

Aug. 19, 1969

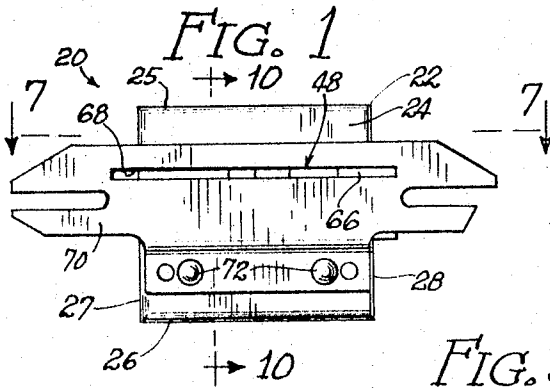
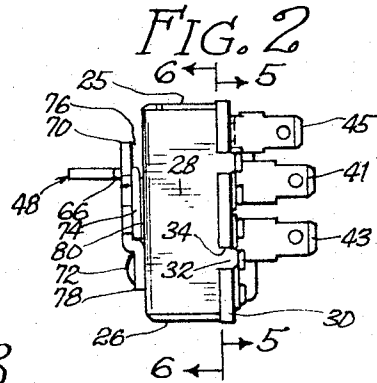
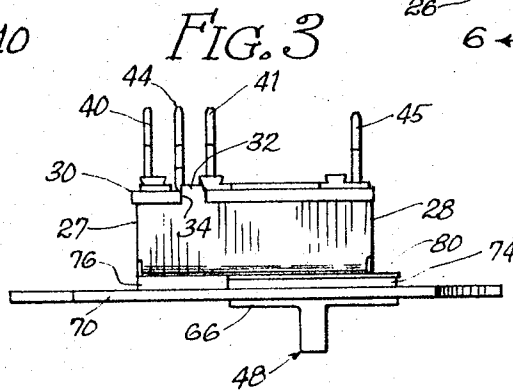
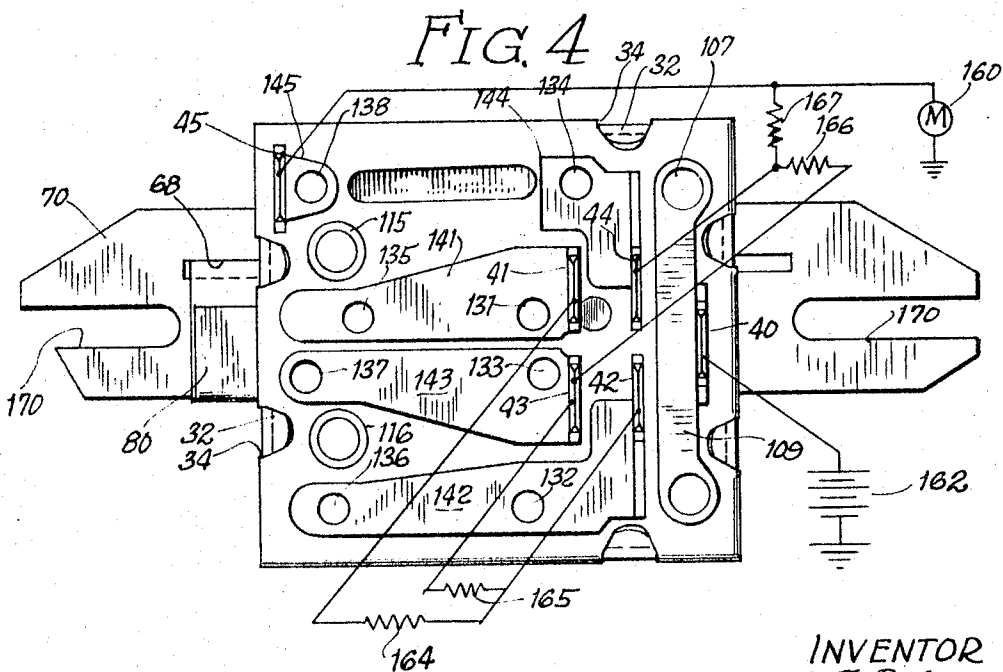
M. F. BEDOCS

