Dec. 14, 1965 L. C. HOY ETAL 3,223,794

MULTIPLE POSITION ELECTRICAL SWITCH WITH CONTACT RAILS AND DUMMY CONTACT PRESSURE STABILIZERS

Filed Nov. 13, 1963 2 Sheets-Sheet 1

FIG. 3

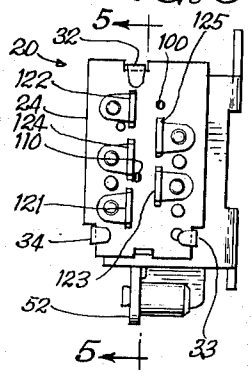

FIG. 2

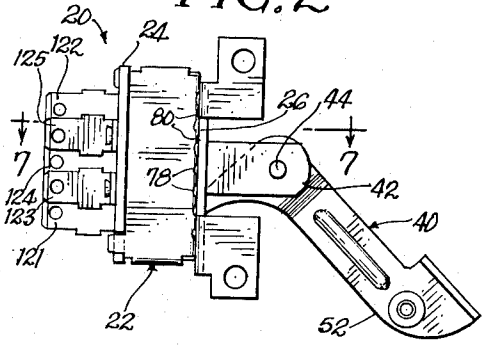

FIG. 1

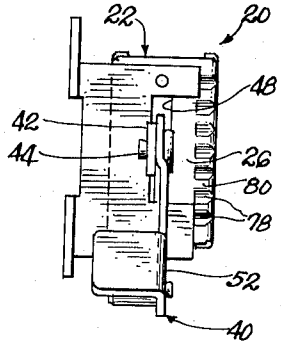

FIG. 4

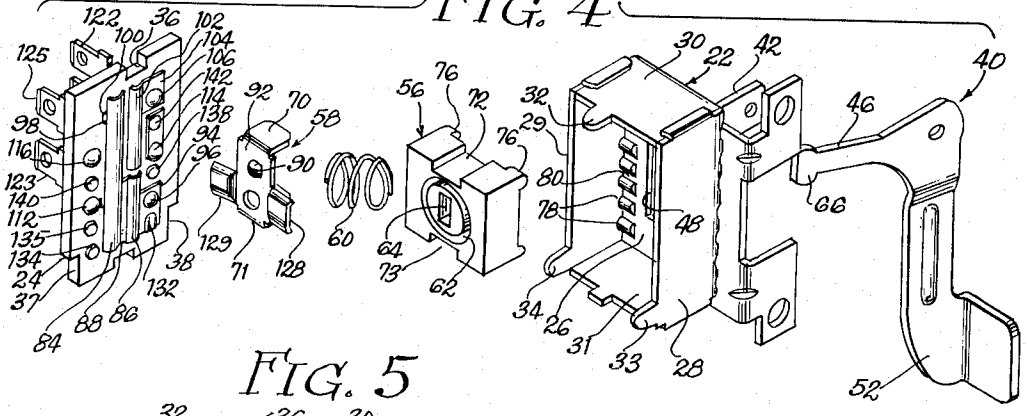

FIG. 5

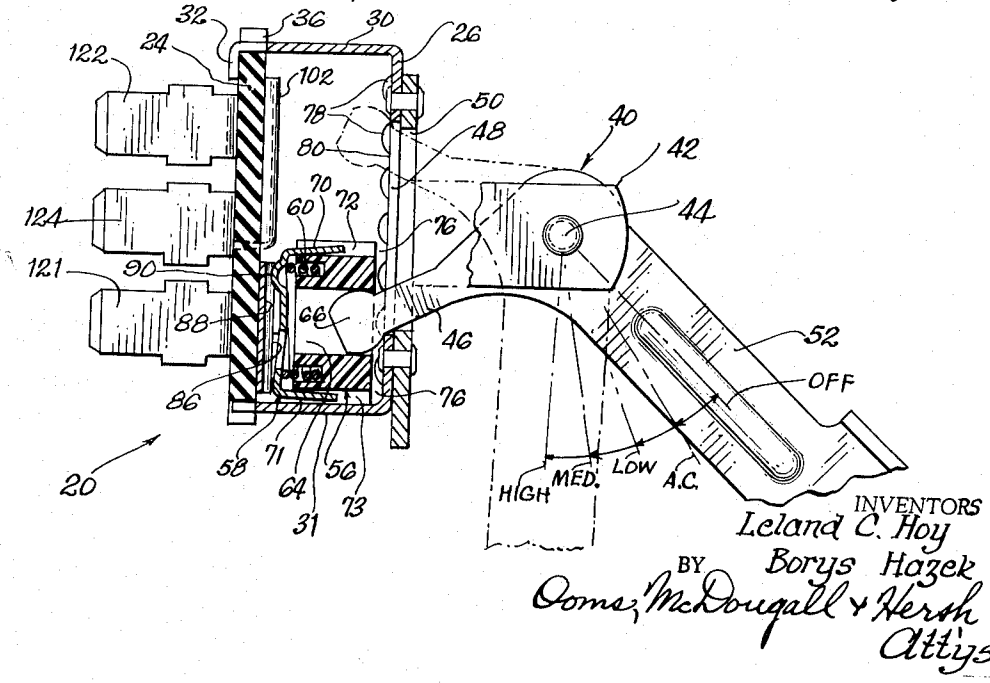

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FIG. 6

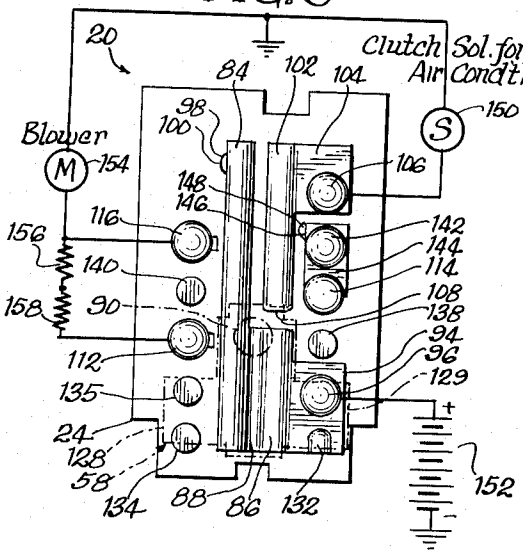
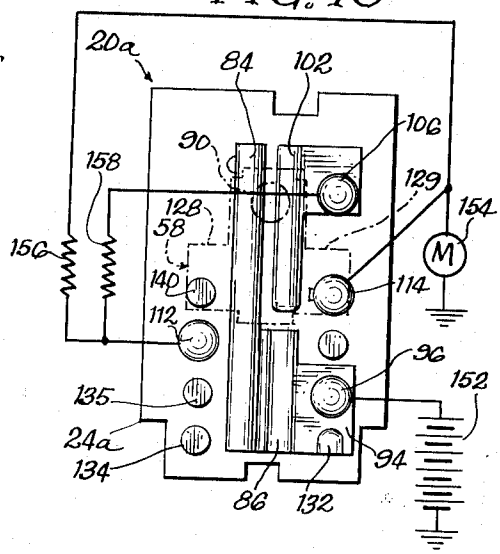


