

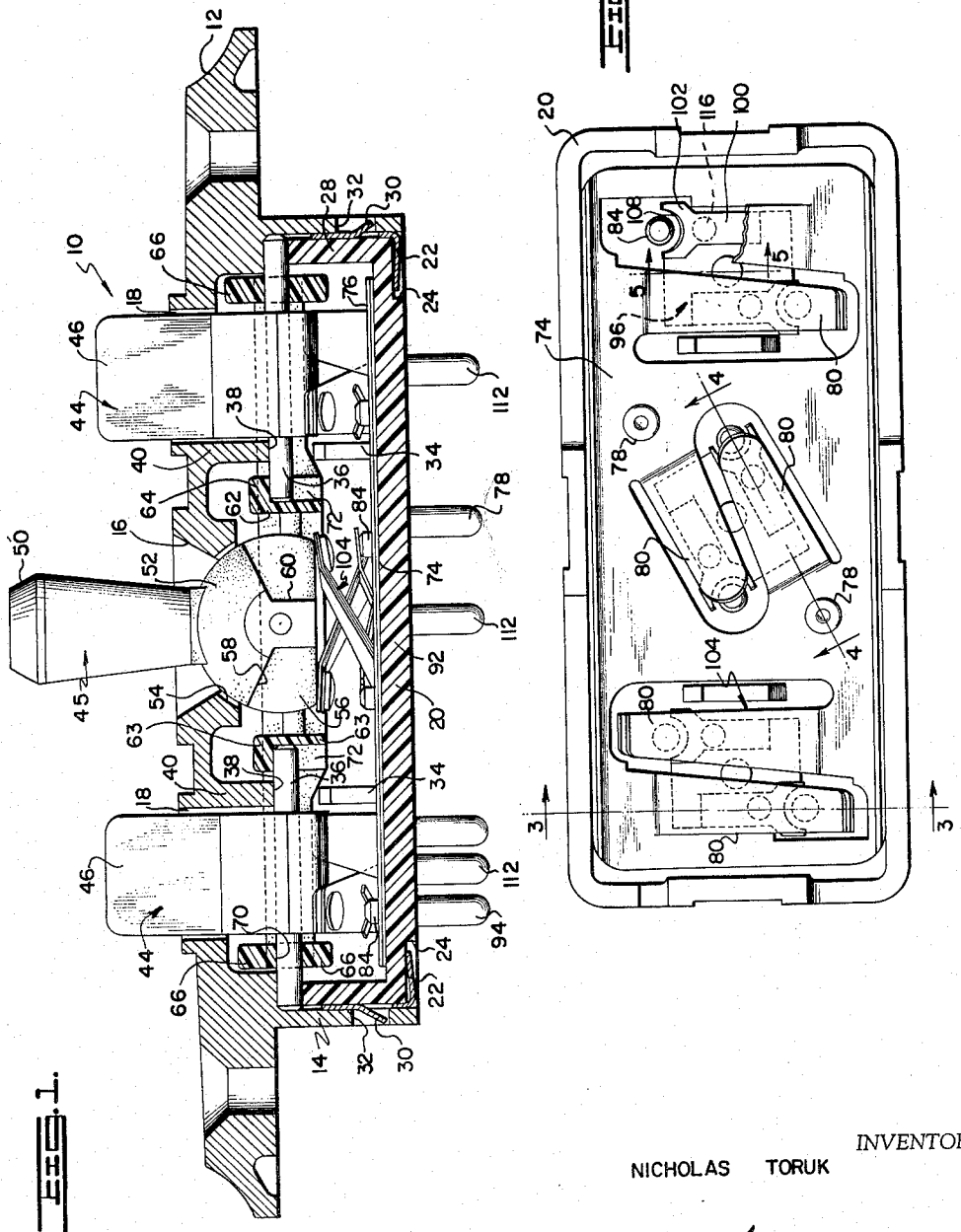
April 28, 1964

N. TORUK
ELECTRIC SWITCH HAVING A PLURALITY OF
PIVOTALLY MOUNTED SWITCH ACTUATORS

3,131,265

Filed Dec. 30, 1960

2 Sheets-Sheet 1



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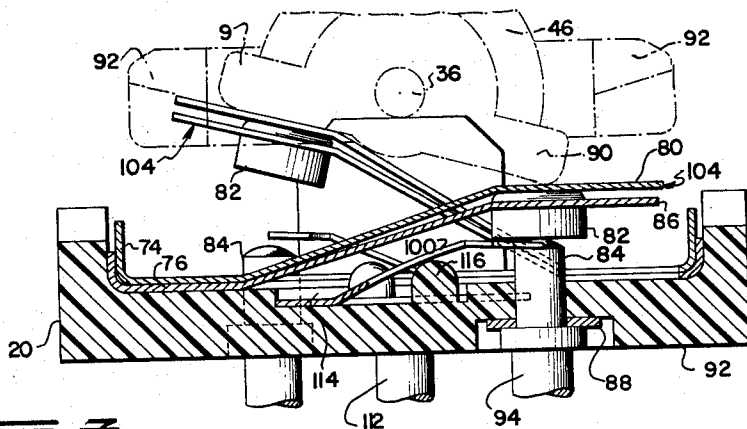


FIG. 3.

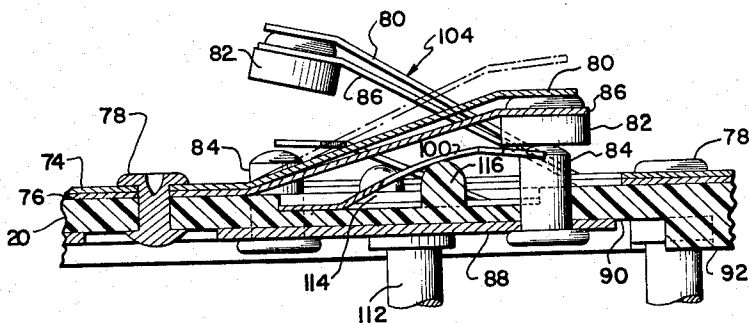


FIG. 4.

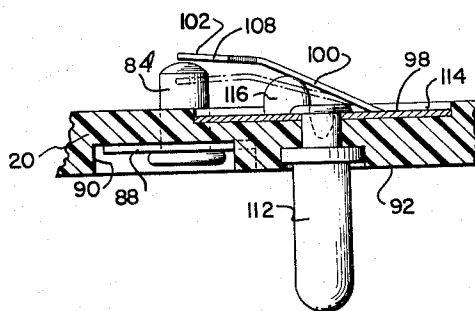
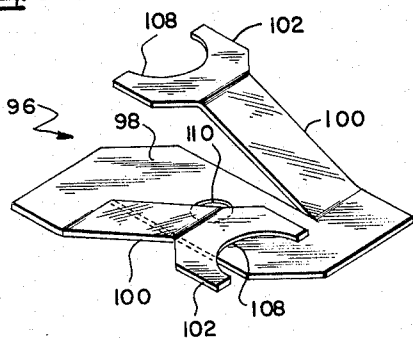


FIG. 5.

FIG. 6.



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Filed Dec. 30, 1960, Ser. No. 79,716

2 Claims. (Cl. 200—6)

This invention relates to circuit controllers and more particularly to electric switch assemblies which permit a single switch blade to engage a plurality of switch contacts.

In the past, switch assemblies have often been used as seat control switches for power operated vehicle seats that are selectively adjustable in both horizontal and vertical directions. Such switch assemblies have often included three individual switches mounted within a common housing, with one of the switches controlling selective vertical movement of the front portion of the seat with the actuator thereof movable in vertical directions only; another of the switches controlling selective vertical movement of the rear portion of the seat with the actuator thereof also movable in vertical directions only, and the other switch controlling selective horizontal movement of the seat with the actuator thereof movable in a horizontal direction. In addition, the actuator of the horizontal control switch may be operable to control simultaneous vertical movement of the front and rear portions of the seat upon movement thereof in vertical directions, without requiring the operator to operate both of the actuators of the vertical control switches. A switch assembly of this sort is shown and claimed in a patent to Meyer et al. 2,916,566, assigned to the assignee of this invention.

