

United States Patent

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[72] Inventor **Wilhelm K. Kolster**
Michigan City, Ind.
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[73] Assignee **Meridian Industries, Inc.**
Continuation-in-part of application Ser. No. 681,406, Nov. 8, 1967.

[54] SELECTOR SWITCH ASSEMBLY 9 Claims, 14 Drawing Figs.

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200/11, 200/157, 340/81
[51] Int. Cl. H01h 21/78
[50] Field of Search 200/11 A,
11 C, 11 D, 11.21, 11.23, 11.24, 61.27, 61.3,
61.34—61.38, 164, 166 A, 166 B, 166 C, 166 PC,
166 CT; 340/52, 54, 55, 66, 67, 80, 81

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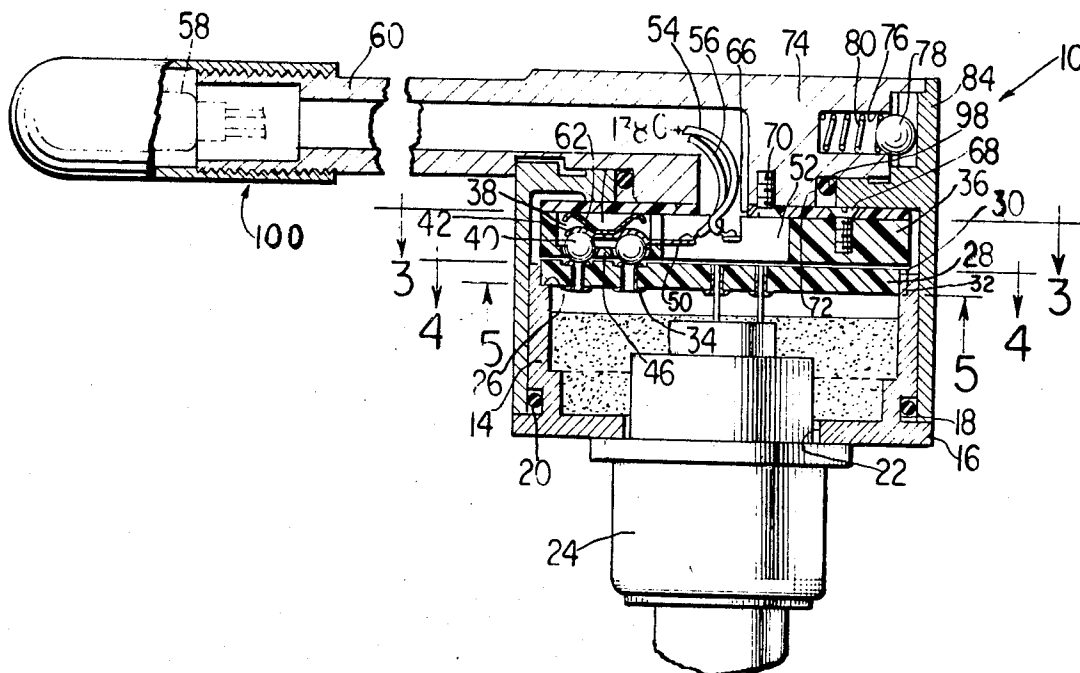
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Primary Examiner—John W. Caldwell
Assistant Examiner—Kenneth N. Leimer
Attorney—Dale A. Winnie

ABSTRACT: A switch for automotive turn signals, and the like, in which a plurality of prearranged resiliently biased electrical contacts are carried by a rotatable member and are adapted to engage selective contacts electrically to associated circuit means such as a printed circuit. The switch mechanism is contained within a housing and has a detent-positioned operating arm carrying a lever for releasing the arm to a selected operating position.