FIG. 10



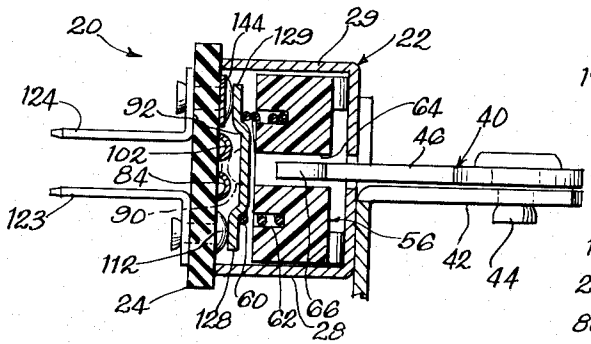


FIG. 7

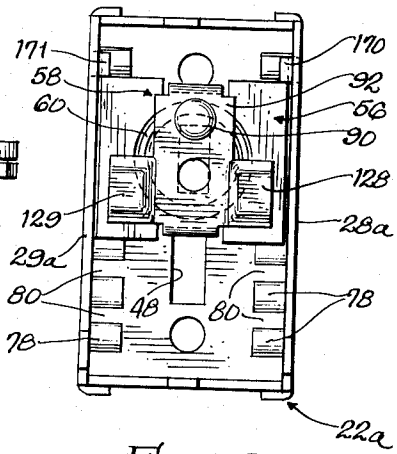


FIG. 9

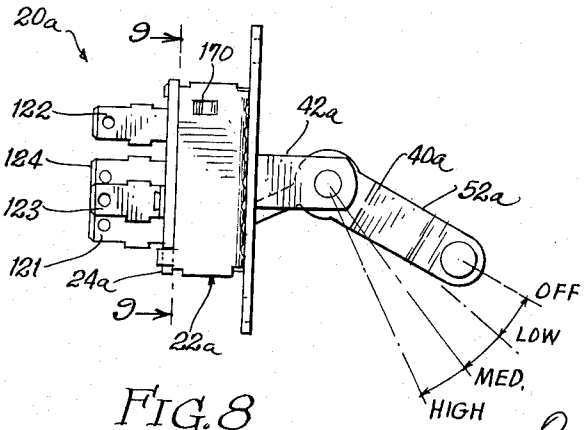


FIG. 8

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MULTIPLE POSITION ELECTRICAL SWITCH WITH CONTACT RAILS AND DUMMY CONTACT PRESSURE STABILIZERS

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Filed Nov. 13, 1963, Ser. No. 323,447
15 Claims. (Cl. 200—16)

This invention relates to electrical switches which may have a fairly large number of positions, such as four or five, for controlling a correspondingly large number of functions.

One object of the present invention is to provide new and improved electrical switches which are particularly well adapted for controlling the supply of electrical power to several different circuits.

Thus, a further and more specific object is to provide new and improved switches which are well adapted for use in an air conditioning system for automobiles, the system being such that the switch is called upon to control the operation of a compressor, and the operation and speed of a blower motor.

Another object is to provide a new and improved switch for supplying power to a plurality of circuits, the switch having an off position in which none of the circuits are energized, and a plurality of on positions in which various circuits are individually energized, the switch being constructed and arranged so as to energize one of the circuits in all of the on positions.

A further object is to provide a new and improved switch which is provided with a movable contactor having a first portion adapted to form a bridge between stationary elongated contact bars, and second and third portions adapted to engage a series of stationary contact points adjacent the contact bars.

A further object is to provide a new and improved switch of the foregoing character in which the three portions of the contactor are arranged in the form of a triangle, and in which the fixed elements of the switch are arranged to equalize the contact pressure among the three portions of the contactor, in all positions of the switch.

A still further object is to provide a new and improved switch of the foregoing character in which semiperforations or fixed dummy contacts are provided to engage portions of the contactor in certain positions of the switch so as to insure equalization of the contact pressure.

Another object is to provide such a new and improved switch which is versatile and dependable, yet highly economical in construction.

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

FIGS. 1, 2 and 3 are front, side and rear elevational views of an electrical switch to be described as an illustrative embodiment of the present invention.

FIG.4 is an exploded or disassembled perspective view of the switch of FIGS. 1–3.

FIG. 5 is a sectional view, taken generally along the line 5—5 in FIG. 3.

FIG. 6 is a somewhat diagrammatic view showing the contact plate and a typical circuit for the switch, the view also showing the movable contactor in phantom to illustrate the operation of the switch.

FIG. 7 is a cross sectional view taken generally along the line 7—7 in FIG. 2.

FIG. 8 is a side elevational view of a modified switch.

FIG. 9 is an enlarged rear view of the switch of FIG. 8 with the contact plate removed, the view being taken generally as indicated by the line 9—9 in FIG. 8.

FIG. 10 is a view similar to FIG. 6 but showing the modified switch of FIGS. 8 and 9.

As already indicated, FIGS. 1–7 illustrate an electrical switch 20 having a casing or housing 22 which may be made of metal or other suitable material. The rear side of the illustrated casing 22 is closed by a terminal member or plate 24, which may be made of plastic or other insulating material.

The illustrated casing 22 has a front wall 26, a pair of side walls 28 and 29, and a pair of end walls 30 and 31. The side and end walls 28–31 extend rearwardly from the front wall 26.

The insulating terminal plate 24 may be suitably secured to the open rear side of the casing 22. In this case, the casing 22 is formed with rearwardly projecting tabs or ears 32, 33 and 34 which are bent inwardly behind the terminal plate 24. It will be seen that the edges of the terminal plate 24 are formed with slots or notches 36, 37 and 38 for receiving the ears 32–34.

The switch 20 is provided with an operating member in the form of a lever 40 which is swingably mounted on a bracket 42 secured to the front wall 26 of the casing 22. A rivet or other fastener 44 provides a pivot between the lever 40 and the bracket 42. It will be seen that the lever 40 has an inner arm 46 which extends into the casing 22 through a slot or opening 48 in the front wall 26 thereof. A slot 50 may be formed in the bracket 42, in alignment with the slot 48. The lever 40 has an outer arm 52 whereby the switch 20 may be operated, either manually or automatically.

