Oct. 7, 1969 D. D. MILLER 3,471,661

INERTIA-OPERATED SWITCH

Filed March 14, 1968

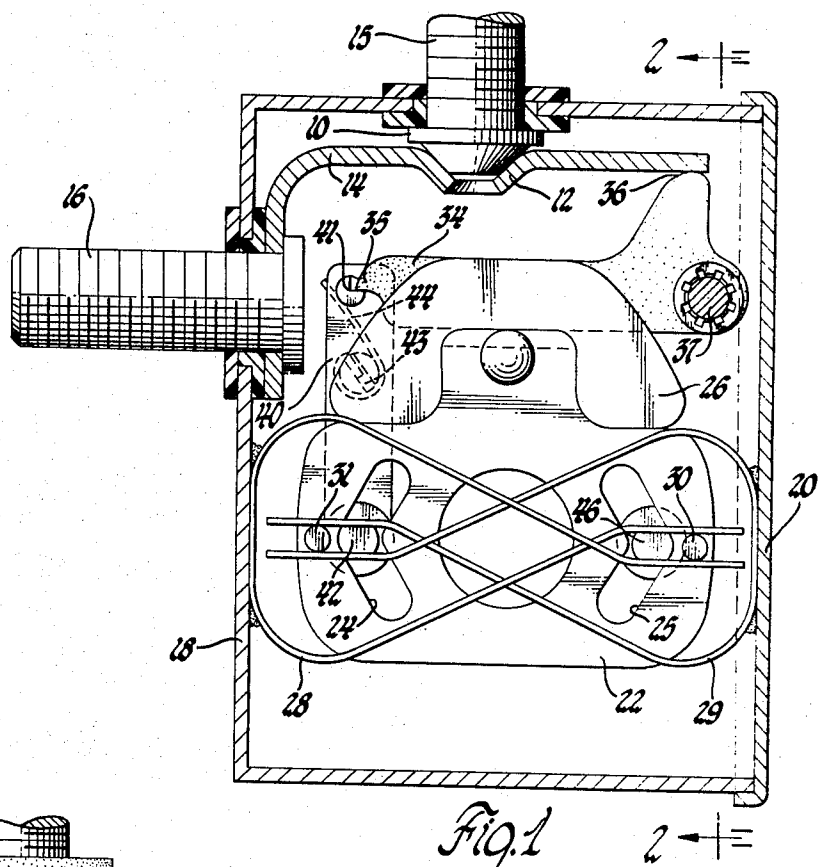


Fig. 1

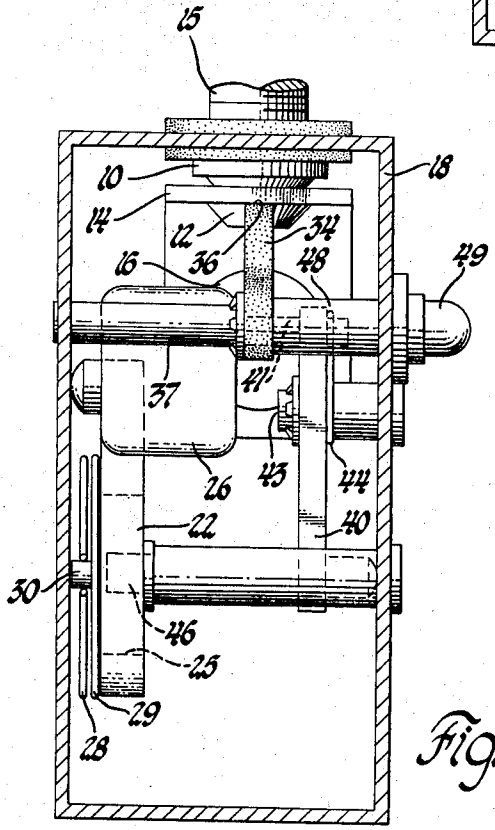


Fig. 2

INVENTOR.
Donald D. Miller

BY
Richard G. Stahl

ATTORNEY

United States Patent Office 3,471,661 Patented Oct. 7, 1969

3,471,661

INERTIA-OPERATED SWITCH

Donald D. Miller, Saginaw, Mich., assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