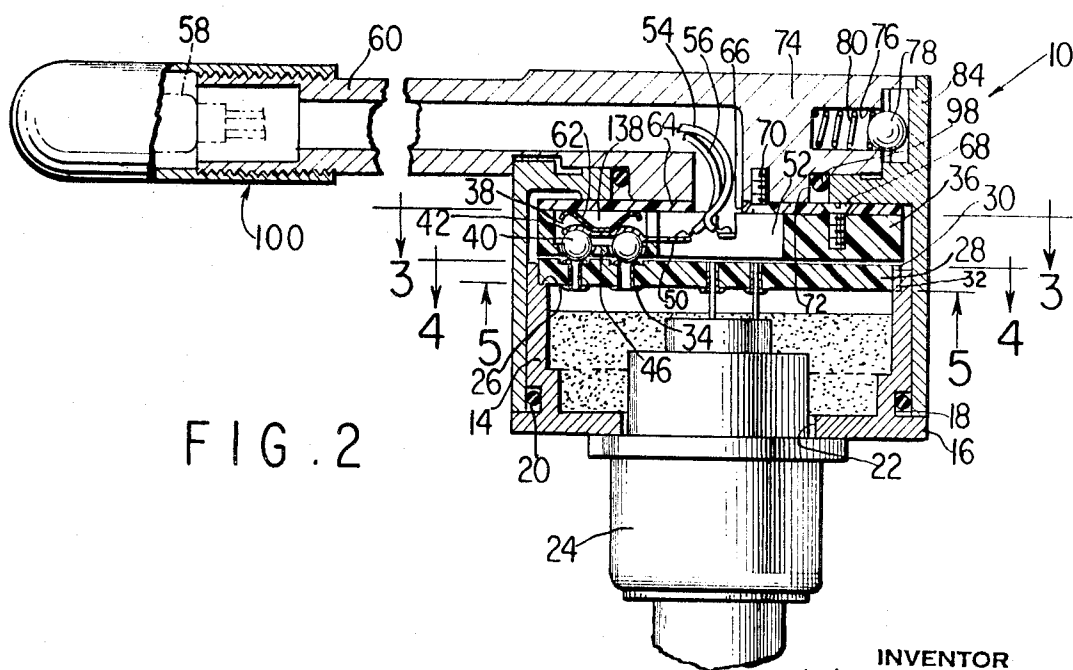
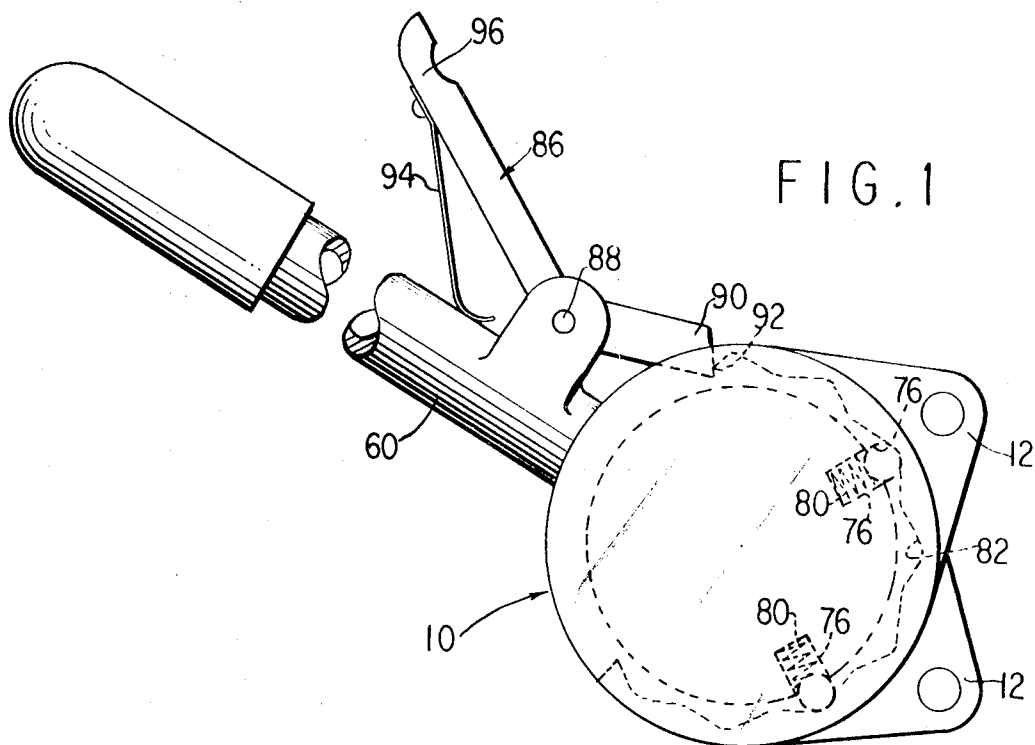


FIG. 2

INVENTOR
WILHELM K. KOLSTER
BY
Emy the & Moore
ATTORNEYS

FIG. 3

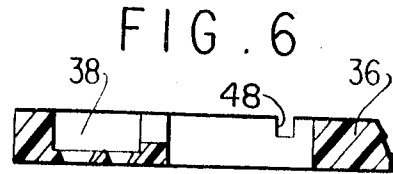
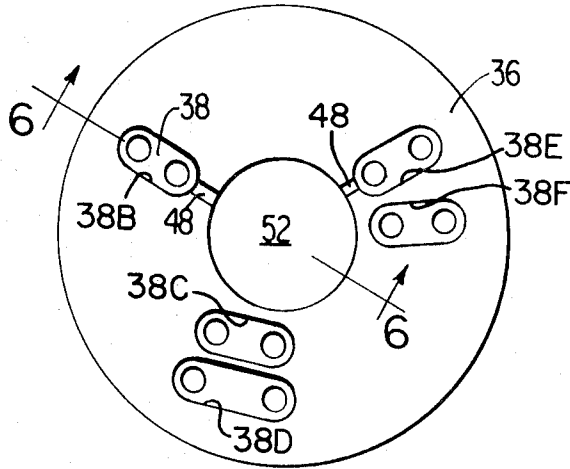


FIG. 4

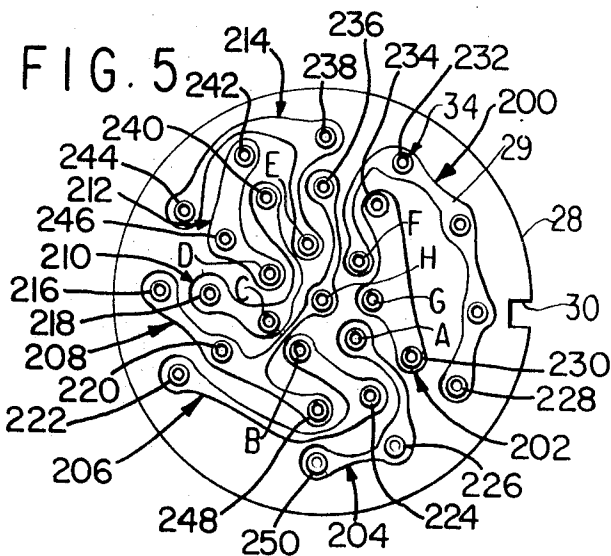
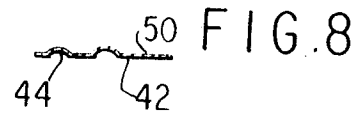
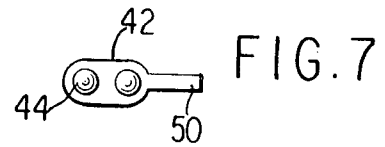
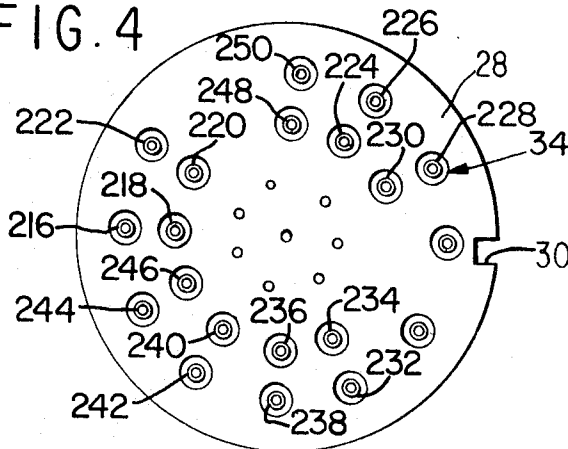


