United States Patent

Bognar

[15] **3,691,325**

[45] **Sept. 12, 1972**

[54] NON-SNAP ACTING ROCKER SWITCH

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[73] Assignee: **TRW, Inc.,** Cleveland, Ohio

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[21] Appl. No.: **144,498**

[52] **U.S. Cl.**.....**200/6 C,** 200/68, 200/168

[51] **Int. Cl.**.....**H01h 19/10,** H01h 21/00

[58] **Field of Search** .....200/159 A, 6 BB, 6 C, 168 S, 200/68

[56] **References Cited**

UNITED STATES PATENTS

2,349,655	5/1944	Grout	200/6 BB
2,626,334	1/1953	Koenig	200/6 BB
3,040,828	6/1962	Ulinski	200/6 BB

FOREIGN PATENTS OR APPLICATIONS

1,329,035	4/1963	France	200/159 A

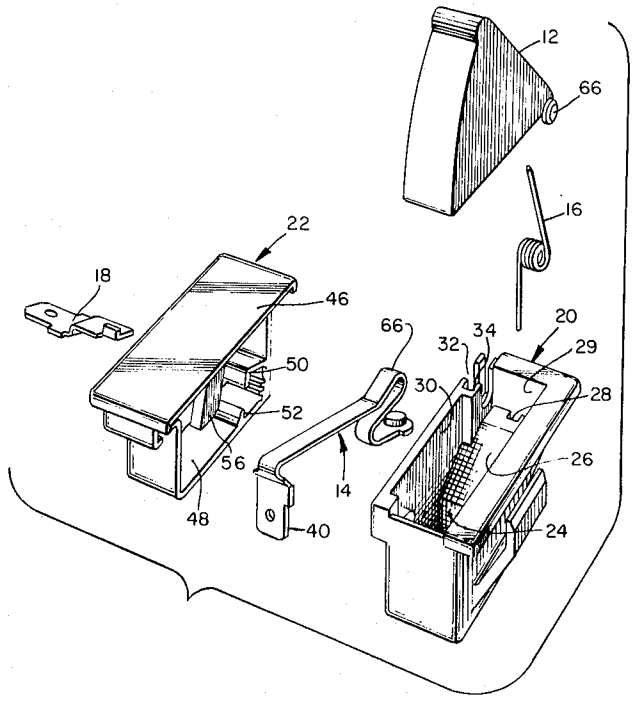
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[57] **ABSTRACT**

This is a cam actuated switch which has a two compartment housing and a plunger which has a shaft that is passed through the separation wall of the housing from one compartment to another. The shaft having a rat guard to prevent water from going from the plunger compartment to the contact compartment. The contact compartment houses the contacts and the end of the shaft has a cam portion extending therefrom adapted to engage against an arced portion of a spring contact.

