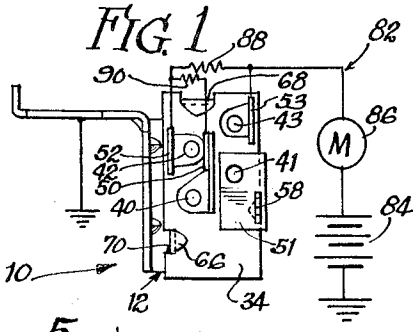
Sept. 6, 1966 W. N. SCHINK 3,271,536

ELECTRICAL SWITCH WITH CONTACT GROUNDING STRAP

Filed Nov. 8, 1965

FIG. 1



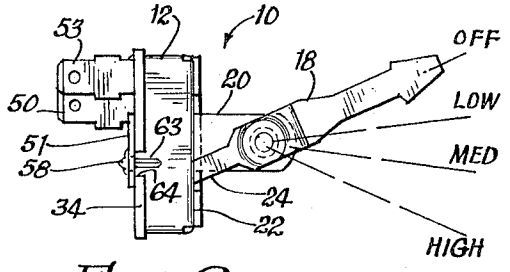


FIG. 2

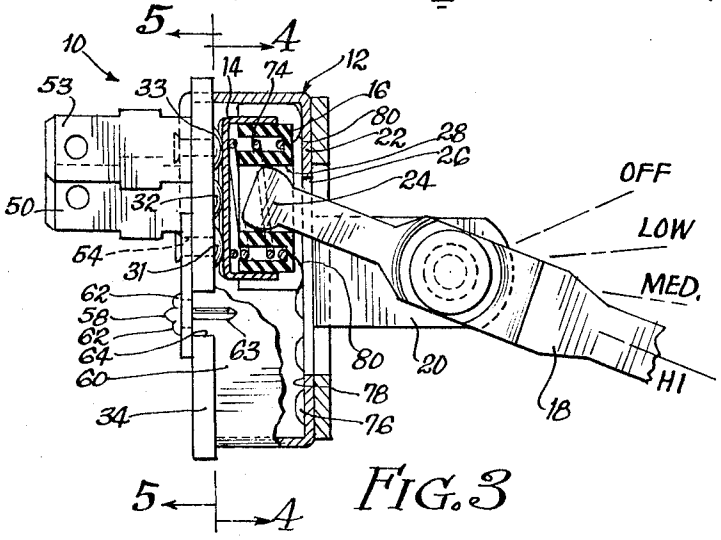


FIG. 3

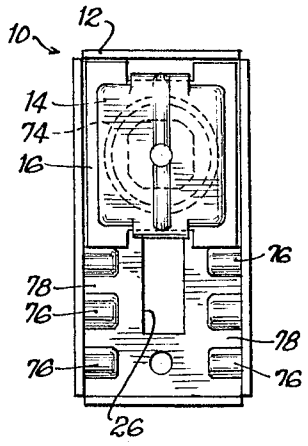


FIG. 4

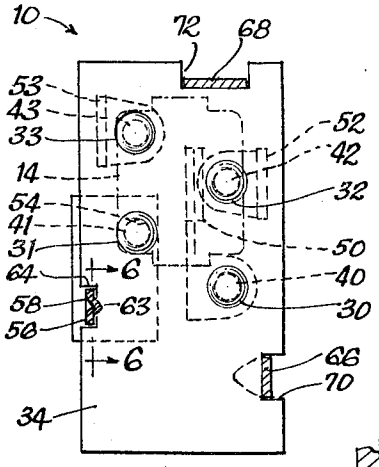


FIG. 5

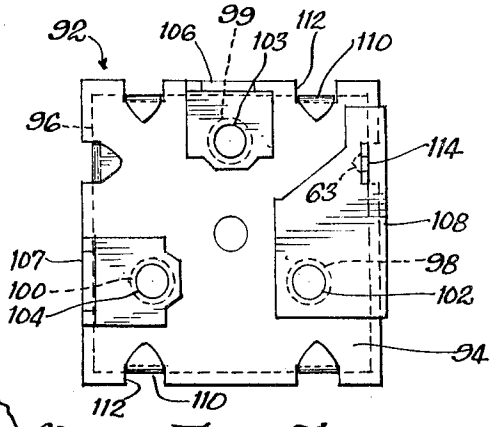


FIG. 7

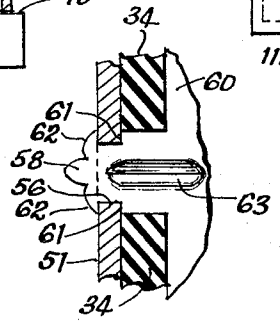


FIG. 6

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ELECTRICAL SWITCH WITH CONTACT GROUNDING STRAP

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Filed Nov. 8, 1965, Ser. No. 506,699
9 Claims. (Cl. 200—16)

This invention relates to electrical switches.

One object of the present invention is to provide a new and improved electrical switch having a strap securely connected between one of the contacts and the casing for grounding the contact to the casing.

A further object is to provide a new and improved switch of the foregoing character in which the grounding strap is firmly secured between a rivet connected to the contact and a tab projecting from the casing.

Another object is to provide a new and improved switch of the foregoing character in which the grounding strap is mounted on an insulating terminal board and is effective not only to ground one of the contacts, but also to secure the terminal board to the casing of the switch.

A further object is to provide such a new and improved switch in which the tab on the casing extends through a slot in the ground strap and is securely staked to the strap.

Another object is to provide such a new and improved switch in which the ground strap is securely clamped against a shoulder on the tab.

A further object is to provide a new and improved electrical switch in which the grounding of one of the contacts is accomplished at extremely low cost.

Further objects and advantages of the present invention will appear from the following description, taken with the accompanying drawings, in which:

FIG. 1 is a rear elevational view of a switch to be described as an illustrative embodiment of the present invention.

FIG. 2 is a side elevational view of the switch.

FIG. 3 is an enlarged fragmentary elevational view, partly in longitudinal section.

FIG. 4 is a rear elevational view with the terminal board removed, taken generally as indicated by the line 4—4 in FIG. 3.