FIG. 9

INVENTOR
WILHELM K. NOLSTER
BY
Smythe & Moore
ATTORNEYS

FIG. 10

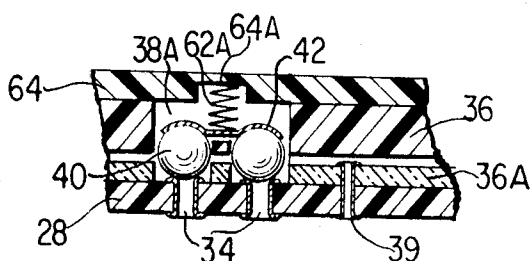
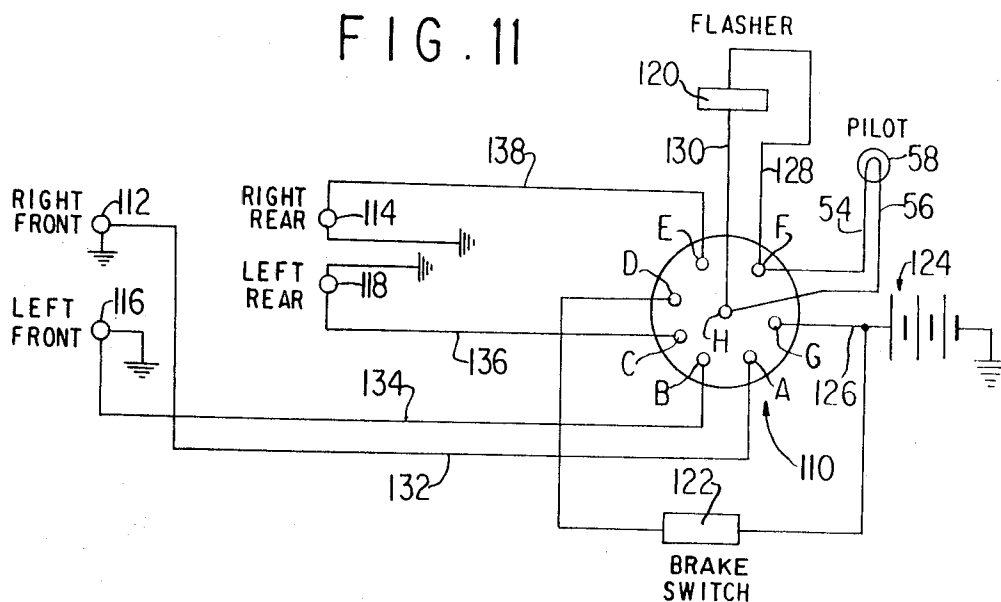


FIG. 11



INVENTOR
WILHELM K. KOLSTER
BY *Smay & Moore*
ATTORNEYS

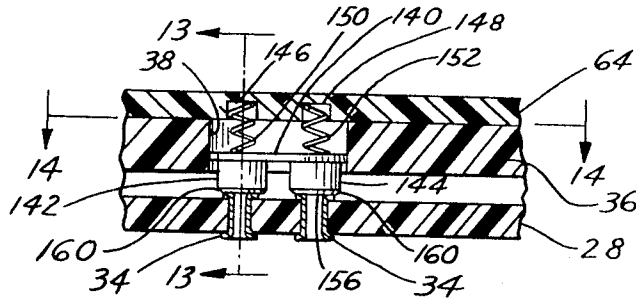


FIG. 12

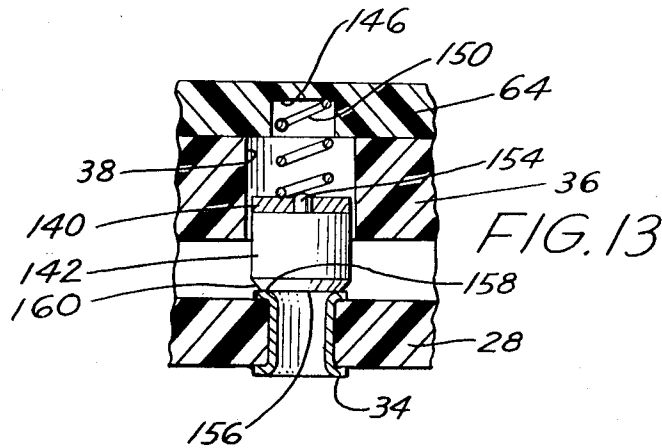


FIG. 13

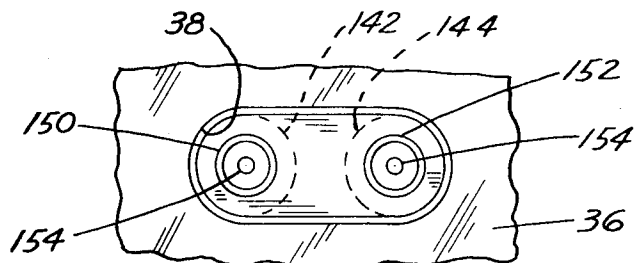


FIG. 14

SELECTOR SWITCH ASSEMBLY

RELATED APPLICATION

This application is a Continuation-in-Part of my copending application Ser. No. 681,406 filed Nov. 8, 1967, for Control Switch.

