Dec. 29, 1959 R. C. WOOFTER 2,919,315

ELECTRIC SWITCH

Filed April 25, 1957 2 Sheets-Sheet 1

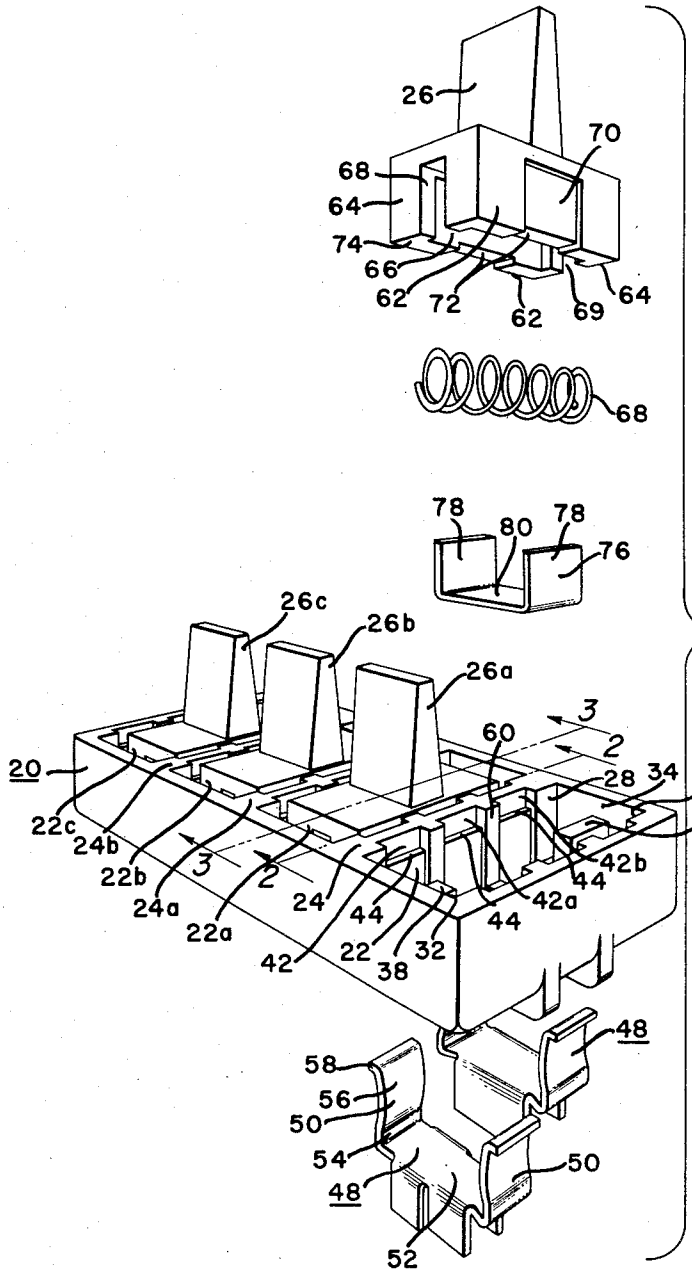


Fig. 1

INVENTOR.
Robert C. Woofter
BY
D. C. Staley
His Attorney

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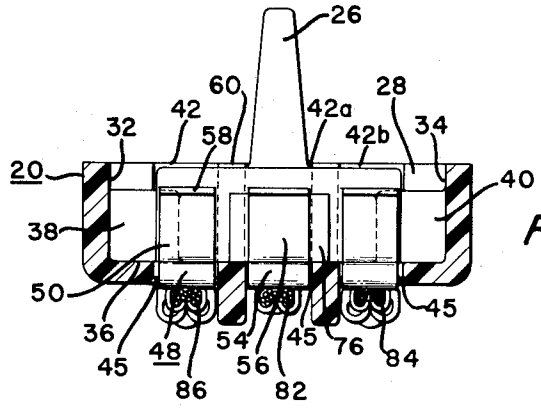