Switch assemblies of the above-mentioned type often are used with a plurality of individual electric motors employed for purposes of vertically moving the front and rear portions of the seat and for horizontal movement of the entire seat. Each of the motors are connected in the respective circuits established by the actuation of the individual switch actuators.

The switch assembly according to this invention permits the above-mentioned movements of the seat portion with the use of a single electric motor. This is accomplished by combining the switch assembly with a contact blade leading to a solenoid for clutching the single electric motor with the appropriate mechanism for vertical or horizontal movement of the seat portions. To provide for accurate and dependable operation of the seat apparatus, the switch assembly incorporates a solenoid contact blade, in addition to the usual motor contact, that is interposed between the power switch blade and the stationary motor contact carried by the base member of the assembly. The solenoid contact blade is located in the path of the switch blade and positioned a predetermined distance from the motor contact so as to assure prior engagement between the switch blade and contact blade followed by the engagement of the switch blade with the motor contact. With this arrangement, the operator of the individual switch actuators is assured that the appropriate gearing is clutched into operative engagement with the electric motor prior to energization of the latter.

An object of this invention is to provide an improved electric switch assembly that can sequentially energize two or more circuits.

Another object of this invention is to provide an improved switch assembly in which a single switch blade sequentially engages a first contact followed by engagement with a second contact.

A further object of this invention is to provide a

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switch assembly in which a single switch blade sequentially engages a first contact followed by engagement with a second contact; the first contact being maintained a fixed distance removed from said second contact to assure prior engagement with the switch blade.

Yet another object of this invention is to provide a switch assembly having a plurality of switch actuators for energizing a common power source and wherein each of said switch actuators provides prior energization of an appropriate solenoid for clutching said power source to a proper gearing assembly.

Yet a further object of this invention is to provide a circuit controller having a plurality of switch actuators for energizing a common power source in which each of said switch actuators provides prior energization of an appropriate solenoid for clutching said power source to a proper gearing assembly; the latter action being assured by maintaining the solenoid contact a fixed distance from the power source contact.

These and other objects of this invention will be readily apparent from the following specification and drawings wherein:

FIGURE 1 is a side elevation view of an electric switch assembly incorporating this invention;

FIGURE 2 is a plan view of the base member of the electric switch assembly of FIGURE 1;

FIGURE 3 is a sectional view taken on lines 3—3 of FIGURE 2, and illustrating in phantom lines the relationship with the switch elements;

FIGURE 4 is a sectional view taken on lines 4—4 of FIGURE 2;

FIGURE 5 is a sectional view taken on lines 5—5 of FIGURE 2; and

FIGURE 6 is a perspective view of the contact member employed in this invention.

Referring now to the drawings, the electric switch assembly 10 includes an outer escutcheon plate 12 in a depending housing 14. The escutcheon plate 12 includes a center aperture 16 and a pair of apertures 18 to either side thereof with each of the apertures opening to the housing 14. A switch base 20 of insulating material fits within housing 14 and is secured thereto by means of angular spring clips 22. One leg of each clip fits within a depression 24 in the switch base 20 and the other leg of the clip fits within a groove 26 in a locating lug 28 of the base and is provided with a tube 30 engageable within an opening 32 in the adjacent wall of housing 14. The switch base 20 is further provided with two longitudinally spaced upright ribs 34, each of which engages a pin 36 adjacent one end thereof to hold the pin within a groove 38 provided in the end of a depending rib 40 of escutcheon plate 12 to one side of each of the apertures 18 therein. The other end of each of the pins 36 fits within a groove 42 provided in the lower wall of escutcheon plate 12 to the other side of each of the apertures 18 therein and is held within the groove by the locating lugs 28 in the end walls of the switch base 20.