3,462,564

HIGH PRECISION MULTIPOSITION ELECTRICAL SWITCH

Filed March 6, 1968

3 Sheets-Sheet 1



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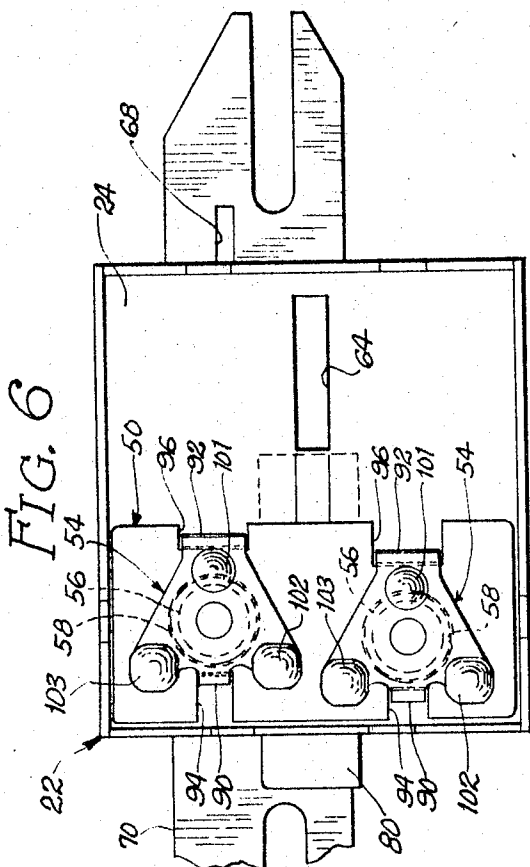
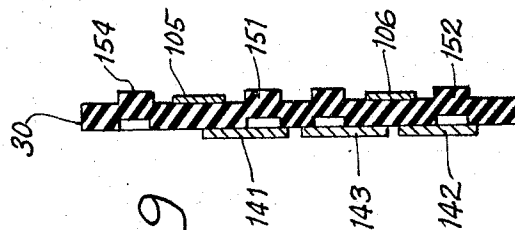
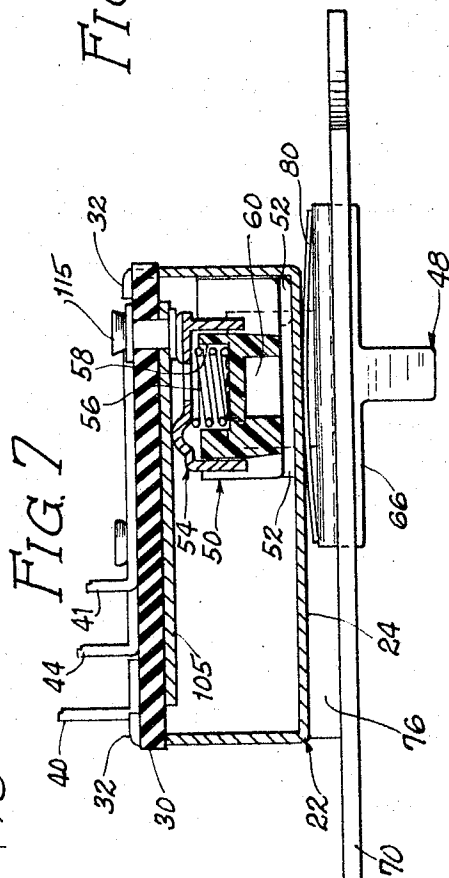
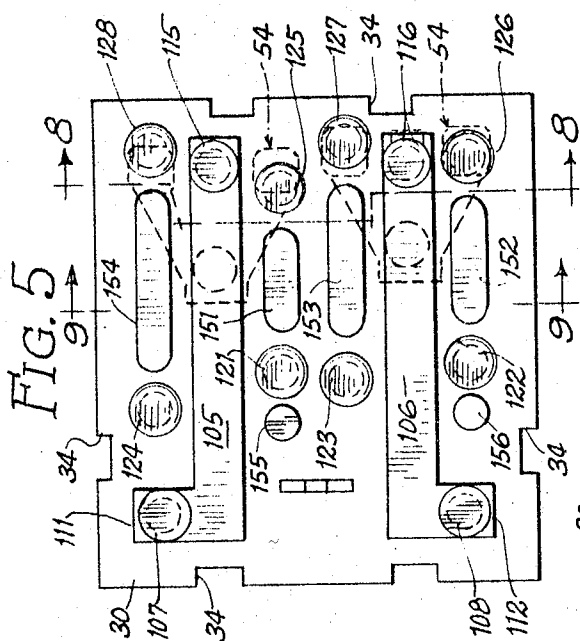
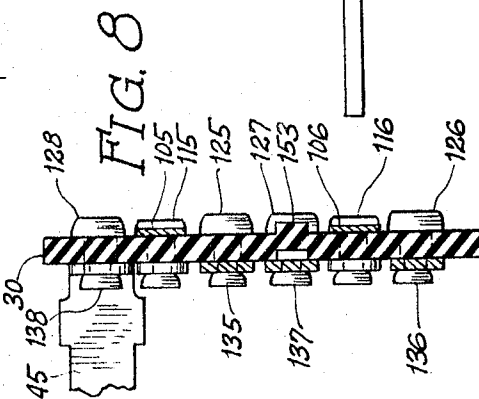
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HIGH PRECISION MULTIPOSITION ELECTRICAL SWITCH