BACKGROUND OF THE INVENTION

Heretofore various control switch assemblies have been proposed for application to electrical circuits such as, for example, vehicular danger or emergency warning flasher systems and direction-of-turn indicating systems. However, such prior art devices have not fully satisfied the requirements of, for example, ease of manufacture or fabrication (resulting in a relatively high initial cost), continued dependability even over extended periods of usage (resulting in additional costs for repair and/or replacement) assurance of operation under adverse conditions as in the range of arctic cold to tropic heat (resulting in additional cost for continuous maintenance and/or replacement) and maintaining the vital components of the switch device substantially free from contaminants such as may be carried by moisture and/or the atmosphere.

SUMMARY OF THE INVENTION

According to the invention an electrical switch assembly comprises a housing, a first member carried by said housing and supporting a plurality of electrical circuits thereon, a plurality of first electrical terminals carried by said first member and electrically connected to said plurality of electrical circuits, a second member carried by said housing, a plurality of electrical contacts operatively carried by said second member, said electrical contacts being so arranged as to be generally directed toward said first member, resilient means operatively engaging said electrical contacts and normally urging said electrical contacts in a direction generally toward said first member, and manually operative means for effecting relative rotation between said first and second members in order to cause sequential engagement and disengagement between said electrical contacts and said electrical terminals.

Accordingly, a general object of this invention is to provide a improved switch assembly having a first plurality of fixed contacts and a second plurality of movable contacts wherein the movable contacts are rotatable en masse relative to the fixed contacts in order to effect engagement between certain of the movable contacts and certain of the fixed contacts.

Another object of the invention is to provide a switch assembly in which the switching mechanism is simplified by the use of printed circuits.

Other more specific objects and advantages of the invention will become apparent when reference is made to the following description considered in conjunction with the accompanying drawings.

DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a top plan view of a switch assembly constructed in accordance with the teachings of the invention;

FIG. 2 is a sectional elevation of the switch assembly of FIG. 1 with certain elements thereof being shown in elevation;

FIG. 3 is a view taken generally on the plane of line 3-3 of FIG. 2 illustrating one of the elements within the switch assembly;

FIG. 4 is a view taken generally on the plane of line 4-4 of FIG. 2, looking in the direction of the arrows, illustrating another of the elements within the switch assembly;

FIG. 5 is a view taken generally on the plane of line 5-5 of FIG. 2, looking in the direction of the arrows, illustrating a bottom view of the element shown in FIG. 5;

FIG. 6 is a fragmentary cross-sectional view taken generally on the plane of line 6-6 of FIG. 3, looking in the direction of the arrows;

FIG. 7 is top plan view of an element of the switch assembly serving as connector strip for ball-type electrical contacts;

FIG. 8 is a cross-sectional view taken generally medially along the longitudinal axis of the strip in FIG. 7;

FIG. 9 is a perspective view of a spring member employed for urging movable and fixed electrical contacts into engagement with each other;

FIG. 10 is an enlarged cross-sectional view similar to a fragmentary portion of FIG. 2 illustrating a modified form of certain of the elements shown in FIGS. 2 and 6;

FIG. 11 is a schematic wiring diagram illustrating exemplary connections between the switch of the invention and the lights of an associated automotive vehicle;

FIG. 12 is a fragmentary cross-sectional view, similar to FIGS. 6 and 10, illustrating a second modification of the invention;

FIG. 13, is an enlarged fragmentary cross-sectional view taken generally on the plane of line 13-13 of FIG. 12 and looking in the direction of the arrows; and

FIG. 14 is an enlarged fragmentary cross-sectional view taken generally on the plane of line 14-14 of FIG. 12 and looking in the direction of the arrows.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now in greater detail to the drawings, FIGS. 1 and 2 illustrate the switch assembly as comprising an outer casing or housing 10 having earlike portions 12 extending therefrom by which the housing 10 may be supported to any suitable portion of the associated vehicle such as, for example, the steering column assembly. A generally tubular member 14, received within housing 10, has a radiating flange portion 16 adapted to be secured to the lower end of housing 10 by any suitable means such as countersunk screws (not shown). An annular groove 18, formed as at the lower end of tubular member 14 is adapted to receive a seal therein such as O-ring 20 in order to prevent the passage, between tubular member 14 and housing 10, of contaminants as well as moisture.

The lower end of tubular member or base 14 has an aperture 22 formed therethrough so as to removably receive therein an electrical connector element 24 through which circuit connections to the flashing light signals and a brake switch pass.

The upper end of the inner generally telescoping member 14 is provided with an annular groove or seat 26 adapted to receive therein a relatively thin disc 28 of electrically insulating material. Angular locking means, such as a slot 30 formed in disc 28 (see also FIGS. 4 and 5) and a key or projection 32 formed on the tubular member 14, prevent relative rotation between the disc 28, base member 14 and housing 10 to which tubular member 14 is secured.

Carried on the underside of disc 28 are a plurality of electrically conductive printed circuits 29, electrically connected to external flasher signal circuits and a brake circuit through the connector 24. Electrically connected to the printed circuits are a plurality of copper or similar conductive members or rivets 34 which extend transversely through the disc 28 and thereby provide contact points or surfaces on the upper side of the disc 28. More specifically as also shown in FIG. 5, the invention is disclosed as comprising printed circuit portions 200, 202, 204, 206, 208, 210, 212 and 214 through which one respective end of such rivets 34 is received so as to form a possible path for current flow therethrough to the other cooperating end of the rivets situated on the other side of mounting board or member 28.

