DETACHABLE LAMP ASSEMBLY FOR ELECTRICAL SWITCH

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9 Claims. (Cl. 200—167)

This invention relates to demountable lamp assemblies and is more particularly concerned with an indicating lamp assembly which may be used with an electric switch.

Switches known as manually operated fractional horsepower starters frequently are combined with indicating devices, such as pilot lights, to indicate the operating condition of the electrical apparatus controlled by the switch. Manually operated starters are manufactured and sold as either single or double pole types and may be furnished either with or without pilot lights. Thus, in the interest of effecting maximum economy in the manufacture, warehousing and distribution of the various combinations which may be required, it is desirable that the various combinations have a maximum number of common parts.

To accomplish this objective, the switch used with the present invention is arranged so it may be made of common parts to provide either a single or double pole switching function and the components associated with the pilot light may be furnished in kit form so the pilot light may be readily attached to provide the switch with a pilot light and proper terminations to satisfy electrical code requirements.

It is an object of the present invention to provide a low cost pilot light which may be readily mounted adjacent to a side wall of an electric switch.

Another object is to provide a pilot light kit for a manually operated starter which kit includes an inexpensive pilot light assembly which may be readily attached to a side wall of the starter and a terminal member which when inserted into a suitable opening in a single pole starter will provide terminal connections to satisfy electrical code requirements.

A further object is to use a minimum number of inexpensive parts in a pilot light which may be readily attached to a side wall of a manually operated switch. Further objects and features of the invention will be readily apparent to those skilled in the art from the specification and appended drawing illustrating a preferred embodiment, in which:

FIG. 1 is a top plan view of a single pole electric switch with a pilot light assembly incorporating the features of the present invention mounted thereon.

FIG. 2 is a side elevation view of a portion of the switch in FIG. 1 with a terminal portion removed.

FIG. 3 is a side view of one of the terminal and contact carrying members used in the switch in FIG. 1.

FIG. 4 is an exploded view of the parts forming the terminal connector as used in the switch in FIG. 1.

FIG. 5 is a cross sectional view of a pilot light assembly according to the present invention.

FIGS. 6 and 7 are top and bottom views of the light assembly in FIG. 5 with the bulb of the assembly omitted.

FIG. 8 is a side view of the light assembly in FIG. 5 with the bulb of the assembly omitted.

FIG. 9 is a view of a detached portion of the lamp socket used in the pilot light in FIG. 5.

As shown in FIG. 1, a pilot light assembly 10, incorporating the features of the present invention, is illustrated as mounted adjacent a flat side wall 12 of a manually operated switch 14. The switch 14 may be of any suitable manually operated type and may be furnished with or without an overload element, as will be hereinafter described. The switch 14, as shown, is of the type disclosed in an application for patent, Ser. No. 540,406, filed concurrently herewith and assigned by Jordan F. Puetz to the assignee of the present invention.

The switch 14 has a housing 16 of insulating material which is formed to provide the flat side wall 12 and four downwardly extending recesses which extend to four ledges indicated as 17, 18, 19, and 20. The ledges 17—20 are coplanar and are arranged so the ledges 17 and 18 are adjacent one side wall and the ledges 19 and 20 are adjacent the opposite side wall of the switch 14. Extending between the ledges 17 and 19 is a passage 21 which has a bottom wall coplanar with the ledges 17 and 19 and a top wall spaced above the plane through the ledges 17 and 19. Extending downwardly from each of the ledges 17—20 are indentations 17a, 18a, 19a, and 20a, each of which extends to an opening in the side walls of the housing 16. The position of two of the openings 22 and 23 is illustrated in FIG. 2 as being spaced directly below the ledges 19 and 20. It is to be understood that similar openings, not shown, are located beneath the ledges 17 and 18. Positioned on each of the ledges 18 and 20 and extending into the openings associated with the ledges 18 and 20, is a terminal and contact member 24, having the shape illustrated in FIG. 3. The terminal contact member 24 is formed of a U-shaped metal part to provide a pair of arms 25 and 26 interconnected by a bridge portion 27. The terminal and contact members 24 are each formed to have the arm 25 resting upon one of the respective ledges 18 and 20 while the bridge portion 27 is received in the indentations 18a and 20a and the arm 26 extends through the openings associated with the ledges 18 and 20, e.g. the opening 23 which is associated with the ledge 20, into an internal cavity of the housing 16. Each of the arms 26 has a contact portion thereon which is engaged by a portion of a movable contact which bridges the terminal contact members 24 associated with the ledges 18 and 20. The arms 25 are each provided with a threaded aperture to receive a wire clamping means including a screw 28.