FIG. 5 is a sectional view showing the front or inner side of the terminal board, the view being taken along the line 5—5 in FIG. 3.

FIG. 6 is a fragmentary enlarged section, taken generally along the line 6—6 in FIG. 5.

FIG. 7 is a rear elevational view of a modified switch constituting another embodiment of the present invention.

It will be seen that FIGS. 1–5 illustrate an electrical switch **10** which is of a type particularly well adapted for automotive services. However, it will be understood that the present invention is applicable to switches of various types.

The illustrated switch **10** comprises a casing **12** which is made of metal and thus is electrically conductive. A contactor **14** is movably mounted within the casing **12**. The contactor **14** is carried by a slider or carriage **16**, preferably made of plastic or other insulating material.

To move the carriage **16**, the switch **10** is provided with an operating lever **18** which is pivoted on a bracket **20** secured to the front wall **22** of the casing **12**. In FIGS. 1–5, the invention is illustrated in connection with a lever-action switch, but it will be understood that the invention is applicable to other types of switches. The operating lever **18** has an arm **24** which projects rearwardly through a slot **26** in the front wall **22**. The arm

24 is received in a slot or opening **28** formed in the carriage **16**.

The switch **10** is provided with a plurality of contacts which are adapted to be engaged by the contactor **14**. The number of contacts and the arrangement thereof may be varied, but the illustrated switch has four contacts **30**, **31**, **32** and **33**. Preferably, the contacts **30–33** are mounted on an insulating terminal board or plate **34** which is secured to the casing **12** so as to form a rear wall thereof. The illustrated contacts **30–33** are in the form of rounded heads formed on the front ends of rivets **40–43** which extend through the terminal board **34**. In the case of the rivets **40**, **42** and **43**, terminals in the form of prongs or lugs **50**, **52** and **53** are securely connected to the rear ends of the rivets. In accordance with the present invention, a grounding strap or plate **51** is securely connected to the rear end of the rivet **41**. A hole **54** is formed in the grounding strap **51** to receive the rivet **41**.