Within the casing 22, the illustrated switch 20 is provided with a movable carriage 56 which preferably is made of plastic or other insulating material. A conductive contactor 58 may be mounted on the carriage 56 so as to be movable therewith. The contactor 58 may be made of copper or other suitable metal.

It will be seen that the contact plate 24 supports a plurality of contact members or elements, which will be described in detail presently. A spring 60 is provided between the insulating carriage 56 and the contactor 58 to bias the contactor rearwardly against the contact members on the insulating contact plate 24. At the same time, the spring 60 biases the carriage 56 forwardly against the front wall 26 of the casing 22. In this case, the spring 60 is of the compression type and is in the form of coiled wire. An annular seat 62 may be formed in the rear side of the carriage 56 to receive and locate the spring 60.

The inner arm 46 of the lever 40 is connected to the carriage 56 in such a manner that the swinging movement of the lever will cause the carriage 56 to slide longitudinally within the casing 22. The side walls 28 and 29 confine the carriage 56 and serve as guides for such longitudinal movement of the carriage. As shown, the carriage 56 is formed with a slot or socket 64 for receiving the inner arm 46 of the lever 40. The illustrated arm 46 has an enlarged and rounded end portion 66 which is adapted to slide and rock within the slot 64.

The contractor 58 is retained and guided on the carriage 56 by means of a pair of flanges or tabs 70 and 71 which project forwardly from the contractor, generally at right angles thereto. Slots or notches 72 and 73 are formed in the upper and lower sides of the carriage 56 for slidably receiving the flanges 70 and 71.

A detenting action may be provided between the carriage 56 and the casing 22 so that the carriage will be detained in each of its operating positions. As shown, the carriage 56 is provided with a plurality of rounded detent projections 76 which extend forwardly therefrom. The illustrated carriage 56 has four such detent projections, located at the four front corners of the carriage

56 which is generally rectangular in shape. Alternate detent projections 78 and grooves 80 are formed in the front wall 26 of the casing 22. In this case, the detent projections 78 and grooves 80 are sufficiently numerous to detain the carriage 56 in five different operating positions. The detent projections 78 may be stamped or otherwise formed rearwardly from the front wall 26. The detent projections 78 and grooves 80 are so located on the front wall 26 of the casing 22 that the detent projections 76 on the carriage 56 must pass over the projections 78 and across the grooves 80 as the carriage 56 is moved longitudinally within the casing 22. The spring 60 exerts a forward biasing force on the carriage 56 so that the detent projections 76 are detained in the successive detent grooves or recesses 80.

As already mentioned, the illustrated switch 20 has five different operating positions, which are designated OFF, AC, LOW, MEDIUM and HIGH in FIG. 5. The switch is particularly well adapted for use in connection with an air conditioning system for automobiles. Thus, the initials AC stand for air conditioner, while the terms low, medium and high refer to the various speeds of the blower employed in connection with the air conditioner. Of course, the switch is applicable to many other types of service.

It now will be in order to describe the details of the contactor 58, and the various contact members on the insulating contact plate 24. The contactor and the various contact members are constructed and arranged so that various circuits may be established or energized in the different positions of the switch.

In the illustrated switch construction, there is one contact member 84 which is in contact with the contactor 58 in all of the operating positions of the switch 20. As shown, the contact member 84 is in the form of an elongated bar or rail which extends parallel to the direction of movement of the contactor 58. The illustrated rail 84 is cylindrically curved in cross section and is generally in the form of a half cylinder, as shown to advantage in FIG. 7.

The second rail or bar 86 is formed parallel to and adjacent one end portion of the rail 84. The rail 86 is also generally in the form of a half cylinder. The two rails 84 and 86 provide a groove or trough 88 therebetween. This groove or trough 88 is adapted to receive and guide the contact point 90 which is formed on the contactor 58. Preferably, the contact point 90 is hemispherical in form. The illustrated contactor 58 is generally in the form of a plate or body 92 made of sheet copper or other metal. The contact point 90 is stamped or otherwise formed rearwardly from the plate 92. It will be seen that the contact point 90 is located near the upper end of the plate 92, which is generally rectangular in shape. The contact point 90 is adapted to slide along the parallel bars or rails 84 and 86. One side portion of the contact point 90 engages the rail 84 in all of the positions of the switch. However, the contact point 90 engages the rail 86 in the off position only.

