

LOCKABLE ROTARY ELECTRICAL SWITCH

5 FIELD OF THE INVENTION

This invention relates to improvements to electrical switch assemblies.

For the purpose of explanation, reference will be made to "industrial" electrical switch assemblies,
10 although this invention is not limited in its application to switch assemblies of this type in so much as it may be utilised in non-industrial or domestic electrical switch assemblies as well,

PRIORITY

15 This patent application claims priority from:

- Australian Provisional Patent Application AU 2008906561, titled "Improvements to electrical switch assemblies", and filed on 22 December 2008.

The entire content of this application is hereby incorporated by reference.

20 BACKGROUND

Industrial electrical switchgear is adapted for use in environments where there will be exposure to one or more of dirt, dust and moisture, such as outdoor environments and harsh indoor environments, such as those found in warehouses and factories.

25

One type of industrial electrical switch assembly comprises a rotary switch (or knob) rotatably nested within a base, where there are one or more seals or gaskets located between the rotary switch and its base so as to prevent dirt, dust and/or moisture from passing between these and fouling the workings of the switch.

30

From time to time it is necessary to prevent the operation of these electrical switches by locking them. One simple technique for facilitating locking is to provide an aperture through both a portion of each of the rotary switch and the base, where these apertures may be aligned when the switch is set in a selected position (usually the "Off" position). In this way, a shank of a padlock may be passed through these
35 aligned apertures and locked closed so as to prevent rotation of the rotary switch relative to the base.

One problem with the above described locking technique is that the apertures for the padlock shank have been found to provide both a gathering and entry point (i.e. entry to the switch) for dust, dirt and moisture.

- 5 An object of the present disclosure then is to provide an electrical switch assembly in which the above described short comings have been substantially ameliorated, or which may, at the least, serve as a useful alternative to known electrical switch assemblies.

For the purpose of this specification the word "comprising" means "including but not limited to", and the word 'comprises' has a corresponding meaning.

SUMMARY OF THE INVENTION

15 In one aspect of the invention, there is proposed an electrical switch assembly comprising a rotary switch having a circular face which is rotatably nested in a collar extending from a base, there being a collar aperture passing through the collar so that an outer end of the collar aperture is located in an outer surface of the collar and an inner end of the collar aperture is located in an inner surface of the collar, where at least the outer end of the collar aperture is located at a level which is below a level of a horizontal centre line.

20

In one form, the rotary switch comprises a circular face defining an annular, circumferential rim.

25 In a further aspect, the invention may include an electrical switch assembly comprising a rotary switch having a circular face defining an annular, circumferential rim, the rotary switch being rotatably nested in a collar extending from a base so that the rotary switch has an axis of rotation which passes through the centre of the circular face of the switch and which is directed normal to the face, there being a collar aperture passing through the collar so that an outer end of the collar aperture is located in an outer surface of the collar and an inner end of the collar aperture is located in an inner surface of the collar, where at least the outer end of the collar aperture is located at a level which is below a level of a horizontal centre line.

30

In one form, when the switch is in a selected position, both the collar aperture and a rim aperture through the rim of the rotary switch are aligned, so that a shank of a padlock may be passed through the both of these.

35

In one form, the outer end of the collar aperture is at a level which is lower than the inner end of the collar aperture.

In one form, in an alternative, the outer end of the collar aperture is at a level which is higher than the inner end of the collar aperture.

In one form, the outer end of the collar aperture is at a level which is the same as that of the inner end of the collar aperture.

In one form, the inner end of the collar aperture is below a level of the horizontal centre line of the rotary switch's circular face.

In a further aspect, there is proposed an electrical switch assembly comprising a rotary switch having a circular face defining an annular, circumferential rim, the rotary switch being rotatably nested in a collar extending from a base so that the rotary switch has an axis of rotation which passes through the centre of the circular face of the switch and which is directed normal to this face, there being a collar aperture passing through the collar so that a centre line of the collar aperture extends radially from the axis of rotation of the rotary switch with a downward angle of inclination.

In one form, the rotary switch is a knob.

In one form, the rotary switch is rotatable between at least first and second positions.

In one form, the first and second positions are the switch assembly's "On" and "Off" positions.

In one form, the selected position is the "Off" position.

In one form, when the rotary switch is turned to the "On" position, the rim aperture is moved so as to be behind the collar of the base.