2 Claims, 5 Drawing Figures



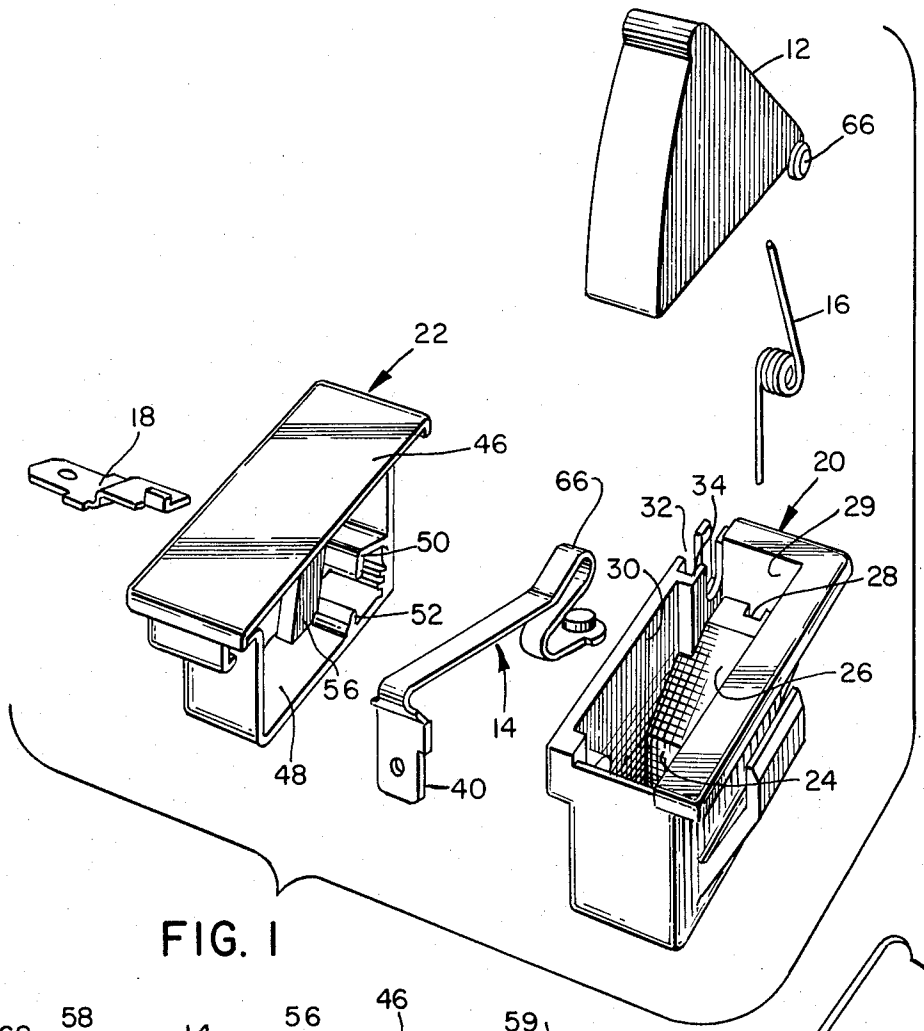


FIG. 1

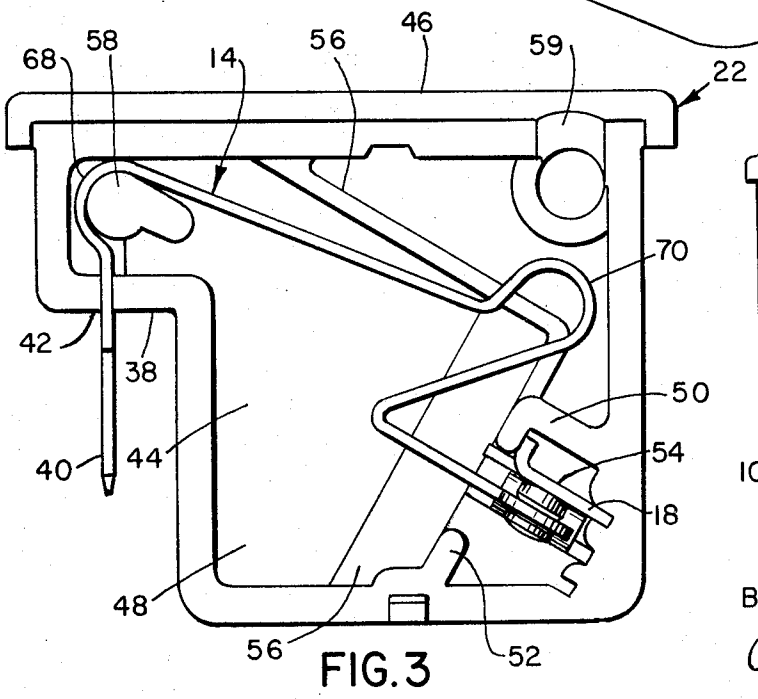


FIG. 3

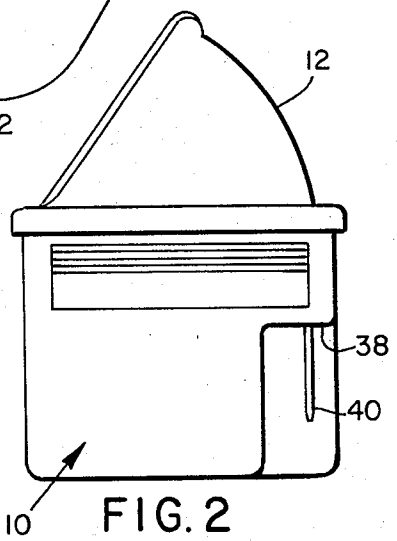


FIG. 2

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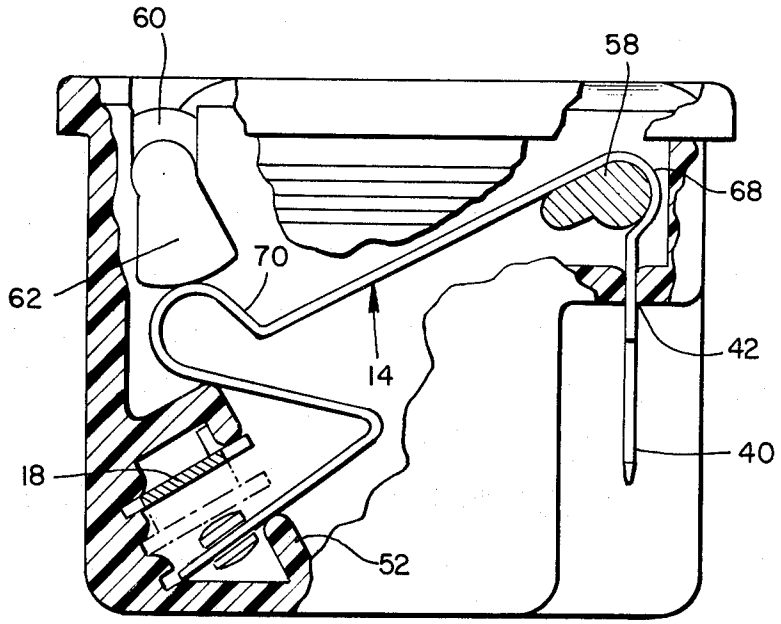


FIG. 4

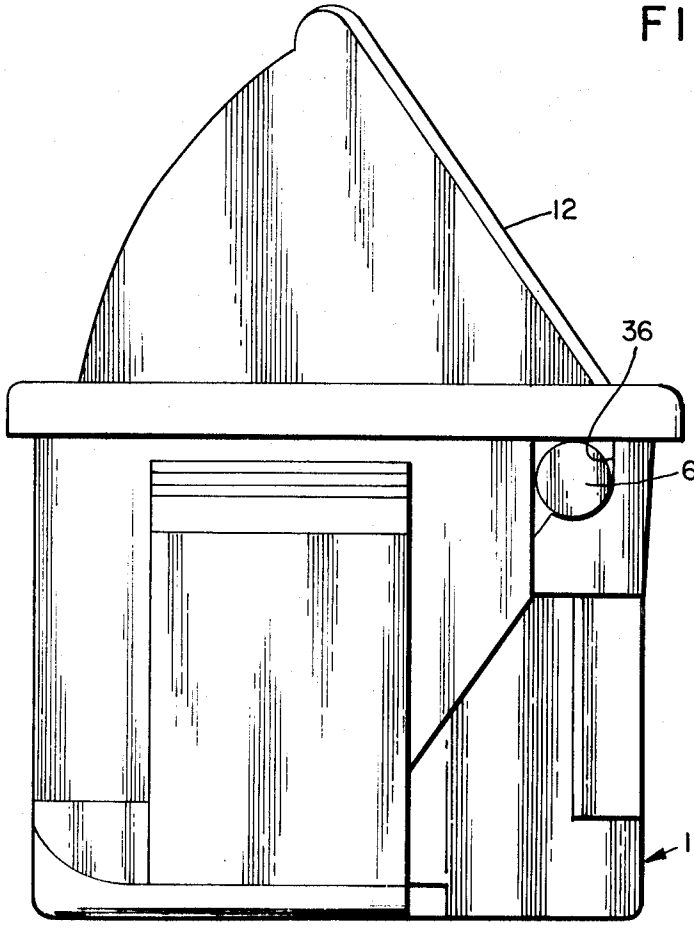


FIG. 5

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NON-SNAP ACTING ROCKER SWITCH

BACKGROUND OF THE INVENTION

DESCRIPTION OF PRIOR ART

There are many rotatable switch patents which utilize a cam as the actuating member. These switches do not pass the actuating shaft from a plunger compartment to a contact compartment, they do not have shafts with rat guards to prevent water from seeping from the plunger compartment into the contact compartment and further more they do not utilize the spring member as a contact member.