The switch assembly 10 includes three individual switches, two of the switches 44 being the same and being disposed to either side of the center switch 45. Each of the switches 44 includes a switch actuator 46 rotatably mounted on each of the pins 36 and swingable relative thereto within the apertures 18. The switch actuator 50 of switch 45 is of molded nylon and includes a lower ball shaped end 52 of spherical shape which seats within a spherical seat 54 provided on the inner end of the walls defining the aperture 16. The ball end 52 of switch actuator 50 further includes a central rib 56 and the ball end is angularly cut away at each side of the rib 56 to provide pairs of angularly

disposed edges 58, each pair providing a junction rib 60 extending laterally from a side of the rib 56.

Rib 56 is received within a slot 62 provided in the center plate portion 63 of a molded nylon switch actuating member 64 with the ribs 60 being located transversely of the slot and engageable with the switch actuating member to either side of the slot. The switch actuating member 64 further includes generally U-shaped integral bar extensions 66, the end bars of which are apertured at 70. In addition, the sides of the center plate portion 63 are provided with bearing grooves 72. The pins 36 are received with the bearing groove 72 in order to rotatably mount the switch actuating member 64 within the switch housing 14 for rotational movement thereof about the same axis as the axis of rotation of the switch actuators 46. The switch actuators 46 are rotatable about the pins 36 independently of any rotational movement of the switch actuating member 64 and are located within the extensions 66.

A pair of stamped metal switch plates 74 and 76 set within the switch base 20 and are riveted thereto by a pair of rivets 78, as best shown in FIGS. 2 and 4. One of the rivets 78 is elongated and furnishes the hot lead to the switch. The plate 74 is of stainless steel and the plate 76 is beryllium copper. It will be noted in FIGS. 1 and 2 that the plate 74 includes three pairs of lanced-out upwardly bent arms 80 with each arm mounting a contact button 82 normally opened to a fixed contact 84 secured to the switch base 20. The plate 76 also includes three pairs of lanced-out upwardly bent arms 86 which are complementary to and cooperate with the arm 80 to maintain the contact button 82. The combination of the arm 80 with the arm 86 makes up a switch blade 104. The contacts 84 are electrically connected with each other by a metal plate 88 that is rivettedly secured to the switch base 20 by the contacts 84. An irregular groove 90 in the base surface 92 accommodates the plate 88 which can be connected through a lead 94 as shown in FIGURE 3, to an electric motor. Disposed immediately below each pair of the switch blades 104 is a solenoid contact blade generally indicated by the numeral 96. As best seen in FIG. 6, each contact blade 96 is stamped from a flat sheet of beryllium copper so as to include a fastening portion 98 and a first and second upwardly bent contact arm portion 100 which respectively terminate with an enlarged engagement surface 102. The contact arms 100 extend in opposite directions and a semi-circular opening 108 of a diameter greater than that of the contacts 84 is provided in each of the engagement surfaces 102. An aperture 110 in the fastening portion 98 accommodates an elongated rivet 112 which furnishes the lead to the solenoid and secures the contact blade 96 to the switch base 20. As shown in FIG. 5, the fastening portion 98 is set in a recessed well 114 in the switch base 20.

Integrally formed with the switch base 20 are a plurality of upstanding stop members 116, each of which is located in the well 114 so as to abut the underside of the individual control arms 100. In the normal position of the contact arm the stop member maintains the engagement surface 102 a distance of .010 removed from the top of the contact 84. When the contact blade 96 is positioned within the well 114, the semi-circular opening 108 of each contact arm is disposed directly above the contact 84 and concentric therewith as shown in FIGURE 2. As shown by the phantom lines in FIG. 5 this arrangement permits the engagement surface 102 of each contact arm to be moved towards the switch base 20 without engaging the contacts 84. In the latter mentioned view, the phantom lines show the position of the contact arm if a stop member was not provided.

The switch assembly as described above thus provides an arrangement whereby pivotal movement of the switch actuators 45 or 46 results in a downward movement of the switch blade 104 and the accompanying contact button 82. As best seen in FIGURE 3 of the drawings, the

switch blade swings from a neutral position to that where it engages the engagement surface 102 of the contact arm 100 and the contact 84 set in the switch base 20. Due to the stop 116, the engagement surface 102 of the blade arm is maintained a fixed distance removed from and above the uppermost portion of the contact 84 which results in the contact button 82 of the switch blade 104 making prior engagement with the surface 102 before engaging the contact 84. As aforementioned, where the contact blade 96 is connected with a solenoid and the contact 84 with an electric motor, the prior energization of the solenoid because of the prior engagement between the switch blade and the surface 102, assures that the appropriate gearing is clutched into operative engagement with the motor before the latter is energized.

