdriver, coin, and the like for turning said pivot pin and shifting said lever.

8. The assembly of claim 5 which includes stop means limiting pivotal movement of said lever in a direction to engage and move said plunger, said stop means preventing engagement of said plunger by said lever when said lever has been shifted laterally relative to said plunger by said eccentric portion.

9. The improvement of claim 2 which includes detent means releasably holding said cam in selected rotated positions.

10. The improvement of claim 5 which includes cooperable projection and recess means on said pivot pin and said housing for releasably holding said pivot pin in selected turned positions, resilient means normally biasing said pivot pin in an axial direction causing cooperative engagement between said projection and recess means.

11. In a lawnmower of the type having a housing supported for movement over the ground, cutting means supported upon said housing and driven by an electric motor, handle means for controlling and manipulating said mower, and switch means including a switch housing mounted on said handle and having a switch therein for turning said motor on and off; that improvement which comprises actuator means movable through a path to actuate said switch, and means for shifting said actuator means away from said switch whereby movement of said actuator means is ineffective to operate said switch.

12. The improvement as defined in claim 11 wherein said actuator means comprises a lever pivotally mounted on said switch housing, said switch including a plunger normally biased toward an "off" position, said lever being engageable with to move said plunger to an "on" position.

13. The improvement of claim 12 wherein said altering means includes a cam pivotally mounting said lever, said cam being movable to shift the pivot axis of said lever from a first position where said lever is engageable with said plunger, to a second position where said lever is prevented from engaging said plunger.

14. The improvement of claim 12 wherein said lever is contoured to generally follow said handle, whereby an operator may grasp and hold said lever and said handle during mower operation.

15. The improvement as defined in claim 13 wherein said cam is turnably supported upon said housing and has an eccentric portion journaling said lever, whereby turning movement of said cam turns said eccentric portion and shifts said lever relative to said plunger.

16. The improvement of claim 15 wherein said cam has one end exposed and provided with a transverse slot adapted to receive a screwdriver, coin, and the like.

17. In a lawnmower of the type having a housing supported for movement over the ground, cutting means supported upon said housing and driven by an electric motor, handle means for controlling and manipulating said mower, and switch means including a switch housing mounted on said handle and having a switch therein for turning said motor on and off; that improvement which comprises actuator means movable through a path to actuate said switch, a cam engageable with said actuator for altering said path of movement of said actuator means, whereby to selectively prevent said switch from being actuated by said actuator means.

18. The improvement as defined in claim 17 which includes means releasably retaining said cam in selected positions.