As shown to best advantage in FIGS. 1 and 3, the grounding strap **51** is in the form of a metal plate which is mounted against the rear side of the insulating board **34**. In addition to being secured to the rivet **41**, the grounding strap **51** is secured to the casing **12**, so that the contact **31** will be grounded to the casing. Preferably, the grounding strap **51** is formed with a slot or opening **56** to receive a tab or lug **58** which projects rearwardly from one side wall **60** of the casing **12**. It will be seen that the lug **58** is formed with rearwardly facing shoulders **61** for engaging the grounding strap **51**. The rear portion of the lug **58** is securely anchored to the grounding strap **51**. Thus, as illustrated to best advantage in FIGS. 1 and 6, the lug **58** has portions **62** which are staked or upset so as to overlap the rear side of the grounding strap **51**. The staked portions **62** are effective to clamp the grounding strap **58** very securely against the shoulders **61**. In this way, the grounding strap **51** is securely fastened to the casing **12**, as well as being electrically connected thereto. If desired, the lug **58** may be formed with a rib **63** which stiffens the lug so as to insure that it will not bend or crumple during the staking operation. The stiffening rib **63** extends longitudinally along the shouldered portion of the lug and also along the adjacent portion of the casing **12**. The grounding strap **51** also holds one side of the insulating board **34** against the casing **12**. It will be seen that the tab **58** extends through a slot **64** formed in one edge of the insulating board **34**.

As shown, the insulating board **34** is secured to the casing **12** at two other points by means of additional tabs **66** and **68** on the casing **12**. These tabs extend through slots **70** and **72** in the insulating board **34** and are bent inwardly behind the insulating board.

The contactor **14** is pressed rearwardly by means of a spring **74** which is interposed between the contactor and the carriage **16**. The illustrated spring is of the coiled compression type, but other types of springs may be employed. In addition to biasing the contactor rearwardly, the spring **74** biases the carriage **16** forwardly.

To locate and detain the carriage **16** in its various positions, the front wall **26** of the casing **12** is formed with alternate detent projections **76** and notches **78**. Detent projections **80** are formed on the carriage **16** to ride over the detent projections **76** and into the notches **78**. The spring **74** provides retaining force between the detent projections **80** on the carriage **16** and the detent elements **76** and **78** on the casing **12**.

In this case, the contactor **14** and the operating lever **18** are movable to four positions which are designated OFF, LOW, MEDIUM and HIGH. In the OFF position, the contactor **14** engages only the contact **30**. In the LOW position, the contacts **30** and **31** are engaged by the contactor. In the MEDIUM position, the contactor

engages the contacts **30**, **31** and **32**. In the HIGH position, the contactor **14** engages the contacts **31**, **32** and **33**. It will be understood that the invention is applicable to switches having other contact arrangements.

As already indicated, the contact **31** is grounded to the casing by the grounding strap or plate **51**. Inasmuch as the contactor **14** engages the contact **31** in the LOW, MEDIUM and HIGH positions, the contactor is grounded to these positions. Thus, in the successive positions, the contactor **14** forms connections to ground from the contacts **30**, **32** and **33**.

The illustrated switch is well adapted for use in circuits which call for the grounding of the contactor. A motor speed control circuit **82** of this type is illustrated by way of example in FIG. 1. The circuit is energized by a battery **84** having one side grounded. The casing **12** of the switch is also grounded. A motor **86** is connected between the ungrounded side of the battery **84** and the terminal **43**. A current limiting resistor **88** is connected between the terminals **52** and **53**. Another resistor **90** is connected between the terminals **50** and **53**.

When the contactor **14** engages the contacts **30** and **31**, both of the resistors **88** and **90** are in series with the motor **86**, so that the motor is operated at low speed. When the contactor **14** engages the contacts **30**, **31** and **32**, only the resistor **88** is in series with the motor, so that it operates at medium speed. When the contactor **14** engages the contacts **31**, **32** and **33**, both of the resistors **88** and **90** are out of circuit so that the motor **86** operates at high speed.

The grounding strap **51** forms a ground connection between the contact **31** and the casing **12** at extremely low cost. At the same time, the grounding strap and the staked tab **58** form a secure mechanical connection to hold the insulating terminal board **34** against the casing.