Rotatably received within the outer casing or housing member 10 is a second annular disc member or collet 36 having a plurality of elongated slots or pocketlike openings 38 arranged therein as also illustrated in FIGS. 3 and 6. Each of the slots or openings 38 is adapted to receive therein a pair of ball

type contacts 40. Positioned above each pair of balls 40 within the respective openings 38 is a contact member 42 (also see FIGS. 7 and 8) provided with a pair of spaced spherically indented 44 adapted to respectively engage the upper side of the ball contacts 40. Even though the bridging contact member 40 may serve to maintain the respective pairs of ball contacts in proper spaced relationship, it is preferable that the slots 38 be provided with separators or webs 46 either integrally formed in or carried by the lower portion of disc 36. The use of such separators also provides for more ready assembly of the switch mechanism.

Two of the slots 38, as also illustrated in FIG. 3, have openings or slots 48 extending into the inner opening 52 of disc 36 through which tongues 50 on connector contacts or clips 42 extend and are thereby adapted to be electrically connected by leads 54 and 56 to a pilot light 58 contained within the end of an operating arm of handle 60. The provision of such tongues 50 on the remaining bridging contacts or clips 42 would not be required.

Also positioned within each of the slots 38 and above the contact connector clips 42 is a bowed or U-shaped spring member 62 which serves to resiliently bias the contacts 40 into engagement with the upper ends of rivets 34. To form an upper support for the spring biased contacts 40 and also to maintain the contact mechanism in a unitary assembly, a third disc 64, having a hole 66 formed through its center for the free passage therethrough of leads 54 and 56, is detachably secured as by screws 68 to the upper side of rotatable disc 36.

Disc 64 is also secured at its upper side to the lower side of a downwardly depending bosslike projection or collar 72 formed on and carried by the end of handle or arm assembly 60. Disc 64 may be detachably secured to projection 72 by screws 70 which are accessible through the opening 52 formed in collar 36.

The projection or collar 72 has an enlarged portion 74 which is provided with a bore 76 containing a detent ball 78 resiliently urged radially outwardly by a spring 80 situated within bore 76. The ball 78 is adapted to sequentially engage a series of detents 82 arcuately arranged on an upstanding flange 84 provided on the upper side of tubular housing member 10.

The spring-biased ball 78 and detents 82 cooperate to provide for properly positioning the handle 60 with respect to the arrangement of the contact balls 40 and rivets 34. The upstanding flange 84 has a predetermined arcuate length to limit the arc through which the handle 60 normally can be turned. However, to permit further turning of the handle in one direction to, for example, provide for the flashing of all lights to indicate emergency stopping, a lever 86 is pivotally mounted, as at 88, on the handle 60.

One arm 90 of lever 86 is adapted to normally engage and abut against end 92 of the arcuate flange 84 in order to thereby limit the counterclockwise rotation of lever 60, as viewed in FIG. 1. Leaf spring 94 biases lever 86 toward such position. However, by manually depressing arm portion 96 of lever 86, arm 90 is moved away from surface 92 thereby enabling the counterclockwise rotation of lever 60 beyond its normal stop position determined by surface 92.

A second O-ring 98 is positioned between the collar 72 and housing 10 to seal the switch mechanism at the upper end thereof. The operating arm or handle 60 is also sectionable, as indicated at 100, to permit replacement of the pilot light 58.

FIG. 10 illustrates a modification of the invention; those elements which are like or similar to those of FIGS. 1-9 are identified with like reference numbers. In the embodiment of FIG. 10, the printed circuit board or disc 28 has secured to the upper surface thereof, as by rivets 39, a disc 36A of non-flammable material such as ceramic, anodized aluminum, beryllium oxide or the like. The slots 38A are adapted to receive the upper portion of contacts 40 and the cliplike connector members 42. Coil compression springs 62A positioned within recesses 64A provided in disc 64 serve to bias the contacts into conductive engagement with the contacts or rivets

34. By having such nonconducting material of disc 36A surrounding the rivet contacts 34, relative rotative motion between disc 36 and plate 28 will result in an upward movement of contacts 40 relative to rivet contacts 34. This, in turn, tends to minimize, if not totally eliminate, possible electrical arcing between ball contacts 40 and stationary rivet contacts 34. Such motion is, of course, accommodated by spring 62A.

FIG. 11 illustrates an application of the hereinabove described switch to a vehicular lighting system. In FIG. 11, the circle 110 represents the underside of connector 24 and also the connections to the printed circuits 29 on the underside of disc 28. Further, reference numeral 112 represents a right front light, the reference numeral 114 a right rear light, the numeral 116 a left front light, the numeral 118 a left rear light, the numeral 122 a brake switch, and the numeral 124 the battery or power source for the system. Source 124 is connected as by conductor 126 to contact G of connector 24 (FIG. 5 and 11) thereby causing printed circuit portion 202 to become the source of electrical potential within the system of printed circuits, while the flasher switch 120 is connected across the terminals F and H by conductors 128 and 130. Also connected across the terminals F and H, in parallel with flasher 120 are the leads 54 and 56 to pilot light 58 whereby the pilot light 58 flashes in synchronism with operation of the flasher switch. A line 132 connects terminal A to lamp 112; line 134 connects terminal B to lamp 116; line 136 connects terminal C to lamp 118 and line 138 connects terminal E to lamp 114. Terminal D is connected to the brake switch 122 which receives power from the source 124.