Filed March 6, 1968

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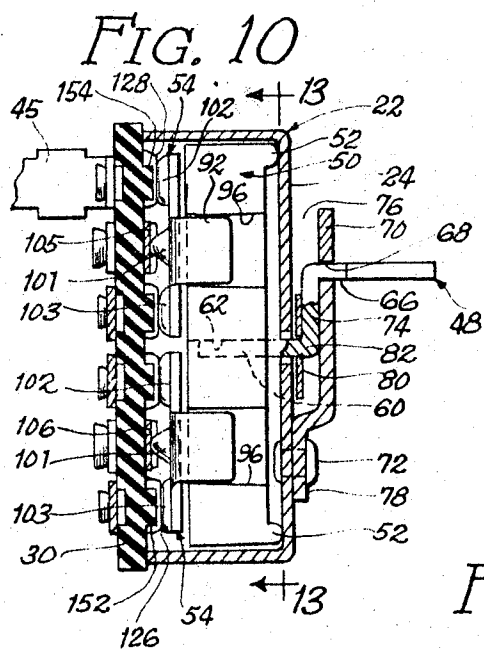
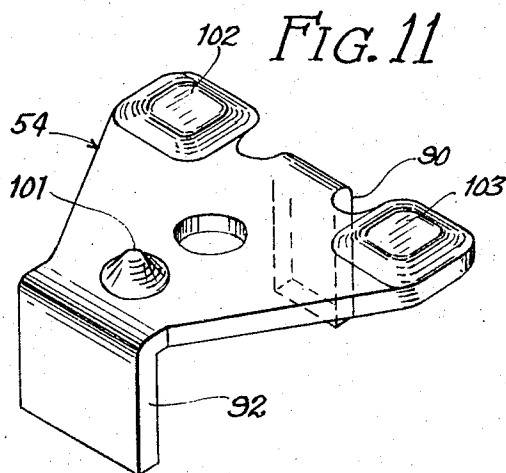
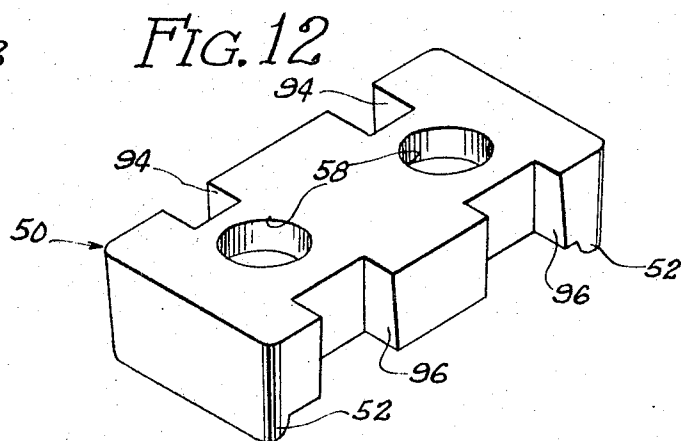
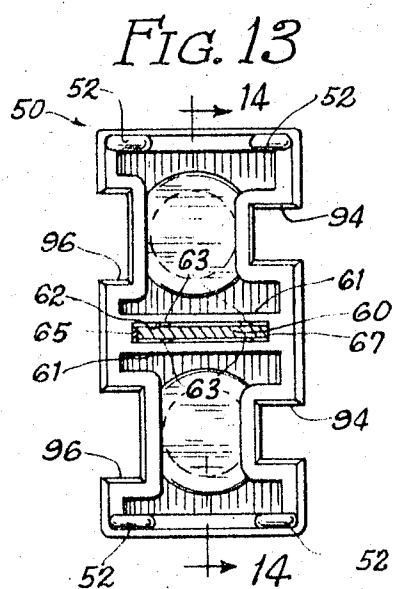
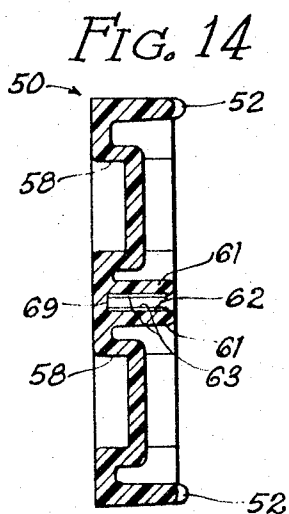
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HIGH PRECISION MULTIPosition ELECTRICAL SWITCH

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**HIGH PRECISION MULTIPPOSITION
ELECTRICAL SWITCH**

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U.S. Cl. 200—16

17 Claims

ABSTRACT OF THE DISCLOSURE

An electrical switch having a plurality of parallel contact bars, electrical connecting means between said bars, a carriage movable along said bars, a plurality of movable contactors mounted on said carriage and corresponding to said bars, a plurality of pairs of contacts corresponding to said bars, the contacts of each pair being located on opposite sides of the corresponding bar, each contactor having a first contacting portion slidably engaging the corresponding bar, and second and third contacting portions movable into engagement with the contacts of the corresponding pair, the contacts being effectively staggered along the path of the carriage in such manner that the contacts are successively engaged as the carriage is moved to successive closely spaced positions, an operating member connected to said carriage and having an elongated guide portion, and a guide bar having an elongated guide slot therein slidably receiving said guide portion to maintain the orientation of said carriage.