In the illustrated construction, the rails 84 and 86 are formed integrally, from a single piece of sheet copper or other metal. Thus the rails 84 and 86 are connected together both electrically and mechanically. It will be seen that a tab or lug 94 extends laterally from one side of the rail 86. The tab 94 may be secured against the insulating terminal plate 24 by means of a rivet 96.

Means may also be provided to prevent the rails 84 and 86 from being swung along the contact plate 24, about the rivet 96. In this case, as shown, the rail 84 is formed with a tab or ear 98 which is received in a hole or recess 100 in the insulating plate 24.

The illustrated switch 20 is provided with another bar or rail 102 which is engaged by the contactor 58 in all of the positions of the switch except the off position. As in the case of the rails 84 and 86, the rail 102 is generally in the form of a half cylinder. It will be seen that the

rail 102 is substantially parallel to the rail 104 and is arranged end to end with respect to the rail 86. It will be understood that the rail 102 is insulated from the rails 84 and 86. The rail 102 is suitably secured to the insulating plate 24. As shown, the rail 102 is formed with a laterally projecting tab or lug 104 which is secured to the plate 24 by means of a rivet 106. To prevent the rail 102 from swinging about the rivet 106, one end of the rail 102 is formed with an ear or tab 108 which is received in a hole or recess 110 formed in the insulating plate 24.

The contact point 90 on the contactor 58 is adapted to slide between the rails 84 and 102 in the various on positions of the switch. Thus, in all of such positions, the contact point 90 forms a connecting bridge between the rails 84 and 102.

In addition to the rails 84, 86 and 102, the illustrated contact plate 24 is provided with a plurality of contact points 112, 114 and 116 arranged on opposite sides of the parallel lines of the rails. It will be seen that the contact points 112 and 116 are on the same side of the rail 84 and are along a line parallel to the rail 84. The contact point 114 is on the opposite side of the rails 84 and 102 and is disposed along a line which also includes the rivets 96 and 106. The contact points 112, 114 and 116 may be in the form of rivets, similar to the rivets 96 and 106. All of the contact points are preferably rounded and generally hemispherical in shape.

The various electrical circuits controlled by the switch may be connected to the rivets or contact points 96, 112, 114, 116 and 106. For this purpose, terminal lugs or prongs 121, 122, 123, 124 and 125 are connected to the respective rivets 96, 106, 112, 114 and 116. The terminal prongs 121–125 are arranged in a regular pattern and are adapted to receive a plug or other connector.

The illustrated contactor 58 has a pair of contact segments or arms 128 and 129 which extend laterally from the main plate portion or body 92 of the contactor. It will be seen that the arms 128 and 129 are formed at the opposite end of the body 92 from the contact point 90. The arm 128 is adapted to engage the contact points 112 and 116 on the insulating contact plate 24. The other arm 129 is adapted to engage the contact point 114. It will be seen that the arms 128 and 129 are offset rearwardly from the body portion 92. In this way, the body portion 92 is prevented from engaging the rails 84, 86 and 102.

In FIG. 6, the movable contactor 58 is shown in broken lines in its OFF position. It will be seen that the contact point 90 engages the rails 84 and 86 but is out of engagement with the rail 102. The arm 129 of the contactor engages the contact or pad 132 which may be an independent contact point, for energizing an independent circuit, but is illustrated as being formed as a dummy contact on the metal tab 94 adjacent the rivet 96. To engage the other arm 128 of the contactor 58, the insulating plate 24 is provided with a contact or pad 134 which is opposite the pad 132. The pad or boss 134 may be formed as an independent contact point, but, as illustrated, is in the form of a semi-perforation punched forwardly from the insulating plate 24. Thus, the illustrated pad 134 is made of insulating material. The effect of the pads 132 and 134 is to maintain the contactor 58 on an even keel and in its proper position, generally parallel to the insulating plate 24, so as to insure that the pressure due to the spring 60 will be evenly distributed upon the three elements of the contactor. These three elements are the contact point 90 and the arms 128 and 129. In the OFF position of the switch, the contactor 58 is connected electrically to the terminal prong 121, and is not connected to any of the other terminal prongs 122–125.