When the switch is installed in a circuit, the terminal and contact member positioned on ledge 20 will be connected to a conductor from a current source and therefore is known as the line terminal 24a. The terminal and contact member 24 positioned on the ledge 18 and designated as 24b will be connected to a terminal of an electric load and hence will be known as the load terminal 24b of the switch 14. The housing 16 is additionally provided with a ledge 29 to provide a support for a melting alloy type thermal release element 30 and a terminal 31. The thermal overload release element 30 is of the well known conventional type and has one terminal end portion secured by the screw 28 of the terminal contact assembly 24b and another terminal end portion secured by a screw 32 on the terminal 31. The terminal 31 also includes a screw 33 which may serve as the load terminal when the overload release element is connected in circuit with the terminal member 24b, as shown.

The pilot light assembly 10 has a housing 40 formed of a molded insulating material to have a generally rectangular shape with a top wall 41 and a bottom wall 42 and a generally cylindrical cavity 43 extending from an opening in the top wall 41 to the bottom wall 42 which provides a closure for the bottom of the cavity 43. Extending parallel to the axis of the cylindrical cavity 43, is a generally flat external side wall 44 which extends downwardly below the bottom wall 42 to provide an area in the lower portion 45. The flange portion 45 is provided with an upwardly extending notch 46. Extending from the side wall 44 of the housing 40 is a hook 47 which has a portion 48 extending perpendicular to the side wall and a
portion 49 formed on the free end of the portion 48. The portion 48 extends upwardly and parallel to the side wall 44. As shown in FIG. 8, the side wall 12 of the housing 16 is provided with two spaced openings 50 and 51 which are arranged so that when the portion 48 of the hook 47 is received in the opening 50, the portion 49 will engage the inner surface of the wall 12 as the notch 46 is aligned with the opening 51. Thus when a threaded connector, such as a screw 52, is threaded into the opening 51, the pilot light assembly 10 is secured to the flat sidewall 12.

As shown in FIGS. 5 and 6, extending downwardly along the walls of the cavity 43 are a pair of oppositely facing rectangular grooves 53 and 54. Formed on the opposite edges of the grooves 53 and 54 are circular indentations 55 and 56. Additionally, centrally formed in the groove 53 is a hemispherical groove 57 which is aligned with an opening 58 in the bottom wall. The bottom wall also has an opening 59 aligned with the central axis of the cylindrical cavity 43. Surrounding the opening 59 and extending into the cavity 43 is a raised flange 60. As shown in FIG. 7, the bottom wall is provided with an adaptive pair of openings 61.

Positioned within the cavity 43 is a lamp socket assembly 70 which includes a U-shaped metal member 71, a disc-like insulating member 72, a conducting rivet-like member 73, a compression spring 74, and a resistor 75. As shown in FIG. 9, the U-shaped metal member 71 has a pair of spaced arms 76 and 77 extending along opposite edges of a generally circular bight portion 78. The bight portion 78 has a centrally located opening 79 therein, shown in FIG. 5, which surrounds the flange 60 to position the U-shaped metal member 71 in the cavity 43 when the arms 76 and 77 are received in the grooves 53 and 54. As shown in FIG. 5, the arms 76 and 77 are sized so that the indentations 55 and 56 each provide an entry passage to conventional bayonet-type sockets 80 and 81 located in the arms 76 and 77. The arms 76 and 77 each have an integrally formed stop indicated on the respective arms by numerals 82 and 83. The stops 82 and 83 are formed as inwardly turned metal tongues which are disposed between the bayonet sockets 80 and 81 and the bight portion 78. As shown in FIG. 5, an assembly consisting of the disc-like member 72 and the rivet-like member 73, is guided for movement by the arms 76 and 77 between the stops 82 and 83 and the bight portion 78. The disc-like member 72 has a central opening 84 and receiving a shank 85 of the rivet-like member 73 when the rivet-like member 73 is positioned so its head portion faces the top wall 41. The shank portion 85, which is deformed during assembly to secure the rivet-like member 73 to the disc-like member 72, includes a cavity wherein one end of an electrical conductor 86 is electrically secured. The conductor 86 extends through the opening 59 and may be provided with a suitable eyelet 87 at its other free end. When the parts are assembled, the compression spring 74 is positioned to have one end resting on the bight portion 78 and have its other end engaging the disc-like member 72 to constantly urge the disc-like member toward the stops 82 and 83 which are formed by bending portions of the arms 76 and 77 inwardly to the position shown after the assembly, consisting of the disc-like member 72, the rivet-like member 73 and the conductor 86, are assembled and installed between the arms 76 and 77. The lamp socket assembly 70 additionally includes the resistor 75 which has one end electrically secured to the arm 76 and another end electrically secured to a free end of a conductor 90 which extends through the opening 58 when the socket assembly is installed in the housing 40. The other free end of the conductor 90 may be provided with an eyelet 91. As shown in FIG. 5, the conductor 75, is arranged to be received in the hemispherical groove 57 and to be maintained therein by the arm 76. The socket assembly is maintained in position in the cavity 43 by a pair of metal tangs 92 which are formed on the bight portion 78 to extend downwardly through the openings 61 when the free ends of the tangs 92 are deformed to engage portions of the bottom wall 42, as in FIG. 7.