It will be understood that the invention is applicable to a wide variety of switches. Moreover, the invention may be embodied in various modified constructions. One such modified construction is shown in FIG. 7, in the form of a rotary-action switch **92** having an insulating terminal board **94** which is mounted on a metal casing **96**. The terminal board **94** carries a plurality of contacts **98**, **99** and **100** which include rivets **102**, **103** and **104**. Terminal lugs or prongs **106** and **107** are mounted on the rivets **103** and **104**. However, a grounding strap or plate **108** is secured to the rivet **102** and is mounted against the rear side of the insulating terminal board **92**.

To secure the terminal board **94** to the casing **96**, rearwardly projecting tabs **110** are formed on the casing. The tabs **110** extend through notches or slots **112** in the terminal board **94** and are bent over or folded behind the terminal board.

The illustrated grounding strap **108** is securely connected to the casing **96** by means of a shouldered tab or lug **114** which is essentially the same as the lug **58** of FIGS. 1–6. As before, the grounding strap **108** is slotted to receive the reduced rear end portion of the lug **114**. The rear end of the lug **114** is securely staked or upset against the rear side of the grounding strap **108** so as to clamp the strap against the shouldered portion of the lug.

In each of the illustrated embodiments, a secure electrical connection between the grounding strap and the casing is assured by the construction whereby the grounding strap is clamped between the staked portion and the shouldered portion of the lug on the casing. This joint is mechanically secure as well as being electrically efficient. The staked joint will remain tight and secure throughout the life of the switch. The connection between the staked lug and the grounding strap also holds the insulating terminal board against the casing.

Various other modifications, alternative constructions and equivalents may be employed without departing from the true spirit and scope of the invention, as exemplified in the foregoing description and defined in the following claims.

I claim:

1. An electrical switch,
comprising the combination of a metal casing,
an insulating board mounted on said casing,
a plurality of contacts in said casing and mounted on said insulating board,
a contactor movable in said casing into engagement with said contacts,
a metal strap mounted on said insulating board and connected to one of said contacts,
said strap having a slot therein,
and a tab projecting from said casing and through said slot,
said tab having an upset end portion for securing said strap to said tab to ground said one contact to said casing.

2. An electrical switch according to claim **1**,
in which said upset end portion comprises staked portions of said tab overlapping said strap.

3. An electrical switch according to claim **1**,
in which said tab comprises a shouldered portion engaging said strap,
said strap being clamped between said shouldered portion and said upset end portion.

4. An electrical switch according to claim **1**,
in which said strap is mounted on the opposite side of said insulating board from said casing and is effective to secure said insulating board to said casing.

5. An electrical switch according to claim **1**,
in which said one contact comprises a rivet extending through said insulating board,
said strap being secured to said rivet.

6. An electrical switch according to claim **1**,
in which said tab comprises a shouldered portion engaging said strap,
said upset end portion of said tab comprising staked portions overlapping the opposite side of said strap,
said strap being clamped between said shouldered portion and said staked portions.

7. An electrical switch,
comprising the combination of a metal casing,
an insulating board mounted on one side of said casing,
a plurality of contacts in said casing and mounted on said insulating board,
a contactor movable in said casing into engagement with said contacts,
a metal grounding strap mounted on said insulating board and connected to one of said contacts,
said strap having a slot therein,
and a tab projecting from said casing,
said insulating board having a slot therein for receiving said tab,
said tab having a shouldered portion received in said slot in said board,
said shouldered portion engaging the inner side of said grounding strap,
said tab having a reduced portion extending through said slot in said grounding strap,
said tab having staked end portions overlapping the outer side of said strap and clamping said strap against said shouldered portion of said tab,
said strap being mounted on the outer side of said insulating board and being effective to hold said board against said casing.

8. An electrical switch according to claim **7**,
in which said one contact comprises a rivet extending through said insulating board,
said strap being secured to said rivet.

9. An electrical switch according to claim **7**,
in which said tab is formed with a longitudinal stiffening rib.

No references cited.

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