This invention pertains to electrical switches generally, but is particularly applicable to automotive type electrical switches, intended especially for use on automobiles, trucks and other vehicles.

One general object of the present invention is to provide an electrical switch which is operable with a high degree of precision to a plurality of closely spaced positions.

Multiposition electrical switches have been employed on automotive vehicles for a variety of purposes, including the control of blower motors. Formerly, a switch of this type was always manually operated and was employed to change the speed range of the motor. Normally, the blower motor was employed in connection with a heater. In recent years, many automobiles have been equipped with combined heating and air conditioning systems having automatic temperature control. A system of this type often requires a highly sophisticated multiposition electrical switch which operates with a high degree of precision.

The present invention provides an electrical switch which is especially well adapted for use in such sophisticated control systems, in that the switch is operable to a series of closely spaced positions with a high degree of precision. In this way, the switch may be operated by a servo system or other power means with such a high degree of reliability that the switch cannot cause any possible malfunctioning of the system.

To provide a series of closely spaced positions, the switch of the present invention preferably utilizes a casing, a carriage movable in the casing along a predetermined path, a plurality of contact bars parallel to said path, a plurality of contactors mounted on said carriage and corresponding to said bars, electrical connecting means between said bars, a plurality of pairs of contacts corresponding to said bars and located on the opposite sides thereof, each contactor having a first contacting portion slidably engaging the corresponding bar, and second and third contacting portions movable into engage-

ment with the corresponding contacts. The contacts are effectively staggered along said path in such a manner that the contacts are successively engaged as said carriage is moved to a series of closely spaced positions.

In accordance with another feature of the present invention, the switch is preferably provided with an operating member connected to the carriage and having an elongated guide portion, and a guide member on the casing and having an elongated guide slot therein for slidably receiving said guide portion, to maintain orientation of said carriage as it is moved along its path. When the carriage is provided with a plurality of contactors, the precise maintenance of the orientation of the carriage is especially necessary, in order to achieve high precision in the operation of the switch.

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

FIG. 1 is a front elevation of a switch to be described as an illustrative embodiment of the present invention.

FIG. 2 is a side view of the switch.

FIG. 3 is a top plan view.

FIG. 4 is an enlarged rear elevation.

FIG. 5 is an enlarged front elevation of the contact board or head, detached from the switch, the view being taken as indicated by the line 5—5 in FIG. 2.

FIG. 6 is an enlarged rear elevation of the switch, with the contact board detached, the view being taken as indicated by the line 6—6 in FIG. 2.

FIG. 7 is a horizontal section, taken generally along the line 7—7 in FIG. 1.

FIG. 8 is a fragmentary vertical section, taken generally along the line 8—8 in FIG. 5.

FIG. 9 is a fragmentary vertical section taken generally along the line 9—9 in FIG. 5.

FIG. 10 is a vertical section, taken generally along the line 10—10 in FIG. 1.

FIG. 11 is an enlarged perspective view of one of the contactors for the switch.

FIG. 12 is an enlarged perspective view of the carriage.

FIG. 13 is a front elevation of the carriage, taken generally as indicated by the line 13—13 in FIG. 10.

FIG. 14 is a section through the carriage, taken generally along the line 14—14 in FIG. 13.

As just indicated, the drawings illustrate an electrical switch 20 which will find many applications, but is especially well adapted for automotive service. Thus, for example, the switch 20 may be employed for controlling the speed of a blower motor, used in connection with an automatic heating and air conditioning system for an automobile.

The illustrated switch 20 comprises a casing 22 which is preferably made of metal, but may be made of any suitable material. As shown, the casing 22 comprises a front wall 24, top and bottom walls 25 and 26, and end walls 27 and 28. The rear of the casing 22 is closed by a rear wall 30, which preferably takes the form of an insulating terminal board or plate. Various means may be employed to fasten the terminal board 30 to the casing 22. As shown, the walls 25—28 are formed with tabs or lugs 32 which extend through slots or notches 34 in the board 30 and are bent or clinched behind the board.