As shown in FIG. 5, a lamp bulb 93 may be secured in the socket assembly 70 in the conventional manner when a pair of oppositely extending projections 94 on the base of the lamp bulb are directed downwardly through the indentations 55 and 56 into a position wherein the projections 94 may be received in the bayonet sockets 80 and 81. When the lamp 93 is thus positioned, the projections 94 will provide an electrical connection with the arms 76 and 77 while a central terminal 95 of the lamp 93 is engaged by the arm 85 when the spring into engagement with the central terminal 95.

The switch 14, as shown in FIG. 1, may be either of the single or double pole type. When the switch 14 is assembled as a double pole type, a separate terminal contact member 24 is provided for each of the ledges 17-20. When the switch 14 is thus assembled and a pair of accessible contacts, not shown, are moved into engagement with the terminal contact members 24 associated with the pair of ledges 17 and 19 and with the terminal contact member 24 associated with the pair of ledges 18 and 20, a pair of circuits will be completed in a manner set forth in the application supra.

The switch shown in FIG. 1 is of the single pole type as it includes a single pair of terminal and contact members 24 which are positioned on the ledges 18 and 20. The switch 14 also includes a terminal member assembly 100, the parts of which are shown in FIG. 4. The terminal member assembly 100 provides a convenient arrangement whereby the switch and pilot light assembly may be wired to comply with the standards of safety for industrial control equipment as required by Underwriters' Laboratories, Inc. One of the requirements of Underwriters' Laboratories is "Industrial Control equipment shall be provided with suitable wiring terminals or leads for connection to conductors..." and that "Terminal parts by which field-wiring connections are made shall ensure thoroughly good connections even under hard usage..." and "for a No. 8 AWG or smaller wire, the parts to which wiring connections are made may consist of clamps or binding screws with terminal plates having upturning lugs or the equivalent to hold the wires in position."

As shown in FIG. 4, the terminal assembly, supplied to satisfy the Underwriters' Laboratories requirements, comprises a metal part 101 having a central portion which is received in the passage 21 and a pair of integral portions 102 and 103 which rest upon the respective ledges 17 and 19. The portions 102 and 103 are each provided with a threaded opening to receive screws 104 which will position wire clamping members or washers 105 on the portions 102 and 103. When the screws 104 and washers 105 are tightened into the portions 102 and 103, the ends of the screws 104 will extend into suitable passages in which are molten into the housing 15 to maintain the member 101 in position as described.

When the pilot light assembly 10 is secured to the wall of the switch 14, and the wiring connections to the pilot light are made, one of the conductors, e.g., conductor 86, has its eyelet 87 secured by the screw 33 while the other conductor e.g., conductor 90, is positioned so its eyelet 91 is secured by the screw 104. The switch is installed in service by connecting a pair of line conductors respectively to the terminals 102 and 103 to form a complete circuit.

The portion 102. The connection to the load is made by connecting one of the load conductors to the terminal portion 103 and securing the other load conductor by the terminal screw 33. Thus it is apparent that if the single pole switch 14 is to be furnished with a pilot light, the conversion can be easily made as the pilot light assembly may be furnished as a separate kit which may
be readily attached to the switch without difficulty in the manner described.

While certain preferred embodiments of the invention have been specifically disclosed, it is understood that the invention is not limited thereto, as many variations will be readily apparent to those skilled in the art and the inventor is to be given its broadest possible interpretation within the terms of the following claims.