Fig. 2

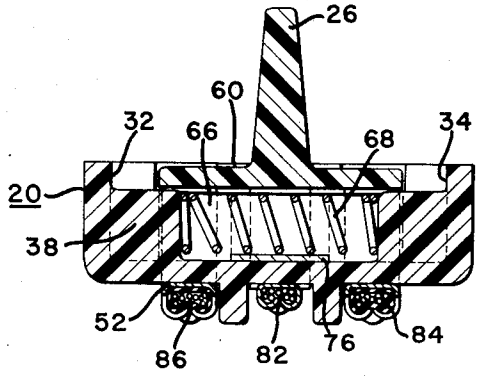


Fig. 3

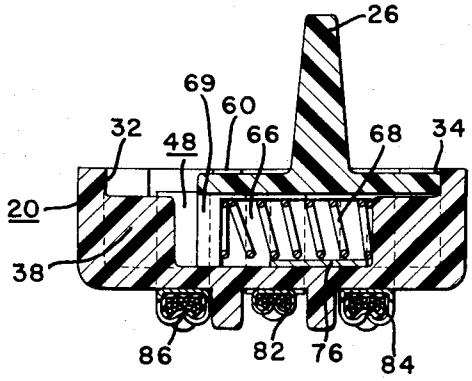


Fig. 4

INVENTOR.
Robert C. Woofter
BY D. C. Staley
His Attorney

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ELECTRIC SWITCH

Robert C. Woofter, Cortland, Ohio, assignor to General Motors Corporation, Detroit, Mich., a corporation of Delaware

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4 Claims. (Cl. 200—16)

This invention relates to electric switches and is more particularly concerned with switches of the manually operated type which employ slidable contact actuators.

It is an object of the present invention to provide a switch housing with a row of recesses or compartments and to provide a movable actuator in each of the recesses which has a contact bridging member arranged to slidably engage the stationary contacts that are disposed along the walls of the recesses.

A further object of the present invention is to provide a plurality of spaced contacts flush with the walls of a recess and to selectively engage the contacts with a bridging member that embraces and is flush with the external surfaces of an actuator that is slidable in the recess.

A still further object of the present invention is to maintain an actuator for a switch in a neutral position by a single spring that is contained with the actuator and is engageable with abutments that are located on the ends of a recess wherein the actuator is slidably movable.

Another object of the present invention is to provide an improved electric switch with snap-in stationary contacts which have portions disposed on opposite sides of a recess and an intermediate terminal portion interconnecting the contacting portions disposed external to the switch house.

A further object of the present invention is to provide a switch with stationary contacts that are located in recesses and spaced along the walls of a recess and to electrically interconnect the adjacent stationary contacts along one wall with adjacent stationary contacts along the opposite wall by a bridging member that is disposed in a recess in an actuator which slidingly engages the walls of the recess while the bridging member slidingly engages the stationary contacts.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein preferred forms of the present invention are clearly shown.

In the drawings:

Figure 1 is an exploded view showing the various parts of the switch according to the present invention in perspective.

Figure 2 is a cross-sectional view of the switch taken along line 2—2 in Figure 1.

Figure 3 is a cross-sectional view taken along line 3—3 in Figure 1.

Figure 4 is a cross-sectional view showing the switch parts in Figure 3 as moved to a second position.

In the drawings, the numeral **20** designates a switch housing which is preferably formed of insulating material such as a molded phenolic condensation product such as Bakelite. In the embodiment as shown, the housing **20** is provided with four parallel recesses **22**, **22A**, **22B** and **22C** which are located in a row in the housing **20** and separated from each other by walls **24**, **24A** and **24B**. Disposed in each of the recesses are

actuators **26**, **26A**, **26B** and **26C**. The actuator **26** is received in recess **22** and all the remaining actuators are identical. For the purposes of description only, actuator **26** and its function in recess **22** will be described.

The recess **22** is formed by two parallel walls **28** and **30** which are interconnected by end walls **32** and **34** and a bottom wall **36** shown on Figure 2. Integrally formed with and projecting outwardly from the bottom wall **36** and the end walls **32** and **34** are abutments **38** and **40**, respectively. The purpose of these abutments **38** and **40** will become hereinafter apparent. Located in each of the parallel walls **28** and **30** are three recesses **42**, **42A** and **42B** which are identical and spaced from one another as shown. Each of the recesses **42**, **42A** and **42B** has a ledge **44** therein, the purpose of which will become hereinafter apparent. Aligned with the recesses **42**, **42A** and **42B** and extending through the bottom wall **36** are openings **45** most clearly seen in Figure 2.

The openings **45**, the recesses **42** and the ledges **44** are arranged so the contact and terminal members **48**, shown in the lower portion of Figure 1, may be secured relative to the housing **20**. The contact and terminal members **48** are each generally U-shaped and have a pair of substantial parallel arms **50** which are interconnected by the terminal portion **52**. Each of the contact portions **50** have a straight portion **54** which is received in the opening **45**, a curved portion **56** which is curved as shown to project slightly from the recess **42** when the hook portion **58** is positioned behind the ledge **44** and the portion **52** is positioned external to the switch housing as shown in Figure 3. The contact and terminal members **48** are installed in the housing **20** by inserting the contact portions **50** through openings **45** until the portion **52** engages the external portion of the switch housing. When the member **48** is thus positioned and when the stress on the curved portion is relieved, the portion **58** will be tightly held in position on ledge **44** and the terminal portion **52** will be tightly maintained in position external to the housing **20**. As can be seen in Figures 2 and 3, when the members **48** are individually installed in the recesses **42**, **42A** and **42B**, the contacting portions **50** will be spaced and separated from the contacting portion **50** on the adjacent member **48** by ribs **60**.