Filed Mar. 14, 1968, Ser. No. 713,157
Int. Cl. H01h 35/14
U.S. Cl. 200—61.48 1 Claim

ABSTRACT OF THE DISCLOSURE

An electrical switch having a pair of spring biased normally open contacts maintained closed by a retaining arm member, rotatable about a pivot point, which is operable, upon the movement of an inertia weight, to open the contacts. A trigger pin secured to one end of a trigger arm, rotatable about another pivot point, engages a pawl on one end of the retaining arm member to maintain the retaining arm member in the position to close the switch contacts. Movement of the inertia weight will cause a cam follower pin secured to the opposite end of the trigger arm to follow either leg of a V-shaped cam surface of the inertia weight support member and rotate the trigger arm about its pivot point in a direction to release the trigger pin from the pawl of the retaining arm member thereby permitting the force of the contact spring bias to rotate the retaining arm member about its pivot point and open the switch contacts.

This invention relates to electrical switches and, more specifically, to inertia operated electrical switches.

Inertia operated switches are well known in the art, however, heretofore, switches of this type have been cumbersome and included may moving parts.

It is, therefore, an object of this invention to provide an improved inertia operated switch.

It is another object of this invention to provide an improved inertia operated switch having a minimum of moving parts.

In accordance with this invention, an inertia operated switch is provided wherein the associated spring biased normally open contacts are maintained in electrical contact by a cam surface on one end of a pivotally mounted retaining arm member which is locked in the position to maintain the contacts closed by a trigger pin, secured to one end of a pivotally mounted trigger arm, engaging a pawl on the other end thereof and are released to open upon the moveemnt of a weight secured to a resiliently suspended weight support member having a V-shaped cam surface in operative engagement with a cam follower pin on the other end of the trigger arm to rotate the trigger arm in a direction to move the trigger pin out of engagement with the retaining arm pawl.

For a better understanding of the present invention together with additional objects, advantages and features thereof, reference is made to the following description and accompanying drawing in which

FIGURE 1 is a front view of the inertia operated switch of this invention and

FIGURE 2 is a section view of FIGURE 1 taken along line 2—2 and looking in the direction of the arrows.

Referring to the figures of the drawing, wherein like elements have been given like characters of reference in the two figures, the inertia operated switch of this invention has a stationary electrical contact **10** and a movable electrical contact **12** mounted upon a movable member **14** which is spring biased in a direction to open the contacts. With movable contact **12** in electrical engagement with stationary contact **10**, an electrical circuit is established between conventional binding posts **15** and **16**

through movable member **14**. Movable member **14** may be made of an electrically conductive spring material to provide the necessary spring bias in a direction to open the contacts, as shown in the drawing, or alternate conventional spring biased movable contact arrangements may be employed.

The mechanism of the switch of this invention may be enclosed within a suitable box like enclosure **18** having an access cover **20**.

Resiliently suspended within the enclosure is a weight support member **22** having two V-shaped cam surfaces **24** and **25** to which is secured a weight **26**. The weight support member is suspended in its reset position by reset springs **28** and **29** which may be secured to the enclosure **18** by any suitable method such as brazing or staking and which engage fixed pins **30** and **31**, respectively, rigidly secured to the weight support member **22**.

A retaining arm member **34**, having a pawl **35** on one end and a cam surface **36** on the other end, is mounted for rotation about pivot point **37** in such a manner that cam surface **36** is in engagement with movable member **14**. Upon the rotation of retaining arm member **34** in a clockwise direction about pivot point **37**, movable contact **12** is moved into electrical engagement with stationary contact **10** against the force of the spring bias of movable member **14**.