What is claimed is:

1. A lamp assembly comprising an insulating housing having a generally cylindrical cavity extending from an open top wall to a closed bottom wall, at least one wall extending parallel to the cylindrical cavity to provide a flange extending beyond the bottom wall, a lamp socket assembly in the cavity, a lamp having a portion secured in the socket assembly, a hook integrally formed on the side wall having a portion extending perpendicularly to the side wall and a portion extending parallel to the side wall, and a notch extending upwardly in the flange, said hook and notch arranged so the hook is received in an opening in an outer wall of an electric switch while the notch is threaded with a threaded opening in the outer wall for passing a threaded connector into the threaded opening for securing the assembly to the switch.

2. The combination as recited in claim 1 including a groove formed in an outer wall of the cavity and a resistor positioned in the groove by the socket assembly.

3. The combination as recited in claim 1 wherein the socket assembly comprises a generally U-shaped metal member having a bight portion and a pair of spaced parallel arms extending along opposite marginal edges of the bight portion, a disc-like insulating member positioned between the arms, said disc-like member having a central opening therein, a conducting rivet-like member secured in said opening providing a terminal end for a conductor extending through the opening in the bottom wall, an opening in the bight portion receiving a flange surrounding the opening in the bottom wall, a compression spring having an end resting on the bight portion and an end engaging the disc-like member for constantly biasing the member toward the top wall, a pair of stops each integrally formed on one of the arms for limiting movement of the disc-like member toward the top wall and a pair of spaced tangs integrally formed on the bight portion and extending downwardly through a pair of spaced openings in the bottom wall for securing the socket assembly in the cavity.

4. The combination as recited in claim 3 wherein each of the arms has a bayonet socket formed therein for receiving bayonet lamps on the lamp.

5. The combination as recited in claim 4 wherein the walls of the cylindrical cavity have rectangular grooves therein for positioning the arms of the metal member and providing a passage for the bases of the lamp into the bayonet sockets.

6. The combination as recited in claim 5 including a groove formed in an outer wall of the cavity and extending outwardly of one of the slots and a resistor positioned in the groove by the arm extending in the said one slot.

7. The combination as recited in claim 6 wherein the resistor has one side connected to the arm which positions the resistor in its groove and another side connected to a conductor extending through an opening in the bottom wall.

8. The combination comprising: a single pole switch having an insulating housing providing a support for first line terminal and a first load terminal and a current responsive overload element, said housing having a pair of spaced latches adapted to provide a support for a second pair of removable terminal members, a passage extending between the pair of latches and an outer wall having a substantially flat surface portion with a pair of spaced openings in the flat surface portion, a lamp assembly comprising an insulating housing having a generally cylindrical cavity extending from an open top wall to a closed bottom wall, at least one side wall extending parallel to the cylindrical cavity to provide a flange portion extending beyond the bottom wall, a lamp socket assembly in the cavity, a lamp having a portion secured in the lamp socket assembly, a pair of load wires each having one end connected to the lamp socket assembly and a second end extending external to the lamp socket assembly housing, a hook integrally formed on the side wall having a portion extending perpendicularly to the side wall and a portion extending parallel to the side wall, and a notch extending upwardly in the flange, said hook and notch arranged so the hook is received in one of the openings in the outer wall of the switch while the notch is aligned with the other of said pair of openings in the outer wall of the switch for passing a threaded connector into the said other opening for securing the lamp socket assembly to the outer wall of the switch and a conducting metal part assembly having a pair of spaced portions each including a terminal screw with each of the portions resting on one of the ledges to provide a second line and a second load terminal when the second pair of terminals are absent and a portion extending through the passage for interconnecting the spaced portions to electrically interconnect the second line and second load terminal whereby the second end of one of the load wires may be electrically connected to the second line terminal.

9. The combination as recited in claim 8 wherein the lamp socket assembly comprises a generally U-shaped metal member having a bight portion and a pair of spaced parallel arms extending along opposite marginal edges of the bight portion, a disc-like insulating member positioned between the arms, said disc-like member having a central opening therein, a conducting rivet-like member secured in said opening providing a terminal end for one of the conductors which extends through an opening in the bottom wall, an opening in the bight portion receiving a flange surrounding the opening in the bottom wall, a compression spring having an end resting on the bight portion and an end engaging the disc-like member for constantly biasing the member toward the top wall, a pair of stops each integrally formed on one of the arms for limiting movement of the disc-like member toward the top wall and a pair of spaced tangs integrally formed on the bight portion and extending downwardly through a pair of spaced openings in the bottom wall for securing the lamp socket assembly in the cavity.

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