In one form, there are two collar apertures passing through the collar, where at least the outer end of the or each of these collar apertures is located at a level which is below a level of the horizontal centre line of the rotary switch's circular face.

In one form, each of these collar apertures is mirrored about a vertical centre line of the rotary switch's circular face.

In one form, there are two rim apertures passing through the rim of the rotary switch.

5

In one form, when the switch is in the selected position, each of the rim apertures is aligned with respect to one of the collar apertures.

10

In a further aspect, there is proposed a base for an electrical switch assembly, the base having a collar extending therefrom, said collar defining a rotary switch region adapted to have a knob rotatably nested therein, there being a collar aperture passing through the collar so that an outer end of the collar aperture is located in an outer surface of the collar and an inner end of the collar aperture is located in an inner surface of the collar, where at least the outer end of the collar aperture is located at a level which is below a level of the horizontal centre line of the switch region.

15

20

In a further aspect, there is proposed a base for an electrical switch assembly, the base having a collar extending therefrom, said collar defining an aperture adapted to have a knob rotatably nested therein, there being a collar aperture passing through the collar so that an outer end of the collar aperture is located in an outer surface of the collar and an inner end of the collar aperture is located in an inner surface of the collar, where at least the outer end of the collar aperture is positioned and/or directed so as to reduce moisture and/or particulate incursion.

25

A further difficulty with the lockable switch assemblies of the prior art was that of providing sufficient space within the rotary switch for the shank of the padlock.

30

In one form then, when the switch is in the selected position, both the collar aperture and an aperture through the rim of the rotary switch are aligned, so that the shank of a padlock may be passed through the both of these such that the shank extends in a direction that is not substantially perpendicular to the direction of elongation of the rib.

In this way the extent of space made available for the padlock shank in the approximately semi-circle shaped recess defined by the rim and the rib is maximised, so that the likelihood of the insertion or removal of the padlock shank being obstructed by the rib is minimised.

In this respect, before explaining at least one embodiment of the invention in detail, it is to be understood that the invention is not limited in its application to the details of construction and to the arrangements of the components set forth in the following description or illustrated in the drawings. The invention is capable of embodiments in addition to those described and of being practiced and carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein are for the purpose of description and should not be regarded as limiting.

The accompanying drawings, which are incorporated in and constitute a part of this specification, illustrate certain embodiments of the invention, and together with the description, serve to explain the principles of the invention.

Those skilled in the art will appreciate that the conception upon which this disclosure is based may readily be utilised as a basis for designing other structures, methods, and systems for carrying out the several purposes of the present invention. It is important, therefore, to recognise that any claims should be regarded as including such equivalent constructions insofar as they do not depart from the spirit and scope of the present invention.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of this invention, it will now be described with respect to one or more exemplary embodiments, which shall be described herein with the assistance of drawings wherein:

Figure 1 is a front view of an electrical switch assembly;

Figure 2 is a side view of the electrical switch assembly in Figure 1;

Figure 3 is a perspective view of the electrical switch assembly in Figure 2;

Figures 4 and 5 are perspective views of the electrical switch assembly in Figures 1 through 3, illustrating the shank of a padlock extending through the aligned apertures; and

Figure 6 is a perspective view of a base for an electrical switch assembly as illustrated in Figures 1 through 3.

In the following description, like reference characters designate like or corresponding parts throughout the several views of the drawings.

DETAILED DESCRIPTION

5

Referring now to Figures 1 through 3, where an exemplary embodiment of an "industrial" electrical switch assembly is illustrated.

The switch assembly 1 includes a generally box shaped base 2 (illustrated in isolation in Figure 6), which
10 houses the workings of the switch assembly and which has a front face 4 and an opposing rear surface 6 via which the base 2 is adapted to be secured to a support surface therefore.

Rotatably located in the front face 4 of the base 2 is a rotary switch (or knob) 8; this rotary switch 8 is generally cylindrical, so it has a circular face 10, and an axis of rotation A-A which passes through the
15 centre of the circular face 10 and which is directed normal to the circular face 10.

A pair of symmetrical, approximately semi-circle shaped recesses are moulded into the face 10 of the rotary switch 8 so that the switch face 10 is defined by an annular, circumferential rim 12 having an outwardly directed lip and a rib 16 extending from one side of the rim 12 to the other. This rib 16 then is
20 the portion which a user may grasp (usually between their thumb and forefinger) to turn the rotary switch 8.