It will be seen that a plurality of terminals are mounted on the insulating board or contact supporting wall 30. Six terminals 40—45 are provided in the illustrated construction. It will be understood that the arrangement and number of the terminals may be varied. The illustrated terminals take the form of prongs which are adapted to receive one or more electrical connectors or receptacles.

The illustrated switch 20 is provided with operating means, comprising an operating member 48, extending to the outside of the switch from within the casing 22. The

operating member 48 is connected to a carriage 50 which is movable in the casing 22 along a predetermined path. The carriage 50 is preferably made of an insulating material, such as a suitable resinous plastic. The carriage 50 may assume various forms but is illustrated as a generally rectangular member which is slidable horizontally within the casing 22. The illustrated carriage 50 is formed with runners or ears 52 which are slidable along the front wall 24 of the casing 22.

As shown to best advantage in FIG. 6, the carriage 50 is fitted with a plurality of conductive contactors 54, preferably mounted on the rear side of the carriage for movement therewith. Each of the illustrated contactors 54 is biased rearwardly, toward the terminal board or head 30 by a spring 56. Recesses 58 are preferably formed in the rear side of the carriage 50 to receive and locate the springs 56. While the springs 56 may assume various forms, they are shown as compression coil springs. In addition to biasing the contactors 54 rearwardly, the springs 56 bias the carriage 50 forwardly into sliding engagement with the front wall 24.

The operating member 48 of the switch 20 is constructed and arranged to provide precise control over the movement of the carriage 50. A rigid connection is provided between the operating member 48 and the carriage 50. In the illustrated construction, the operating member 48 is provided with a rearwardly projecting flange or lug 60 which is snugly received in a slot 62, formed in the front side of the carriage 50. The connecting lug 60 extends through an opening or slot 64 formed in the front wall 24 of the casing 22.

As shown to best advantage in FIGS. 13 and 14, the carriage 50 is formed with relatively thin resilient walls 61 on the opposite sides of the slot 62. Two pairs of ribs 63 project from the wall 61 into the slot 62 for engagement with the flange or lug 60. Another rib 65 projects from the carriage 50 into the slot 62 at one end thereof. The other end of the slot 62 has a flat wall 67, without any rib, to assure the accurate positioning of the carriage 50 relative to the lug 60. The provision of the ribs 63 and 65 makes it possible to maintain a snug fit between the lug 60 and the slot 62 under conditions of mass production, in which the lug 60 may be subject to minor dimensional variations, particularly in metal thickness. The ribs 63 and 65 compensate for any such variations. When the lug 60 is tightly fitted into the slot 62, the lug exerts pressure on the ribs 63 with the result that the thin walls 61 tend to spring outwardly to accommodate the lug.

The depth of the slot 62 is preferably such that the end of the lug 60 engages the bottom 69 of the slot. This engagement may be employed to position the carriage 50 relative to the front wall 24 of the casing 22, so that there will be no binding between the carriage and the front wall.

The operating member 48 is provided with a guide portion or flange 66 which, in this instance, is disposed in front of the casing 22. The guide flange 66 is slidably received in an elongated guide slot 68, formed in a guide bar or member 70. A close but free sliding fit is preferably provided between the guide flange 66 and the slot 68. It will be seen that the guide flange 66 is of considerable length, so that there can be very little angular movement of the guide flange in the guide slot 68. Thus, the engagement of the guide flange 66 with the slot 68 maintains the orientation of the carriage 50 with a high degree of precision, as the operating member 48 is moved along its path of movement.

The guide bar 70 is suitably secured to the casing 22, as by means of rivets 72 extending through the front wall 24. Other fastening means may be employed, such as extruded semi-perforations with their ends staked. Preferably, the operating member 48 is formed with a flange or leg 74 which is confined between the guide bar 70 and the front wall 24. To provide a space 76 for the flange 74, the illustrated guide bar 70 is formed with a rearwardly offset

mounting portion 78, through which the rivets 72 extend.

As shown to best advantage in FIG. 10, the illustrated operating member 48 is generally Z-shaped. The flange 74 is oriented vertically and is movable between the front wall 24 and the guide bar 70. The connecting flange or lug 60 projects rearwardly from the flange 78 and generally perpendicular thereto. The guide portion or flange 66 projects forwardly from the flange 74 and generally perpendicular thereto.

It is preferred to provide spring means to take up the free play between the operating member 48 and the guide bar 70. Such spring means may assume various forms. As shown to best advantage in FIGS. 7 and 10, the illustrated switch comprises a thin leaf spring 80, compressed between the front wall 24 and the vertical flange 74 of the operating member 48. The illustrated connecting lug 60 extends through a slot 82 formed in the central portion of the leaf spring 80. As shown in FIG. 7, the leaf spring 80 is bowed rearwardly so that the central portion of the spring is slidable along the front wall 24. It will be understood that the spring 80 prevents any rattling of the operating member 48.