Slidably movable within the recess **22** is the contact actuator **26** which is formed as shown in Figure 1. The contact actuator **26** has two parallel walls **62** which are spaced and interconnected by end walls **64**. The actuator **26** is formed to have a recess **66** wherein the coil spring **68** is received. The end walls **64** are notched as at **69**. These notches **69** are located and sized to permit the abutments **38** and **40** to pass through the end walls **64** and engage the spring **68** whenever the switch is moved from the neutral position shown in Figure 3 to the left or to the right as shown in Figure 4. When the actuator is thus moved as, for an example, to the position shown in Figure 4, the abutment **40** will be pressed against the spring **68**. The spring **68** will react against the right wall **64** of the actuator to constantly urge the actuator **26** to the right. Each of the parallel walls **62** of the actuator **26** have a recess **70** therein. The recesses **70** are located relative to each other and in alignment with notches **72** of the bottom wall **74** of the actuator **26** so a contacting bridging member **76** may be positioned to have its arm portions **78** received in the recesses **70** and its interconnecting portion **80** received in notches **72** and extend across the bottom of the recess. The portion **80** of the contact bridging member will also serve to maintain the spring **68** in the recess **66** when the actuator is assembled in the switch housing. The arm portions **78** of the contact bridging member are sized and have a thickness so

the arm portions 78 will be flush with the material of the actuator which forms parallel walls 62 when the bridging member is in position to embrace the actuator 26.

From the arrangement of the above parts, it is seen that when the actuator 26 is in a neutral position relative to the recess 22 in the switch housing as shown in Figure 3, the abutments 38 and 40 will extend through notches 69 so as to be in engagement with the spring 68. The parts of the switch are also arranged so when the actuator is in this position, the portions 78 of the contact bridging member will engage only the curved portion 50 of the stationary contact member 48 which is received in recess 42A. The actuator is of the width to be snugly received between the curved portions 50 of the contact terminal member 48 so that the parts will be held against rattling. In this connection, it is to be noted that when the actuator is in the neutral position as shown in Figure 3, then the bridging member 76 will be in engagement with the contact terminal member 48 that is in recess 42A. The insulating material of the actuator which is to the left and to the right of the bridging member 76 will engage the contact terminal members in recesses 42 and 42B. When the actuator is moved from the neutral position as shown in Figure 3 to the left as in Figure 4, then the arm portions 78 of the bridging member 76 will simultaneously engage the curved portions 50 of both of the contact terminal members 48 which are received in recesses 42A and 42B and thus compete the circuit between the four arms on the two contact terminal members 48. When this arrangement is employed and if the contact in the recess 42A is a common lead, then the circuit will be completed between the common lead 82 and the leads 84 which are connected to the terminal portions 52 of the terminal contact member 48 that is received in recess 42B. After the force which is used to move the actuator 26 to the left is removed, the spring 68 will automatically restore the actuator 26 to a neutral position relative to the switch housing. It is apparent that if the actuator is moved to the right, then the bridging member will complete the circuit between the contact terminals which are included in the recesses 42 and 42A and complete to a lead 86. If leads 84 and 86 are connected with a suitable reversible motor then the switch can be used to energize the motor in either direction of rotation. It is apparent further that when the switch 20 is installed in some suitable support, the actuators 26 may be miantained in position by some type of ornamental cover or bezel, not shown, which will cover the entire top surface of the switch housing 20 and which is provided with suitably located openings to permit the actuators to be moved to the left or right in the switch housing.

While the embodiments of the present invention as herein disclosed constitute preferred forms, it is to be understood that other forms might be adopted.

What is claimed is as follows:

1. In an electric switch, the combination comprising; a housing formed of insulating material including two spaced parallel walls interconnected by end walls and a bottom wall defining a recess, a plurality of fixed contact members having contact arm portions spaced to provide adjacent contacts along both of the parallel walls relative to which said contact arm portions are locked in engagement and having an integral terminal portion interconnecting said arm portions at a location externally of the recess, an abutment extending from each of said end walls and extending into said recess, an actuator of insulating material movable in said recess between said end walls, said actuator having a pair of parallel walls slidable relative to the parallel walls of the housing walls, end walls engageable with the end walls of the housing recess, a bottom wall slidable relative to the bottom wall of the housing recess, said actuator parallel walls forming a recess in the bottom wall of the actuator, said actuator having a notch in each of the end walls of the actuator arranged to permit passage of the abutments into the recess in the bottom wall of the actuator, a spring means provided in the actuator recess and engageable at opposite ends against said abutments for centering of said actuator relative thereto, and a U-shaped contact bridging member having arm portions received in recesses in the walls of the actuator and having an intermediate portion joining the arm portions disposed flush with the bottom walls of the actuator and extending transversely on one side of said spring means, said bridging contact member being adapted selectively to engage the contacts of said contact arm portions disposed along the parallel walls of the housing recess and connected integrally with said terminal portion for interconnecting said contact arm portions of said fixed contact members.