The face 10 of the rotary switch 8 is raised relative to the face 4 of the base 2, and a flange extends out from the face 4 of the base 2 and around the circumference of the rotary switch 8 forming a collar 18
25 which meets a back edge of the outwardly directed lip of the rotary switch's face 10. In one embodiment, this collar 18 is blended from the face 4 of the base 2 out to the rim 12 of the rotary switch's face 10. An advantage of blending the collar 18 in this fashion is that dirt and dust will less readily settle upon this blended surface than it would a flat, horizontal surface.

A collar aperture, which is in this case a generally U-shaped notch 20, is formed into the collar 18 so that
30 an outer end 20a of the notch 20 is located in an outer surface of the collar 18 and an inner end 20b of the notch 20 is located in an inner surface of the collar 18; the outer end 20a of the notch 20 is at a level lower than the inner end 20b of the notch 20, and both ends 20a and 20b of the notch 20 are located at a level below a level of the horizontal centre line a-a of the rotary switch's 8 circular face 10.

35

In other words, a centre line x-x of the notch 20 may be defined as extending radially from the axis of rotation of the rotary switch 8 with a downward angle of inclination.

It should be understood that the inner end 20b of the notch 20 may be lower than or at the same level as the outer end 20a, so long as the outer end 20a is below the a level of the horizontal centre line a-a.

This notch 20 is sized (i.e. it is both wide and deep enough) so that a shank 42 of a padlock 40 may locate therein (see Figures 4 and 5).

A rim aperture 30 passes through the rim 12 of the rotary switch 8 so that an outer end 30a of the rim aperture 30 is located in an outer surface of the rim and an inner end 30b of the rim aperture 30 is located in an inner surface of the rim 12. When the switch is located in its "Off" position, the outer end 30a of the rim aperture 30 is at a level which is lower than the level of the inner end 30b of the rim aperture 30, and both ends 30a and 30b of the rim aperture 30 are located at a level below a level of the centre line a-a of the rotary switch's 8 circular face 10.

In other words, when the rotary switch 8 is in its "Off" position, the centre line x-x of the rim aperture 30 may be defined as extending radially from the axis of rotation A-A of the rotary switch 8 with a downward angle of inclination.

This rim aperture 30 is sized (i.e. its diameter is sufficient) so that a shank 42 of a padlock 40 may be passed therethrough, as illustrated in Figures 4 and 5.

When the switch is turned to the "Off" position, both the collar aperture or notch 20, and the rim aperture 30 are aligned, and a shank 42 of a padlock 40 may be passed through the rim aperture 30 and locate and be captured in the notch 20, so that the act of locking the padlock 40 closed will lock the rotary switch 8 in this position relative to the base 2.

When the rotary switch 8 is turned to the "On" position, the rim aperture 30 is moved so as to be behind the collar 18 of the base 2. In this position, this rim aperture 30 cannot form a ledge upon which dust and dirt may gather.

As can be seen in Figure 1, the dust and dirt 50 falls past the collar aperture 20 due to the fact that the collar aperture 20 is located below the horizontal centre line a-a of the rotary switch 8 and collar 18.

A significant advantage of positioning and orienting the collar aperture or notch 20 in this fashion is that it is both vertically shielded from dust, dirt and water, by the collar 18 portion directly above the collar notch 20, and it does not form a ledge upon which dust and dirt 50 may easily gather, by virtue of its combined outward and downward inclination. Moreover, water cannot run down the collar aperture or notch 20 toward the rotary switch 8. If the notch 20 were oriented so that it did form a ledge upon which dust and dirt 50 could gather, either of operation of the switch 8 or location of a padlock shank 42 in the notch 20 could well cause this dust and dirt to work its way between the rotary switch 8 and the base 2.

Moreover, when the switch is in the selected (i.e. "Off") position, and the shank 42 of the padlock 40 is passed through the apertures 20 and 30, the shank 42 extends in a direction that is not substantially perpendicular to the direction of elongation of the rib 16.

In this way the extent of space made available for the padlock shank 42 in the approximately semi-circle shaped recess defined by the rim 12 and the rib 16 is maximised, so that the likelihood of the insertion or removal of the padlock shank 42 being obstructed by the rib 16 is minimised.