In the illustrated switch 20, each of the contactors 54 is in the form of a generally triangular plate made of copper or other conductive material. Each contactor 54 is formed with a pair of locating tabs 90 and 92 which are slidably received in slots or grooves 94 and 96, formed in the carriage 50. Three contacting portions or elements 101, 102 and 103 are formed on each of the illustrated contactors 54. It will be seen that the contacting elements 101-103 are in the form of rearwardly projecting contact points or bosses which are smoothly rounded. The two contactors 54 are staggered appreciably along the path of movement of the carriage 50, as will be explained in greater detail presently.

The movable contactors 54 are engageable with a multiplicity of stationary contact elements, mounted on the contact board or head 30. The arrangement of the contact elements is shown to best advantage in FIG. 5. It is preferred to provide a plurality of contact bars 105 and 106, extending parallel to the path of movement of the carriage 50. The contacting portions 101 of the two contactors 54 are slidably engaged with the bars 105 and 106 in all positions of the switch. Thus, the bars 105 and 106 conveniently serve as common or battery contacts. In this case, both of the bars 105 and 106 are connected to the terminal 40. The connections to the bars 105 and 106 are made by means of rivets 107 and 108, extending through the bars 105 and 106 and also through the insulating board 30. The terminal 40 has a strap portion 109 extending between the rivets 107 and 108, as shown in FIG. 4.

The bars 105 and 106 are elongated along the path of the carriage 50. The rivets 107 and 108 extend through tabs 111 and 112, extending laterally from the bars 105 and 106 at one end of the contact board 30. The opposite ends of the bars 105 and 106 are secured to the board 30 by means of rivets 115 and 116.

The terminal board 30 is also provided with a plurality of pairs of contact points, on opposite sides of the contact bars 105 and 106. The illustrated terminal board 30 is provided with eight such contact points 121-128. For convenience, contact points 121-128 have been numbered in the order in which they are engaged by the contactors 54. To provide for sequential engagement, the contact points 121-128 are staggered along the path of the carriage 50.

The contact points 121 and 124 constitute one pair, disposed on opposite sides of the contact bar 105 and engageable by the contacting elements 102 and 103 of the first or upper contactor 54 of FIG. 6. The contacts 122 and 123 constitute another pair, on opposite sides of the contact bar 106, and engageable by the contacting elements 102 and 103 of the second or lower contactor

54. Similarly, the contact points 125 and 128 constitute a pair, on opposite sides of the contact bar 105, while the contact points 126 and 127 constitute another pair on opposite sides of the contact bar 106.

All of the contact points 121-128 are in the form of heads of rivets 131-138, extending through the insulating board 30. It will be seen from FIG. 4 that the rivets 131 and 135 are connected to a strap portion 141 of the terminal 41. The rivets 132 and 136 are connected to a strap portion 142 of the terminal 42. Similarly, the rivets 133 and 137 are connected to a strap portion 143 of the terminal 43. On the other hand, the rivets 134 and 138 are connected to separate flange portions 144 and 145 on the terminals 44 and 45.

When the operating member 48 is centrally disposed, the contactors 54 engage only the contact bars 105 and 106, and not any of the contact points 121-128. This is the Off position of the switch. As the operating member 48 is moved to the left, the contactors 54 successively engage the contact points 121-124. The sequential engagement is due to the staggering of the contact points 121-124, and also the staggering of the contactors 54. If the operating member 48 is moved to the right from its Off position, the contactors 54 successively engage the contact points 125-128, due to the staggering of the contactors and the contact points.

Insulating bosses are preferably provided on the insulating board 30 to provide for smooth and easy movement of the contactors 54, into and out of engagement with the contact points 121-128. These insulating bosses may advantageously be in the form of semi-perforations, punched or pressed from the insulating board 30. In the specific construction shown to best advantage in FIG. 5, there are six such insulating bosses or semiperforations 151-156. The boss 151 is located between the contact points 121 and 125. The boss 152 extends between the contact points 122 and 126. Similarly, the boss 153 extends between the contact points 123 and 127, while the boss 154 extends between the contact points 124 and 128. All of these bosses 151-154 are elongated and generally oval in shape. The bosses 155 and 156 are adjacent the contact points 121 and 122 and are on opposite sides thereof from bosses 151 and 152. As shown, the bosses 155 and 156 are circular in shape.