A trigger arm member **40**, having a trigger pin **41** on one end and a cam follower pin **42** on the other end, is mounted for rotation about pivot point **43**. Trigger pin **41** is engageable with pawl **35** of retaining arm **34** upon the rotation of trigger arm **40** in a clockwise direction about pivot point **43** and cam follower pin **42** is in operative engagement with V-shaped cam surface **24** of weight support member **22**. Trigger arm **40** is urged in a clockwise direction about pivot point **43** by spring **44** in a manner well known in the art. With trigger pin **41** in engagement with the pawl **35** of retaining arm **34**, retaining arm **34** is locked in the position which will maintain movable contact **12** in electrical engagement with stationary contact **10** against the force of the spring bias of movable member **14**.

Fixed pin **46**, which is rigidly secured to the enclosure **18**, is in operative engagement with the other V-shaped cam surface **25** of weight support member **22**.

Extending through enclosure **18** is a reset arm **48** having a reset handle **49**. Retaining arm member **34** may be rotated in either direction from outside enclosure **18** through reset handle **49** and reset arm **48**.

The switch is operated by movement of weight **26**. Any movement of weight **26** either rotates or translates weight support member **22** which results in either the rotation thereof about fixed pin **46** or cam follower pin **42** or the translation thereof along both fixed pin **46** and can follower pin **42**. In either event, cam follower pin **42** follows either one leg of cam surface **24** to rotate trigger arm **40** in a counterclockwise direction about pivot point **43** which rotates trigger pin **41** out of engagement with pawl **35** to release retaining arm **34**. With retaining arm **34** thus released, the spring bias force of movable member **14**, acting through cam surface **36**, rotates retaining arm member **34** in a counterclockwise direction about pivot point **37** and opens the electrical contacts **10** and **12** to interrupt the electrical circuit between binding posts **15** and **16**.

After the switch has operated, reset springs **28** and **29** return weight support member **22** and the attached weight **26** to the reset suspended position and reset handle **49** may be operated to revolve retaining arm member **34** in a clockwise direction about pivot point **37** until spring **44**, biased to revolve trigger arm member **40** in a clockwise direction about pivot point **43**, moves trigger pin **41**

into engagement with pawl 35, thereby resetting the switch for the next operation.

While a preferred embodiment of the present invention has been shown and described, it will be obvious to those skilled in the art that various modifications and substitutions may be made without departing from the spirit of the invention.

I claim:

1. An inertia operated switch having a stationary electrical contact and a movable electrical contact mounted upon a movable member spring biased in a direction to open the electrical contacts comprising, a enclosure, a weight, a weight support member having two V-shaped cam surfaces resiliently suspended within said enclosure for movably supporting said weight which is secured thereto, a retaining arm member mounted for rotation about a first pivot point having a pawl on one end thereof and a cam surface on the other end thereof in engagement with said movable member upon which said movable contact is mounted for operating said movable contact into electrical engagement with said stationary contact against the force of said spring bias upon the rotation of said retaining arm member in a first direction about said first pivot point, a trigger arm member mounted for rotation about a second pivot point having a trigger pin secured to one end thereof engageable with said pawl on said retaining arm member for locking said retaining arm member in the position which will maintain said movable contact in electrical engagement with said stationary

contact against the force of said spring bias and a cam follower pin on the other end thereof in operative engagement with one of said V-shaped cam surfaces of said weight support member, a trigger spring for urging the rotation of said trigger arm member about said second pivot point in a direction to bring said trigger pin into engagement with said pawl on one end of said retaining arm member and a fixed pin secured to said enclosure engaging the other one of said V-shaped cam surfaces of said weight support member.

References Cited

UNITED STATES PATENTS

2,671,832	3/1954	Hansard et al.	200—61.53
2,780,688	2/1957	Stec	200—61.52
2,885,505	5/1959	Mathisen	200—61.53
2,981,809	4/1961	Van Horn	200—61.52 X
2,986,614	5/1961	Minch	200—61.5

FOREIGN PATENTS

263,217	1/1927	Great Britain.

ROBERT K. SCHAEFER, Primary Examiner

ROBERT A. VANDERHYE, Assistant Examiner

U.S. Cl. X.R.

200—61.52, 61.5