In operation, the switch actuators 46 are individually movable about their respective pivot axes defined by the pin 36. One of the switch actuators 46 controls the vertical movement of the seating portion of a vehicle seat while the other controls movement of the back rest portion. The switch actuator 45, on the other hand, controls horizontal movement of the entire seat and as viewed in FIG. 1 a movement of the actuator 45 to the left or right about its pivot axis, results in a closing of the switch located directly below with subsequent energization of the solenoid for clutching the electric motor into operation engagement with the appropriate gearing as aforementioned. In addition, the actuator 45 is movable transverse to the aforementioned movement so as to cause the switch actuating member 64 to swing about the pins 36 for simultaneously closing the respective switches that are ordinarily closed by the individual movement of the switch actuators 46. As viewed in FIG. 3, a bar 92 of extension 66 of the switch actuating member 64 is capable of engaging the overhang of the switch arm 104 for closing the latter without any movement of the switch actuator 46. This arrangement permits the simultaneously vertical movement of the seating and back rest portions of a vehicle seat without necessitating individual movement of the switch actuators 46. A complete description of the operation of the switch actuating member 64 in a switch assembly similar to that of the subject invention can be found in the patent to Meyer et al. 2,916,566, assigned to the assignee of this invention.

It is obvious from the above that this switch assembly includes switch arrangement that provides sequential engagement of a first contact member, which as described in the invention, can serve to energize a solenoid followed by engagement with a second contact member for closing a circuit to an electric motor. Although the subject invention is particularly described incorporated in a specific switch assembly, it should be noted that the invention is not limited thereto but encompasses all modifications and variations that may be made in the form and arrangement of parts without departing from the spirit of my invention.

What I claim is:

1. A circuit controller having a pivotally mounted switch actuator comprising: a fixed contact member, a pivotally mounted switch blade operable by said actuator and having a contact button fixed thereto for engagement with said fixed contact member, a pivotally mounted contact blade disposed between said switch blade and said contact member having a contact surface thereof in the path of pivotal movement of said switch blade contact button, and an upstanding stop member intermediate the ends of said contact blade and abutting said contact blade, thereby maintaining said contact blade a fixed distance between said switch blade and said fixed contact member, said contact surface of said contact blade having an opening complementary to the peripheral surface of said fixed contact member so as to permit said contact blade opening to receive said fixed contact without making contact therewith, said switch blade contact button first engaging said contact blade contact surface upon movement of

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said switch actuator, whereby upon further movement of said switch actuator said fixed contact is received within said contact blade opening such that upon still further movement of said switch actuator said switch blade contact button secondly engages said fixed contact.

2. A circuit controller having a plurality of pivotally mounted switch actuators comprising: a plurality of fixed contact members, a plurality of pairs of oppositely disposed pivotally mounted switch blades each pair associated with an actuator and each blade of the pair operable by the associated actuator, each switch blade having a contact button fixed thereto for engagement with an associated fixed contact member, a plurality of pivotally mounted contact blades each disposed between a switch blade and a contact member each contact blade having a contact surface thereof in the path of pivotal movement of an associated switch blade contact button, and an upstanding stop member intermediate the ends of each contact blade and abutting the contact blade, thereby maintaining said contact blade a fixed distance between the associated switch blade and the associated fixed contact

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member, said contact surface of each contact blade having an opening complementary to the peripheral surface of the associated fixed contact member so as to permit said contact blade opening to receive the associated fixed contact without making contact therewith, each switch blade contact button first engaging an associated contact blade contact surface upon movement of an associated switch actuator, whereby upon further movement of said associated switch actuator the associated fixed contact is received within said associated contact blade opening such that upon still further movement of said associated switch actuator said switch blade contact button secondly engages said fixed contact.

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