For example, the cam operated switch disclosed in the patent to J. S. Thompson, U.S. Pat. No. 2,262,306, shows a shaft 11 rotating the double cams 52 which engage the inwardly extending portions 53 and move the pivotally mounted contacts 33 and 34 out of circuit, making engagement against the biasing leaf springs 40, 41. This patent does not disclose separate enclosed compartments for the plunger or knob and the contact elements nor does it disclose that the spring member may also carry the contacts.

The patent to G. W. Jones U. S. Pat. No. 2,832,851, discloses a cam which engages against tang 46 of a contact arm allowing a leaf spring member 56 to bias the contact arm. This patent fails to anticipate the present invention for the same reasons given for the Thompson patent.

Another prior art patent is the one to Lariana, U. S. Pat. No. 3,002,060, disclosing a cam 72 which leans against the toothed type cam follower 50 extending from the saddlemember 38 which in turn bears against the contact arm. The reference fails to anticipate the present invention in that the cam does not bear against an arced surface of the contact spring arm and the contacts are not in separate compartments.

SUMMARY OF THE INVENTION

The inventor's cam operated spring lever arm switch has fewer parts than the average snap-action switch. It also has a more consistant contact force and less contact bounce. It is cheaper to manufacture, easier to assemble and less likely to develop mechanical failure.

The present invention provides a cam operated lever arm switch having one compartment for the plunger or rocker arm and another compartment for the contacts.

An object of the present invention is to provide a cam operated spring lever arm switch.

Another object of the present invention is to provide a cam operated spring lever arm switch in which the plunger is separated from the contact holding area.

Still another object of the present invention is to provide a cam operated spring lever arm switch in which the cam operates from a shaft which extends from the plunger compartment to the contact compartment.

A further object of the present invention is to provide a cam operated spring lever arm switch in which the spring has an arced portion engageable with the cam.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded view of the switch;

FIG. 2 is a side elevation of the switch assembly shown in FIG. 1.;

FIG. 3 is a plan view of the contact container portion;

FIG. 4 is a section partly in elevation of the spring container compartment with the cam engaged against the spring; and

FIG. 5 is another side elevation of the switch assembly taken from the opposite side as that shown in FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As illustrated in the drawing, the switch assembly comprises a two piece housing **10**, a rocker-actuator **12**, a movable contact arm **14**, a torsion spring **16**, and a fixed contact **18**.

The two piece housing **10** comprises an actuator portion **20** and a contact container portion **22**. The front, rear and side walls of the actuator portion **20** define a box like cavity **24**. The rear wall of the actuator portion **20** is biased rearwardly to provide a slanted stop portion **26**. The stop portion **26** terminates in a platform that extends backwardly until it abutts a portion **29** of the back wall that extends upwardly and which is in spaced parallel relation to the front wall. A slot **28** is formed, adjacent the portion or section **29**, through the platform and is continued as a channel extending outside the cavity **24**. One of the side walls is a partition wall **30** having an arcuate slot **32** formed therethrough in close proximity to the section **29** of the back wall. An inner wall **34** is spaced from a portion of the partition wall **30** and has an arcuate slot formed therein which is similar to the arcuate slot **32** and is in spaced parallel relation to the partition wall **30**. An arcuate floor is formed between the portion of the partition wall **30** through which the arcuate slot **32** if formed and the inner wall **34**. An aperture **36** is formed through the side wall directly across from and on a line with the arcuate slot **32**.

The contact container portion **22** comprises a base portion **44** of a generally rectangular configuration having a rectangular extension at an upper portion. Forward, side and rear walls and a cap portion **46** extend upwardly from side edges of the base portion **44** to define a contact cavity **48**. An L-shaped guide wall **50** extends from the rear wall of the contact container portion **22** and a short, stop leg **52** extends from the side wall into the contact cavity **48** toward the guide wall **50**. A rectangular slot **54** is formed in the area defined by the rear wall, the side wall, the guide wall **50** and the stop leg **52** through the base portion **44**. A pair of barrier portions **56** extend upwardly from the base portion **44**, meeting the guide wall **50** and the stop leg **52**, providing protection for the contact against moisture which has gotten into the contact cavity **48**. A mandrel **58** is formed, in the extension of the contact cavity **48**, extending from the base portion **44**. The forward wall is angled to provide an overhang **38** having a slot **42** through which the terminal end **40** of the movable contact arm **14** extends.