By using a printed circuit arrangement such as illustrated by FIG. 5 and a movable contact arrangement such as shown in FIGS. 2 and 10, interconnections may be made between terminals G, F, H, A, B, C and E whereby the conventional flashing signals indicating a right turn, left turn or hazardous emergency stopping condition can be exhibited. For purposes of illustration a select number of rivet contacts 34 have been assigned reference numbers 216, 218, 220, 222, 224, 226, 228, 230, 232, 234, 236, 238, 240, 242, 244, 246, 248 and bridge rivet contacts 224 and 226 (of printed circuit portions 206 and 204, respectively). Accordingly, it can be seen that as such movable contacts are selectively brought into and out of registry with the fixed rivet contacts correspondingly selective circuits leading to the lamps shown in FIG. 11 are energized. For example, when printed circuit portions 208 and 210 are brought into closed circuit by virtue of the movable contacts within slots 38B and 38C respectively bridging rivet contacts 220-22 and 236-240, the leads from terminals B and C cause the energization of the left front 116 and left rear 118 lamps. A braking signal can also be applied through terminal D regardless of whether the switch arm is in a turn or a neutral position. The illustrated arrangement is such that by using eight printed circuits and five pairs of movable electrical contacts all of the above results may be accomplished.

The invention as thus far described has specifically disclosed the use of rivets 34 for providing electrical terminal points on the upper side of board or plate 28 by engaging the printed circuit at one end and extending through the board 28 and thereby providing at its other end a contact surface for engagement by the movable contacts 40. It should be apparent, 250 while slots 38 have been, in FIG. 3, respectively further identified as 38B, 38C, 38D, 38E and 38F. Accordingly, if lever 100 is rotated to a position to indicate a left turn, movable member 36 will be accordingly rotated so as to cause the contacts: within slot 38D to bridge rivet contacts 238 and 242 (of printed circuit portions 214 and 212, respectively); within slot 38C to bridge rivet contacts 236 and 240 (of printed circuit portions 208 and 210, respectively); within slot 38E to bridge rivet contacts 228 and 230 (of printed circuit portions 200 and 202, respectively) and within slot 38B to bridge the rivet contacts 220 and 222 (of printed circuit portions 208 and 206, respectively). In comparison, if control lever 100 is rotated to indicate a right turn, movable member 36 will be accordingly rotated to as to cause the contacts: within slot

38D to bridge rivet contacts 244 and 216 (of printed circuit portions 214 and 208, respectively); within slot 38C to bridge rivet contacts 246 and 218 (of printed circuit portions 212 and 210, respectively); within slot 38F to bridge rivet contacts 232 and 234 (of printed circuit portions 200 and 202, respectively) and within slot 38B to bridge rivet contacts 248 and 250 (of printed circuit portions 208 and 204, respectively). Further, when control lever 100 is rotated to a position to indicate a hazard warning, movable member 36 will be accordingly rotated to as to cause the contacts: within slot 38D to bridge rivet contacts 216 and 222 (of printed circuit portions 208 and 206, respectively); within slot 38C to bridge rivet contacts 218 and 220 (of printed circuit portions 210 and 208, respectively); within slot 38E to bridge rivet contacts 232 and 234 (of printed circuit portions 200 and 202, respectively); within slot 38 F to bridge rivet contacts 238 and 236 (of printed circuit portions 214 and 208, respectively) and within slot 38 B to however, that the invention is not limited to the use of such rivets 34 and, in fact, may be practiced in many other forms employing other suitable conductor means for electrically coupling the printed circuitry to terminals situated on the upper side of the printed circuit board 28.

Further, both the preferred embodiment as well as the first modification of the invention, shown in FIG. 10, disclose the use of ball type contacts 40. Even though such contacts represent the preferred configuration, the invention may be practiced employing movable contacts of a configuration other than spherical. Accordingly, FIGS. 12, 13 and 14 illustrate a further modification of the invention employing movable electrical contacts of a configuration other than spherical.

In the modification of FIGS. 12, 13 and 14 slots 38 accommodate a generally horizontally disposed contact strip 140 which is preferably brazed to contacts 142, 144. As seen in both FIGS. 12 and 13, contacts 142 and 144 are so positioned with respect to each other as to be in proper position for effecting engagement with the related conductor or rivets 34 when disc or body 36 is rotated to selected switched positions.

Recesses 146 and 148 formed in upper plate or member 64 respectively accommodate one end of springs 150 and 152 which, at their other ends, engage the bridging contact strip 140. Preferably, as shown in FIG. 13, each of the contacts may be provided with an extension 154 closely receive through an aperture formed in contact strip 140 so as to better secure the respective contacts 142 and 144 to the contact strip 140.

As also illustrated in FIGS. 12 and 13, each of the contacts 142 and 144 is provided with a lower flattened portion 156 adapted to form a surface for engaging the terminal ends 158 of the conductors or rivets 34. Further, each of the contacts, such as 142 and 144 are preferably provided with a chamfered or inclined surface portion 160 in order to aid in the upward and downward movement of the contacts 142 and 144 as such contacts are brought into and out of engagement with the fixed contacts or rivets 34.

The invention can, of course, be practiced not only by varying the configuration of the various elements comprising the invention but also by varying the relative functions of certain of the elements. For example, it is conceivable that under certain circumstances the circuitry and contacts carried by disc or member 28 could be situated so as to be rotated by the arm assembly 60 relative to the contacts carried by body or disc member 36 which, in such case, would be in a fixed position.

Although only one preferred embodiment and two selected modifications of the invention have been disclosed and described, it is apparent that other embodiments and modifications of the invention are possible within the scope of the appended claims.