In the next position of the switch, designated by the initials AC in FIG. 5, the contact point 90 is moved upwardly from the position shown in FIG. 6, so that the contact point engages the lower end of the rail 102 as well as the rail 84. Thus, the contact point 90 estab-

lishes a circuit between the rails **84** and **102**, so that an electrical connection is provided between the terminal prong **121** and the prong **122**. This connection is maintained in all of the other ON positions of the switch, inasmuch as the contact point **90** rides along between the rails **84** and **102**. In the AC position of the switch, the arm **129** of the contactor **58** engages the rivet **96**, while the arm **128** engages a contact or pad **135**, similar to the pad **134**. While the pad **135** may be an independent contact, it is shown as an insulating semi-perforation.

In the next position of the switch, designated LOW in FIG. 5, the contact point **90** continues to establish a connection between the rails **84** and **102**. The contactor arm **128** engages the contact point **112**, while the arm **129** engages a contact or pad **138**, similar to the pads or bosses **134** and **135**. Thus, the arm **128** establishes a circuit between the terminal prong **121** and the prong **123**.

In the fourth or MEDIUM position of the switch, the arm **129** of the contactor engages the contact point **114**, while the arm **128** engages still another contact or pad **140**, similar to the pads **134**, **135** and **138**. Thus, a circuit is established between the terminal prong **121** and the prong **124**.

In the fifth or HIGH position of the switch, the arm **128** of the contactor engages the contact point **116**, while the arm **129** engages the contact point **142**, illustrated as being made of metal. Thus, there are four points of metal-to-metal contact between the contactor and the fixed contact structure. Two of such points of contact are between the arms **128** and **129** and the contact points **116** and **142**, respectively. The other two points of contact are between the opposite side portions of the contact point **90** and the rails **84** and **102**. Nevertheless, the spring pressure is evenly distributed among the four points of contact. While the contact point **142** may be formed independently for connection to an independent circuit, it is illustrated as being formed on a metal plate **144** which is secured to the insulating plate **24** by the contact rivet **114**. To prevent the metal plate **144** from rotating about the rivet **114**, the plate **144** is formed with a tab **146** which extends rearwardly into an opening or recess **148** in the insulating plate **24**.

FIG. 6 illustrates a typical electrical circuit which may be employed in connection with the switch. In this circuit, the switch is employed to control the energization of a clutch solenoid **150** for an air conditioning compressor. When the solenoid is energized, the compressor is driven through a clutch by the engine of the vehicle which carries the air conditioning system. It will be seen that the clutch solenoid **150** is adapted to be connected to the terminal prong **122**, and thence to the rivet **106** and the rail **102**. The other side of the clutch solenoid **150** may be grounded.

Power is supplied to the switch from a battery **152** or some other suitable source of power. As shown, the positive terminal of the battery is connected to the terminal prong **121** and thence to the rivet **96** and the rails **84** and **86**. The negative terminal of the battery is grounded.

Thus, the clutch solenoid **150** is energized in all of the positions of the switch, except the off position. In all of the on positions, the contact point **90** forms a bridge between the rails **84** and **102**.

The switch **20** is also employed to control the energization and speed of a motor **154** which drives the blower for the air conditioning system. One side of the motor **154** is connected to the terminal prong **125** and thence to the contact point **116**. Thus, in the fifth or high position of the switch, the motor **154** is fully energized from the battery **152** by the connection established between the contactor arm **128** and the contact point **116**. The fact that the contactor arm **129** also energizes the contact point **142** does not affect the operation of the motor **154**, because the motor is already fully energized through contactor arm **128** and the contact point **116**.

A current limiting resistor **156** is connected between the terminal prongs **125** and **124**. Thus, the motor **154** is energized through the resistor **156** when the contactor arm **129** engages the contact point **114** in the fourth or medium position of the switch. The introduction of the resistor **156** into the circuit reduces the speed of the motor **154**.

A second resistor **158** is connected between the terminal prongs **124** and **123**. When the contactor arm **128** engages the contact point **112** in the second or low position of the switch, the motor **154** is energized through both of the resistors **156** and **158**, connected in series, so that the motor is operated at a low speed.

FIGS. 8, 9 and 10 illustrate a slightly modified switch **20***a* which has only four positions, corresponding to the first four positions of the switch **20**. Most of the components of the switch **20***a* are identically the same as the corresponding components of the switch **20**, and to that extent the components have been given the same reference characters in FIGS. 8–10 as in FIGS. 1–7. Thus, it will not be necessary to repeat the description of these components. Only the differences between the switches **20** and **20***a* need be described in detail.