The mandrel **58** is located in close proximity to the slot **42**. The cap portion **46** extends beyond the upper edge of the forward side and rear walls of the contact container portion **22** to provide a dependent portion. An arced wall **59** extends from the base portion **44** between the cap portion **46** and the rear wall of the contact container portion **22** and is raised slightly above the edge of the rear wall.

The rocker-actuator **12** is constructed of a plastic material having a generally pie or wedge shape configuration which is hollow and divided internally by a median wall. A shaft extends from a side wall of the rocker-actuator **12** at the apex of the triangle and has a flange and a rat guard extending therefrom.

A wedge shaped actuator arm or cam **62** extends outwardly from the shaft and has an arced engagement surface at its terminal end. A nib **66** extends from the apex of the triangle on the other side wall of the rocker-actuator **12** as shown in FIG. **1**.

The movable contact arm **14** is constructed of a flat, flexible material such as phosphor bronze and comprises a terminal **40** at one end from which an arced portion **68** extends to form a lever arm having a bight portion **70** which in turn is integral with a V-shaped portion having a contact **72** at its free end. The arced portion **68** is spaced from the terminal **40** to provide the necessary levering action.

The actuator portion **20** is assembled with the torsion spring **16** and the rocker-actuator **12**, forming the actuator assembly, by passing either end of the torsion spring **16** through the slot **28** into the channel which extends therefrom. The other end of the torsion spring **16** is passed into the cavity of the rocker-actuator **12** bearing against the median wall. The shaft of the rocker-actuator is passed through the slot formed in the inner wall **34** and the arcuate slot **32** in the partition wall **30**. The flange or rat guard **60** lies in the area between the partition wall **30** and the inner wall **34** partially closing the arcuate slot **32** and the slot formed in the inner wall **34**. The actuator arm **62** lies outside the actuator portion **20** in close proximity to the partition wall **30**. The nib **66** of the rocker-actuator **12** snaps into engagement with the aperture **36** in the side wall of the actuator portion **20**. The rocker-actuator **12** can now be rotated through an arc which also causes the actuator arm to roatate through an arc. The contact container portion **22** of the housing **10** has the contact arm **14** and the fixed contact **18** engaged to it thus forming the contact assembly. The upper portion of the terminal end **40** of the contact arm **14** is pushed into the slot **42** and the arced portion **68** partially circumscribes the mandrel **50** positioning the free contact end of the contact arm **14** within the area defined by the guide wall **50** and the stop leg **52**. The contact end of the fixed contact **18** is passed through the slot in the base portion **44** into the area defined by the guide wall **50** and the stop leg **52**. A terminal portion of the fixed contact **18** extends outside the housing **10**. The length of the contact arm **14** from the arced portion **68** to its contact end is free to move.

The contact assembly is attached to the actuator assembly, by ultrasonic welding, so that the actuator arm **62** overlies the bight portion **70** in close proximity thereto. The arced wall **59** closes the arcuate slot **32** in the partition wall **30** leaving just enough space for the shaft of the actuator to rotate. When a force is applied to the rocker-actuator, the actuator arm **62** engages the bight portion **70** and cams it downwardly causing the length of the contact arm **14** to flex, moving the contact portion of the contact arm **14**.

With reference to the foregoing description it is to be understood that what has been disclosed herein represents an embodiment of the invention and is to be construed as illustrative rather than restrictive in nature and that the invention is best described by the following claims;

I claim:

1. A switch assembly comprising a housing, an actuator, a single unitary flexible contact arm having a contact associated therewith, and having an arced portion looped back on itself to form a bight, and a fixed contact, the housing having a partition wall, the major portion of the actuator located on one side of the partition wall and the flexible contact arm and fixed contact located on the other side of the partition wall from the major portion of the actuator and an actuator cam associated with the actuator and located on the same side of the partition wall as the flexible contact arm in close proximity to the arced portion whereby movement of the actuator in one direction engages the actuator cam against the arced portion causing the contact arm and its contact to change position relative to the fixed contact.

2. A switch assembly as set forth in claim **1** wherein the partition wall separates the housing into two compartments and the actuator has a shaft extending therefrom, the shaft having a terminal end, the actuator cam projecting from the terminal end.

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