2. The combination as set forth in claim 1 wherein the contacts of said contact arm portions spaced along the parallel walls of the housing are curved and received in a recess so the contacts slightly extend outwardly from the surface of the parallel walls of the housing, said contacts having a bent end portion which is received in a notch in the recess in the parallel walls to secure the contacts in the recesses relative to which said contact arm portions are locked in engagement.

3. For an electric switch having a recess-forming housing means relative to which there is provided a slidable actuator carrying a contact bridge means necessary to interconnect wiring leads, a fixed contact member adapted to be connected directly to a wiring lead comprising, a pair of contact arm portions engageable by the contact bridging means of the actuator and extending substantially parallel to each other on opposite sides of the actuator at a location inside the recess-forming housing means, an intermediate terminal portion integral with said contact arm portions at a location outside the recess-forming housing means and adapted both for interconnecting contact arm portions of said fixed contact member and for connecting wiring leads directly to an integral portion of said fixed contact member, and at least one pair of segments of said integral terminal portion extending in a direction opposite to that of said contact arm portions and transverse thereto, said segments of said intermediate terminal portion having curved ends whereby the wiring lead is connected directly in engagement electrically between said segments and said intermediate terminal portion.

4. An electric switch, comprising, a housing formed of insulating material including spaced parallel walls interconnected by a pair of end walls as well as a bottom wall defining a recess, a pair of abutments projecting integrally from said bottom wall as well as said pair of end walls, said bottom wall having a plurality of openings therein extending in pairs in parallel relation intermediate to said spaced parallel walls, an integral ledge in each of three laterally-outwardly projecting extensions of the recess in said housing, each of said ledges extending upwardly from said bottom wall, said pairs of openings being in alignment with the extensions of the recess, a plurality of fixed contact members having a pair of contact arm portions adapted to extend through said pair of openings in the bottom wall and adapted to fit complementary to the laterally-outwardly projecting extensions of the recess, a curved segment on each contact arm portion extending slightly outwardly from the lateral extensions in the recess, bent end segments on each contact arm portion positioned against said ledge and adapted to hold each said fixed contact member tightly in position relative to said housing, an intermediate terminal portion integral with said contact arm portions at a location outside the recess formed by said housing and adapted both for interconnecting contact arm portions of each said fixed contact member and for connecting wiring leads directly to an integral portion of said fixed contact member, at least one pair of segments of said integral terminal portion extending in a direction opposite to that of said contact arm portions

and transverse both to said contact arm portions and to said pairs of openings through said bottom wall, said segments of said intermediate terminal portion having curved ends whereby a wiring lead is connectible directly in engagement electrically between said segments and said intermediate terminal portion at a location externally of the recess, an actuator of insulating material movable longitudinally in said recess between said end walls, a pair of parallel surfaces on said actuator adapted to be slidable relative to said parallel walls of the housing and having a recess centrally located relative to each surface, a body portion located in between said parallel surfaces terminating at opposite ends having longitudinally extending notches located and sized to permit said abutments to pass relative thereto, said body portion also having a central open space intermediate the parallel surfaces and connected at opposite ends with the longitudinally extending notches, a spring means receivable in the central open space of said actuator and engageable against said abutments so as to urge said actuator to a neutral central position relative to three pairs of contact arm portions of said fixed contact members, and

a single U-shaped contact bridging member embracing said actuator and adapted to be flush relative to parallel side surfaces thereof as well as electrically engageable relative to two pairs of curved segments of longitudinally adjacent contact arm portions, said single U-spaced contact bridging member extending across one side of space in said body portion of said actuator in which said spring means is retained thereby.

References Cited in the file of this patent

UNITED STATES PATENTS

1,189,116	Johnson	June 27, 1916
1,288,381	Cavanagh	Dec. 17, 1918
2,111,421	Faile	Mar. 15, 1938
2,226,850	Foster	Dec. 31, 1940
2,521,561	Batcheller	Sept. 5, 1950
2,564,957	Cermak	Aug. 21, 1951
2,710,317	Pearl	June 7, 1955

FOREIGN PATENTS

119,716	Austria	Nov. 10, 1930