The switch **20***a* has a slightly modified operating lever **40***a* having an outer arm **52***a* which differs in shape from the arm **52** but is essentially the same in functions. The lever **40***a* is swingably mounted on a bracket **42***a* which is the same in function as the bracket **42**, although differing to some extent in shape.

In FIG. 8, the four operating positions of the lever **40***a* are designated off, low, medium and high. These positions correspond to the first four positions of the lever **40** in FIG. 5, although the designations of the positions are somewhat different.

The carriage **56** is movable to four positions which are the same as the first four positions of the carriage in the switch of FIGS. 1–7. In the modified switch **20***a* the carriage **56** is prevented from moving to the fifth position by a pair of stops **170** and **171** which are struck inwardly from the side walls **28***a* and **29***a* of the casing **22***a*.

The switch **20***a* has a slightly modified insulating contact plate **24***a* on which the arrangement of the various contact elements is simplified to some extent, by the omission of various components. Thus, the contact point **116** and the corresponding terminal prong **125** are omitted. The contact point **142** and the plate **144** are also omitted.

FIG. 10 illustrates a somewhat modified electrical circuit in which the clutch solenoid **150** is omitted. Thus, the switch is employed merely to control the energization and speed of the blower motor **156**. In this case, the blower motor **156** is connected between the contact point **114** and the ground. It will be understood that the connection between the contact point **114** and the motor **156** is established by way of the terminal prong **124**. The connection of the battery **152** is the same in FIG. 10 as in FIG. 6. However, the resistor **156** is connected between the contact points **114** and **112**, by way of the terminal prongs **124** and **123**. The second resistor **158** is connected between the contact point **112** and the rivet **106**, by way of the prongs **123** and **122**.

In the OFF position of the switch **20***a*, the contactor **58** is in its lowermost position in which the contact point **90** engages the rails **84** and **86**. The arms **128** and **129** engage the pads or bosses **134** and **132**.

In the second or LOW position of the switch, the contact point **90** forms a bridge between the rails **84** and **102**, so that a circuit is established between the battery **152** and the motor **156** through the contactor **58**, the rails **84** and **102**, the rivet **106**, the prong **122** and the resistors **158** and **156**. The arms **128** and **129** engage the insulating pad **134** and the rivet **96**.

In the third and fourth positions of the switch the contact point **90** continues to form a bridge between the rails **84** and **102**. In the third or MEDIUM position, the arm **128** engages the contact point **112**, so that the resistor

158 is short-circuited and the motor 154 is energized through the resistor 156.

In the fourth or HIGH position of the switch 20*a*, the contactor arm 129 engages the contact point 114 and thereby establishes a direct connection to the motor 154, so that it will operate at full speed. In FIG. 10, the contactor 58 is shown in broken lines in its fourth position.

In both of the illustrated switches, the contact point 90 rides freely between the rails 84 and 102, so that two points of contact are maintained between the contact point and the rails. The contactor arms or segments 128 and 129 afford two more points of contact with the fixed contact structure, making four points of contact with the contactor. It will be noted that the contact point 90 and the arms 128 and 129 are arranged in a triangle. Thus, the spring pressure upon the contactor is evenly distributed among the three contact members 90, 128 and 129. The ability of the contact point 90 to ride freely between the rails insures that good contact will be maintained at all four points of contact between the contactor and the fixed contact structure.

It will be understood that the fixed contact rails may be segmented in various ways to meet various circuit requirements. Moreover, the fixed contact points may be varied in number and position so that a wide variety of switching functions may be performed. Similarly, the fixed dummy contacts may be varied in number and position. It will be understood that the shape and position of the contact members on the contactor may also be varied.

The present invention makes it possible to perform various complicated combinations of switching functions in which several circuits are to be selectively energized in various positions of the switch, and in which at least one circuit is to be continuously energized for two or more positions. At the same time, the present invention makes it possible to provide switches having these great capabilities at low cost and with assurance of long life and dependable operation.