It will be evident from FIG. 8 that the contact points 121-128 project slightly farther from the insulating board 30 than do the semi-perforated bosses 151-156. Thus, the contacting elements 102 and 103 of the contactors 54 ride up slightly as they move from the insulating bosses to the contact points. The contact points 128 also project farther from the board 30 than do the contact bars 105 and 106. However, the contacting elements 101 on the contactors 54 project rearwardly to a greater extent than do the contacting elements 102 and 103, as will be evident from FIG. 10. It will be understood that the switch 20 may be employed with various circuit arrangements. Thus, it is merely by way of example that one circuit arrangement has been illustrated in FIG. 4. The purpose of the illustrated circuit is to control the speed of the motor 160, which may be the blower motor of an automatic heating and air conditioning system for an automobile. The motor 160 is adapted to be energized by a battery 162 which is connected between the battery terminal 40 and ground. As shown, the motor 160 is connected between the terminal 45 and ground. A series of resistors 164-167 are employed to reduce the speed of the motor 160. As shown, the resistor 164 is connected between the terminals 41 and 42. The resistor 165 is connected between the terminals 42 and 43. Similarly, the resistor 166 is connected between the terminals 43 and 44, while the resistor 167 is connected between the terminals 44 and 45.

It maybe helpful to review the operation of the switch 20 in connection with the circuit diagram of FIG. 4. The switch 20 has an Off position in which the operating

member 48 is centrally disposed. In this position, the contactors 54 are out of engagement with all of the contact points 121-128. Thus the contactors 54 engage only the contact bars 105 and 106. Accordingly, the motor 160 is deenergized.

If the operating member 48 is moved to the left, the upper or first contactor 54 engages the contact point 121. The motor 160 is then energized through all of the resistors 164-167, connected in series. This represents the Low Speed position of the switch.

Continued movement of the operating member 48 to the left causes the lower contactor 54 to engage the contact point 122, while the upper contactor remains in engagement with the contact point 121. Thus, the first resistor 164 is short-circuited or by-passed, so that the motor 160 is energized through the resistors 165-167. This constitutes the Medium Low Speed position of the switch.

Additional movement of the operating member 48 to the left causes the lower contactor 54 to engage the contact point 123, while remaining in engagement with the contact point 122. The resistors 164 and 165 are thus by-passed, so that the motor 160 is energized through the resistors 166 and 167. This represents the Medium Speed position of the switch.

With additional movement of the operating member 48 to the left, the upper contactor 54 engages the contact point 124, while the lower contactor remains in engagement with the contact point 123. The resistors 164-166 are thus by-passed so that the motor 160 is energized through the resistor 167. This constitutes the Medium High Speed position of the switch.

Thus, the operating member 48 may be moved to the left, from its off position, to four distinct positions, designated Low, Medium Low, Medium, and Medium High. When the operating member 48 is moved to the right from its central Off position, the contactors 54 sequentially engage the contact points 125-128, with a similar overlapping action, so that there is no interruption in the circuit as the switch is moved to its successive positions. Inasmuch as the contact points 125, 126 and 127 are connected to the contact points 121, 122 and 123 by the straps 141, 142 and 143, the first three positions of the switch, when the operating member 48 is moved to the right are duplicates of the Low, Medium Low, and Medium positions, already described. However, when the upper contactor 54 engages the contact point 128, all of the resistors 164-168 are by-passed, so that the motor 160 is energized directly from the battery 162. This constitutes the High Speed position of the switch.

The switch 20 may be employed advantageously in connection with an automatic temperature control system in which the operating member 48 is moved to the left, from its central Off position, when the control system is calling for air conditioning to lower the temperature of the air in the automobile. As the demand for cooling increases, the control member 48 is moved farther to the left, so that the speed of the blower motor 160 is increased. When the control system is calling for heat, the control member 48 is moved to the right. The movement of the control member 48 is proportional to the demand for heat, so that the speed of the blower motor 160 is increased with increasing demand for heat.

It will be evident that the switch provides a multiplicity of closely spaced operating positions. In this way, the switch is advantageously suited for operation by a servo system or other power means. The closely spaced positions are achieved by providing a plurality of contactors, engaging a plurality of contact bars which are electrically connected together. Each contactor has three contacting elements, one of which engages the corresponding contact bar. The other two contacting elements engage stationary contacts which are staggered to achieve sequential engagement. With this construction, the spacing between the successive positions of the switch may be much

less than the diameter of the contact points. Inasmuch as the size of the contact points is not a limiting factor, the switch may employ contact points of ample size to achieve a high current carrying capacity. Each of the contactors has a maximum of three points of engagement with the corresponding contact bar and contact points. Thus, adequate contact pressure at all points of contact is assured.