I claim:

1. An electrical switch assembly, comprising a housing, a first member carried by said housing and supporting a plurality of electrical circuits thereon, a plurality of first electrical circuits thereon, a plurality of first electrical terminals carried by said first member and electrically connected to said plurali-

ty of electrical circuits, a second member rotatably carried by said housing, a plurality of electrical contacts operatively carried by said second member, said electrical contacts being so arranged as to be generally directed toward said first member, resilient means operatively engaging said electrical contacts and normally urging said electrical contacts in a direction generally toward said first member, and manually operative means for effecting relative rotation between said first and second members in order to cause sequential engagement and disengagement between said electrical contacts and said electrical terminals, said plurality of electrical circuits comprising a plurality of printed circuits of a predetermined pattern imprinted on one side of said first member, means for nonrotatably supporting said first member in said housing, a plurality of bridging contact members carried by said rotatable member and engaging said electrical contacts, a plurality of prearranged slots formed in said rotatable member for respectively receiving therein pairs of said plurality of electrical contacts and at least one of said bridging contact members, said rotatable member being annular in shape and provided with a central opening, at least two of said slots having openings extending into said central opening, and said bridging contact members situated within said at least two slots include extensions passing through said openings of said slots.

2. An electrical switch assembly, comprising a housing, a first member carried by said housing and supporting a plurality of electrical circuits thereon, a plurality of first electrical terminals carried by said first member and electrically connected to said plurality of electrical circuits, a second member rotatably carried by said housing, a plurality of electrical contacts operatively carried by said second member, said electrical contacts being so arranged as to be generally directed toward said first member, resilient means operatively engaging said electrical contacts and normally urging said electrical contacts in a direction generally toward said first member, and manually operative means for effecting relative rotation between said first and second members in order to cause sequential engagement and disengagement between said electrical contacts and said electrical terminals, said plurality of electrical circuits comprising a plurality of printed circuits of a predetermined pattern imprinted on one side of said first member, means for nonrotatably supporting said first member in said housing, a plurality of bridging contact members carried by said rotatable member and engaging said electrical contacts, said housing comprising an outer tubular casing and a second tubular member telescopically received within said outer casing, said nonrotatable member being mounted on said tubular member and said rotatable member being positioned within said tubular casing above said second tubular member, an upwardly extending arcuate flange provided on said outer tubular casing, said manually operative means comprising an elongated arm operatively connected to said rotatable member for effecting rotation of said rotatable member, cooperating detent means carried by said arm and said flange, said detent means being effective for maintaining said arm in any selected position to which said arm has been rotated, and lever means pivotally carried on said arm, said lever means including a portion adapted to abutably engage an abutment surface formed on said outer tubular casing in order to thereby limit rotational movement of said arm in one direction.

3. An electrical switch assembly according to claim 2, including resilient biasing means operatively engaging said lever means so as to normally maintain said lever means and said portion thereof in position as to engage said abutment surface upon sufficient rotation of said arm in said one direction.

4. In a switch mechanism for automotive turn signals or the like, the combination of a housing, a member having printed circuits of a predetermined pattern imprinted on one side thereof, means for nonrotatably supporting said member in said housing, a plurality of conductive rivets electrically connected to said printed circuits and passing transversely through said member in a predetermined arrangement, a

rotatable member mounted in said housing, a plurality of ball contacts adapted to engage said rivets, means for mounting said ball contacts in a predetermined pattern between said nonrotatable and said rotatable members, a plurality of spring-pressed contact means carried by said rotatable member and adapted to engage said ball contacts, manually operative means for effecting relative rotation between said nonrotatable and said rotatable members, and an intermediate member interposed between said nonrotatable and rotatable members, said intermediate member being provided with a plurality of slots with said ball contacts positioned in pairs within said slots, and said intermediate member being attached to one of said relatively rotatable members.

5. In a switch mechanism for automotive turn signals or the like, the combination of a housing, a member having printed circuits of a predetermined pattern imprinted on one side thereof means for nonrotatably supporting said member in said housing, a plurality of conductive rivets electrically connected to said printed circuits and passing transversely through said member in a predetermined arrangement, a rotatable member mounted in said housing, a plurality of ball contacts adapted to engage said rivets, means for mounting said ball contacts in a predetermined pattern between said nonrotatable and said rotatable members, a plurality of spring-pressed contact means carried by said rotatable member and adapted to engage said ball contacts, manually operative means for effecting relative rotation between said nonrotatable and said rotatable members, an intermediate member interposed between said nonrotatable and rotatable members, said intermediate member being provided with a plurality of slots with said ball contacts positioned in pairs within said slots said intermediate member being attached to one of said relatively rotatable members, said rotatable member being annular in shape to provide a central opening, at least two of said slots having openings into said central opening, and at least two of said spring-pressed contact means including extensions passing through said last named openings.

6. In a switch mechanism for automotive turn signals or the like, the combination of a housing, a member having printed circuits of a predetermined pattern imprinted on one side thereof, means for nonrotatably supporting said member in said housing, a plurality of conductive rivets electrically connected to said printed circuits and passing transversely through said member in a predetermined arrangement, a rotatable member mounted in said housing, a plurality of ball contacts adapted to engage said rivets, means for mounting said ball contacts in a predetermined pattern between said nonrotatable and said rotatable members, a plurality of spring-pressed contact means carried by said rotatable member and adapted to engage said ball contacts, said housing comprising an outer tubular casing and second tubular member telescopically received within the outer casing, said nonrotatable member being mounted on said second tubular member and said rotatable member being positioned within said outer tubular casing above said second tubular member, said outer tubular casing being provided with an upwardly extended arcuate flange, and an elongated handle provided for rotating said rotatable member, and cooperative detent means positioned on said handle and said flange providing for properly positioning the handle in different switch positions.