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

We claim:

1. In an electrical switch,
the combination comprising a housing having a fixed insulating wall member,
a track comprising first and second fixed elongated substantially parallel conductive contact rails mounted on said insulating wall member within said housing,
at least one of said rails being segmented into a plurality of components,
a conductive contactor movable within said housing and having a first contact member riding in said track between said rails and slidably engaged with said rails to establish a closed circuit therebetween,
actuating means for moving said contactor along said track and within said housing,
at least two fixed conductive contacts mounted on said insulating wall member within said housing,
said contacts being on opposite sides of said track and spaced laterally from said rails,
and second and third contact members on said contactor and disposed on opposite sides of said track for engagement with said respective contacts,
said contactor having spring means biasing said contactor toward said insulating wall member and against said rails and said contacts,
said first, second and third contact members of said contactor being disposed in a triangular pattern to equalize the spring pressure among said first, second and third contact members.

2. In an electrical switch,
the combination comprising a housing having a fixed insulating wall member,
a track comprising first and second fixed elongated substantially parallel conductive contact rails mounted on said insulating wall member within said housing
at least one of said rails being segmented into a plurality of components,
a conductive contactor movable within said housing and having a contact member riding in said track between said rails and slidably engaged with said rails to establish a closed circuit therebetween,
said contactor having spring means biasing said contactor toward said insulating wall member and against said rails,
and actuating means for moving said contactor along said track and within said housing.

3. In an electrical switch,
the combination comprising a housing having a fixed insulating wall member,
a track comprising first and second fixed elongated substantially parallel conductive contact rails mounted on said insulating wall member within said housing,
at least one of said rails being segmented into a plurality of components,
a conductive contactor movable within said housing and having a first contact member riding in said track between said rails and slidably engaged with said rails to establish a closed circuit therebetween,
actuating means for moving said contactor along said track and within said housing,
at least one fixed conductive contact mounted on said insulating wall member within said housing on one side of said track and spaced laterally therefrom,
and a second contact member on said contactor and disposed on said one side of said track for engagement with said contact,
said contactor having spring means biasing said contactor toward said insulating wall member and against said rails and said contact.

4. A switch according to claim 1,
in which said first contact member takes the form of a curved contact point projecting from said contactor and slidably engaging both of said rails simultaneously.

5. A switch according to claim 1,
in which each of said contact rails projects from said insulating wall member and is cylindrically curved in cross section.

6. A switch according to claim 1,
in which each of said contact rails projects from said insulating wall member and is cylindrically curved in cross section,
and in which said first contact member takes the form of a curved contact point projecting from said contactor and slidably engaging both of said contact rails simultaneously.

7. A switch according to claim 1,
in which said fixed contacts are in the form of contact points projecting from said insulating wall member,
and in which said insulating wall member is provided with at least one insulating dummy contact boss projecting therefrom on the opposite side of said track from one of said contact points to equalize the spring pressure among said rails, said one contact point and said boss.

8. A switch according to claim 1,
in which each of said rails projects from said insulating wall member and is cylindrically curved in cross section,
and in which said first contact member is in the form of a curved convex member projecting from said contactor and slidably engaging both of said rails simultaneously,
and in which said fixed contacts are in the form of

curved contact points projecting from said insulating wall member,

said insulating wall member being provided with at least one insulating dummy contact boss projecting therefrom and disposed on the opposite side of said track from one of said contact points to equalize the spring pressure among said rails, said one contact point, and said boss.

9. A switch according to claim **2**,

in which each of said rails projects from said insulating wall member and is cylindrically curved in cross section,

and in which said contact member takes the form of a curved contact point projecting from said contactor and slidably engaging both of said rails simultaneously.

10. A switch according to claim **3**,

in which each of said rails projects from said insulating wall member and is cylindrically curved in cross section,

and in which said first contact member takes the form of a convex member projecting from said contactor and slidably engaging both of said rails simultaneously,

said fixed contact being in the form of a contact point projecting from said insulating wall member.

11. A switch according to claim **1**,

in which each of said rails projects from said insulating wall member and is cylindrically curved in cross section,

and in which said first contact member takes the form of a convex member projecting from said contactor and slidably engaging both of said rails simultaneously,

said fixed contacts being in the form of contact points projecting from said insulating wall member.

12. A switch according to claim **2**,

in which said contact member takes the form of a curved contact point projecting from said contactor and slidably engaging both of said rails simultaneously.

13. A switch according to claim **2**,

in which each of said rails projects from said insulating wall member and is cylindrically curved in cross section.

14. A switch according to claim **3**,

in which said first contact member takes the form of a curved contact point projecting from said contactor and slidably engaging both of said rails simultaneously.

15. A switch according to claim **3**,

in which each of said rails projects from said insulating wall member and is cylindrically curved in cross section.

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