The switch 20 operates with a high degree of precision, in that the closely spaced positions of the switch are positioned accurately, within very close tolerances. This advantageous feature is important when the switch is to be operated by a servo system or the like, because sloppiness in the switch will cause malfunctioning of the control system. In the illustrated switch 20, the orientation of the carriage 50 is precisely maintained by the engagement of the elongated guide member 66 with the elongated guide slot 68 in the guide bar 70. Any play between the operating member 48 and the guide bar 70 is taken up by the bowed leaf spring 80. The tongue or lug 60 on the operating member 48 is tightly fitted into the slot 62 in the carriage 50, so that there will be no play between the operating member and the carriage. With the illustrated switch construction, it is readily possible to establish the various positions of the switch within very close tolerances. Thus, the switch will operate in conjunction with the automatic control system without any possible malfunctioning.

The guide bar 70 may also serve as a mounting bracket. For that purpose, the bar 70 may be provided with elongated mounting slots 170, adapted to receive mounting screws or the like. The slots 170 make it possible to adjust the position of the switch casing 22, relative to the other components of the control system.

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 casing, a carriage movable in said casing along a predetermined path, operating means for moving said carriage in said casing, said casing having a contact supporting wall opposite said carriage, a plurality of contact bars mounted on said wall and extending parallel to said path, electrical connecting means between said bars, a plurality of contactors corresponding to said contact bars and mounted on said carriage for movement therewith, a plurality of pairs of contacts corresponding to said contact bars and mounted on said wall, the contacts of each pair being located on opposite sides of the corresponding contact bar, each of said contactors having a first contacting portion slidably engaging the corresponding contact bar, and second and third contacting portions straddling the corresponding contact bar and movable into engagement with the contacts of the corresponding pair, said contacts of said pairs being effectively staggered along said path in such manner that said contacts are successively engaged by the corresponding contacting portions as said carriage is moved along said path to a series of successive closely spaced positions.
2. A switch according to claim 1, in which said contacts are in the form of contact points mounted on said wall.
3. A switch according to claim 1, in which said carriage is slidable in said casing along a linear path, said contact bars being linear and parallel to said path.
4. A switch according to claim 1,

in which said electrical connecting means comprises a conductive strap connected between said bars.

5. A switch according to claim 1, in which said contacting portions of each contactor are arranged in a triangular pattern.

6. A switch according to claim 1, in which said contactors are staggered on said carriage and along said path.

7. A switch according to claim 1, in which said operating means comprise an operating member connected to said carriage and extending out of said casing,

said casing having a slot therein for receiving said operating member,

said operating member having an elongated guide portion,

and a guide member mounted on said casing and having an elongated guide slot therein extending along said path,

said guide portion of said operating member being slidably received in said slot to maintain the orientation of said carriage as said carriage is moved along said path.

8. An electrical switch, comprising the combination of a casing,

a carriage movable in said casing along a predetermined path,

contactor means mounted on said carriage and movable therewith,

contact means mounted on said casing and selectively engageable by said contactor means,

an operating member connected to said carriage and extending out of said casing,

said casing having a slot for receiving said operating member,

said operating member having an elongated guide portion extending parallel to said path,

and a guide member on said casing and having an elongated guide slot therein extending parallel to said path,

said guide portion of said operating member being slidably received in said guide slot to maintain the orientation of said carriage as said carriage is moved along said path.

9. A switch according to claim 8,

in which said guide portion of said operating member is longer than said carriage in the direction of said path.

10. A switch according to claim 8,

in which said operating member is formed with a connecting lug,

said carriage being formed with a slot for snugly receiving said lug.

11. A switch according to claim 8,

in which said casing comprises a front wall,

said guide member being spaced in front of said front wall,

said operating member having a flange confined between said front wall and said guide member.

12. A switch according to claim 11,

in which said guide portion of said operating member projects forwardly from said flange and generally perpendicular thereto.

13. A switch according to claim 12,

in which said operating member comprises a lug projecting rearwardly from said flange and generally perpendicular thereto,

said lug projecting into said casing through said slot therein,

said carriage having a slot for receiving said lug.

14. A switch according to claim 11,

including spring means engaging said flange and disposed between said front wall and said guide member to take up any free play in said operating member.

15. A switch according to claim 10,

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in which said carriage includes a plurality of ribs projecting into said slot and snugly engaging said lug.

16. A switch according to claim 10, in which said carriage includes resilient wall means adjacent said slot,

and at least one rib projecting from said wall means and into said slot for snugly engaging said lug.

17. A switch according to claim 10, in which said carriage includes a rib projecting into said slot at one end thereof for snugly engaging said lug,

said carriage having a flat wall at the other end of said slot for locating said lug.

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References Cited

UNITED STATES PATENTS

3,306,994	2/1967	Bassett	200—16
3,319,016	5/1967	Hoy et al.	200—16
3,378,654	4/1968	Hoy et al.	200—16

ROBERT K. SCHAEFER, Primary Examiner

J. R. SCOTT, Assistant Examiner

U.S. Cl. X.R.

200—166