Figure 6 shows the base 2 for the electrical switch assembly 1. The base 2 has a collar 18 extending therefrom. The collar defines a rotary switch region 60 which may be a well, recess or aperture, adapted to have a rotary switch nested therein. A collar aperture or notch 20 passes through the collar 18 so that an outer end 20a of the collar aperture or notch 20 is located in an outer surface of the collar 18 and an inner end 20b of the collar aperture or notch 20 is located in an inner surface of the collar 18. In this example, at least the outer end 20a of the collar aperture or notch 20 through the collar 18 is located at a level which is below a level of the horizontal centre line a-a of the rotary switch region 60.

All publications mentioned in this specification are herein incorporated by reference. Any discussion of documents, acts, materials, devices, articles or the like which has been included in the present specification is solely for the purpose of providing a context for the present invention. It is not to be taken as an admission that any or all of these matters form part of the prior art base or were common general knowledge in the field relevant to the present invention as it existed in Australia or elsewhere before the priority date of each claim of this application.

Although the disclosure has been herein shown and described in what is conceived to be the most practical and preferred embodiment, it is recognized that departures can be made within the scope of the invention, which is not to be limited to the details described herein but is to be accorded the full scope of any appended claims so as to embrace any and all equivalent devices and apparatus:

CLAIMS:

1. An electrical switch assembly comprising a rotary switch having a circular face which is rotatably nested in a collar extending from a base, there being at least one collar aperture passing through the collar so that an outer end of the at least one collar aperture is located in an outer surface of the collar and an inner end of the at least one collar aperture is located in an inner surface of the collar, where at least the outer end of each of the at least one collar aperture is located at a level which is below a level of a horizontal centre line.
2. The electrical switch assembly of claim 1, wherein when the rotary switch is in a selected position, both the at least one collar aperture and a rim aperture through an annular, circumferential rim of the rotary switch are aligned, so that a shank of a padlock may be passed through the both of these apertures.
3. The electrical switch assembly as in either of claims 1 or 2, wherein the outer end of the at least one collar aperture is at a level which is lower than the inner end of the at least one collar aperture.
4. The electrical switch assembly as in either of claims 1 or 2, wherein the outer end of the at least one collar aperture is at a level which is higher than the inner end of the at least one collar aperture.
5. The electrical switch assembly as in either of claims 1 or 2, wherein the outer end of the at least one collar aperture is at a level which is the same as that of the inner end of the at least one collar aperture.
6. The electrical switch assembly as in any one of the preceding claims, wherein the inner end of the at least one collar aperture is below a level of the horizontal centre line of the rotary switch's circular face.
7. The electrical switch assembly as in any one of the preceding claims, wherein the rotary switch is a knob.
8. The electrical switch assembly as in any one of the claims 2 to 7, wherein the rotary switch is rotatable between at least first and second positions.
9. The electrical switch assembly as in claim 8, wherein the first and second positions are "On" and "Off" positions.

10. The electrical switch assembly as in claim 9, wherein the selected position is the “Off” position.
11. The electrical switch assembly as in either one of claims 9 or 10, wherein when the rotary switch is turned to the “On” position, the rim aperture is moved so as to be behind the collar of the base.
12. The electrical switch assembly as in any one of the preceding claims, wherein the at least one collar aperture includes two collar apertures, where at least the outer end of each of these collar apertures is located at a level which is below a level of the horizontal centre line of the rotary switch’s face.
13. The electrical switch assembly as in claim 12, wherein the two collar apertures are mirrored about a vertical centre line of the rotary switch’s circular face.
14. The electrical switch assembly as in either one of claims 12 or 13, wherein there are two rim apertures through the rim of the rotary switch.
15. The electrical switch assembly as in claim 14, wherein when the switch is in the selected position, each of the rim apertures is aligned with its respective collar aperture.
16. An electrical switch assembly comprising a rotary switch having a circular face defining an annular, circumferential rim, the rotary switch being rotatably nested in a collar extending from a base so that the rotary switch has an axis of rotation which passes through the centre of the circular face of the switch and which is directed normal to this face, there being a collar aperture passing through the collar so that a centre line of the collar aperture extends radially from the axis of rotation of the rotary switch with a downward angle of inclination.
17. A base for an electrical switch assembly, the base having a collar extending therefrom, said collar defining a rotary switch region adapted to have a rotary switch nested therein, there being a collar aperture passing through the collar so that an outer end of the collar aperture is located in an outer surface of the collar and an inner end of the collar aperture is located in an inner surface of the collar, where at least the outer end of the collar aperture through the collar is located at a level which is below a level of a horizontal centre line of the rotary switch region.