7. In a switch mechanism for automotive turn signals or the like, the combination of a housing, a member having printed circuits of a predetermined pattern imprinted on one side thereof, means for nonrotatably supporting said member in said housing, a plurality of conductive rivets electrically connected to said printed circuits and passing transversely through said member in a predetermined arrangement, a rotatable member mounted in said housing, a plurality of ball contacts adapted to engage said rivets, means for mounting said ball contacts in a predetermined pattern between said nonrotatable and said rotatable members, a plurality of spring-pressed contact means carried by said rotatable member and adapted to engage said ball contacts, said housing comprising

an outer tubular casing and second tubular member telescopically received within the outer casing, said nonrotatable member being mounted on said second tubular member and said rotatable member being positioned within said outer tubular casing above said second tubular member, said outer tubular casing being provided with an upwardly extended arcuate flange, an elongated handle provided for rotating said rotatable member, cooperative detent means positioned on said handle and said flange providing for properly positioning the handle in different switch positions, lever means pivotally mounted on said handle, said lever means having a portion adapted to engage one end of said arcuate flange to limit movement of the handle in one direction, an spring means normally maintaining said lever means in a flange-engaging position.

8. In a switch mechanism for automotive turn signals or the like, the combination of a housing, a member having printed circuits of a predetermined pattern imprinted on one side thereof, means for nonrotatably supporting said member in said housing, a plurality of fixed contacts connected to said printed circuits and passing transversely through said member in a predetermined arrangement, a rotatable member mounted in said housing, a plurality of movable contacts adapted to engage said fixed contacts, means for mounting said movable contacts in a predetermined pattern between said nonrotatable and said rotatable members a plurality of spring-pressed contact means carried by said rotatable member and adapted to engage said movable contacts, said housing comprising an outer tubular casing and a second tubular member telescopically received within the outer casing, said nonrotatable member being mounted on said second tubular member and said rotatable member being positioned within said outer tubular casing above said second tubular member, said outer tubular casing being provided with an upwardly extended arcuate flange, an elongated handle provided for rotating said rotatable member, cooperative detent means positioned on said handle and said flange providing for properly positioning the handle in different switch positions, manually releasable latching means carried by said handle, said latching means including a latch portion adapted to engage a cooperating portion of said arcuate flange to limit movement of said handle in one direction, and spring means normally maintaining said latch portion in position for engaging said cooperating portion of said arcuate flange.

9. A selector switch assembly, comprising a housing assembly, a control lever assembly, and a switch contact assembly, said housing assembly comprising a first generally tubular housing section including a radially inwardly directed annular flange formed integrally therewith, said annular flange including a generally centrally disposed first aperture formed therethrough, said control lever assembly comprising a main body portion situated against the upper end face of said annular flange and forming a generally upper end wall of said housing assembly, a cylindrical extension formed on said body portion and closely received within said first aperture for rotation therein, a spring-loaded detent member carried by said body portion, a flange portion formed integrally with said first housing section and extending longitudinally thereof, a plurality of recesses formed in said longitudinally extending flange portion generally juxtaposed to said control lever assembly body portion, an elongated handle operatively connected to said body portion for causing selective rotation of said body portion relative to said first housing section, said spring-loaded detent member being effective to sequentially traverse and engage said plurality of recesses as said body portion is rotated relative to said first housing section, a second generally cup-shaped housing section slidably received within said first housing section, the closed end of said cup-shaped second housing section forming a generally lower end wall of said housing assembly, said switch contact assembly comprising a printed circuit board carried within said housing assembly and secured against rotation to said second housing section, said printed circuit board including a plurality of printed circuit portions

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carried on the underside of said board so as to be disposed generally between said board and said second housing section, a plurality of fixed contact members arranged in a correlated pattern and extending through said board so as to have respective one ends of said contact members connected to said printed circuit portions and so as to have respective second ends terminating on the opposite side of said board, a plurality of movable bridging contact members situated in and carried by a rotatable switch body member, said plurality of movable contact members being arranged in a pattern permitting selective engagement between said movable contact members and said fixed contact members upon rotation of said rotatable switch body, resilient means carried by said rotatable switch body member for urging said movable contact members toward said opposite side of said board, said rotatable switch

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body member being situated generally within said housing assembly so as to be axially between the lower end face of said annular flange and said opposite side of said board, fastening means operatively securing said rotatable switch body member to said extension so as to contain said annular flange between said rotatable switch body member said control lever assembly body portion whereby rotation of said handle and said control lever assembly body portion causes like rotation of said rotatable switch body member and a second aperture formed in said lower end wall of said housing assembly generally centrally thereof for reception therein an electrical connector assembly through which electrical conductor means pass for connection to said printed circuit board.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,591,740

Dated July 6, 1971

Inventor(s) Wilhelm K. Kolster

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Abstract, line 4 after "electrically" insert "connected".
Column 4, line 26 "134" should be --34--; line 39, after "and" insert lines 62 through 75, column 4; all of lines 1 through 17, column 5 and the words "within slot 38B to" of line 18. Column 4, delete lines 62 through 75; all of lines 1 through 17, column 5 and the words "within slot 38B" of line 18. Column 4, line 72 ")" should be --(--; line 75 "to" should be --so--. Column 5, line 7 after respectively insert--)--;.
Claim 1, line 4 delete "circuits thereon, a plurality of first electrical". Claim 9, column 10, line 6 after "member" insert --and--.

Signed and sealed this 14th day of March 1972.

(SEAL)

Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents