April 12, 1960 G. H. STEEL 2,932,819

INDICATING UNIT

Filed Aug. 5, 1958

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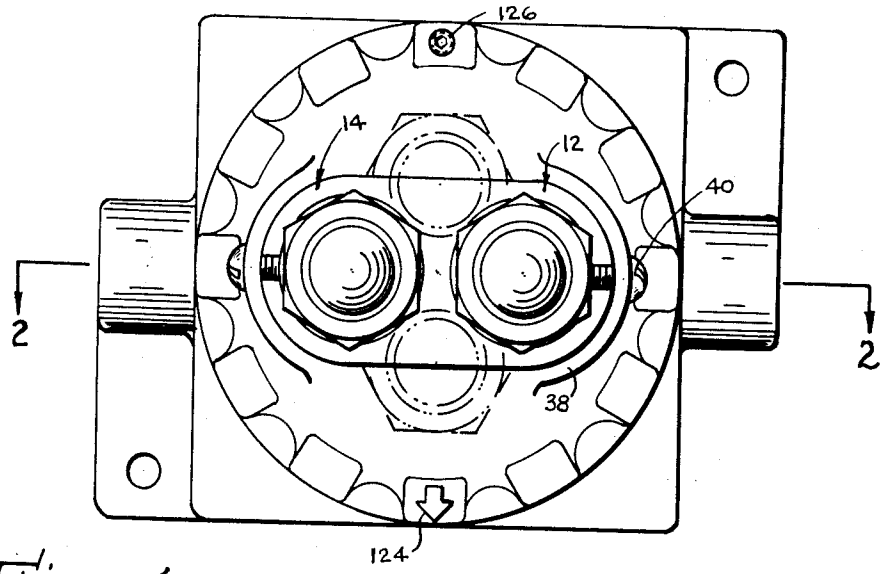
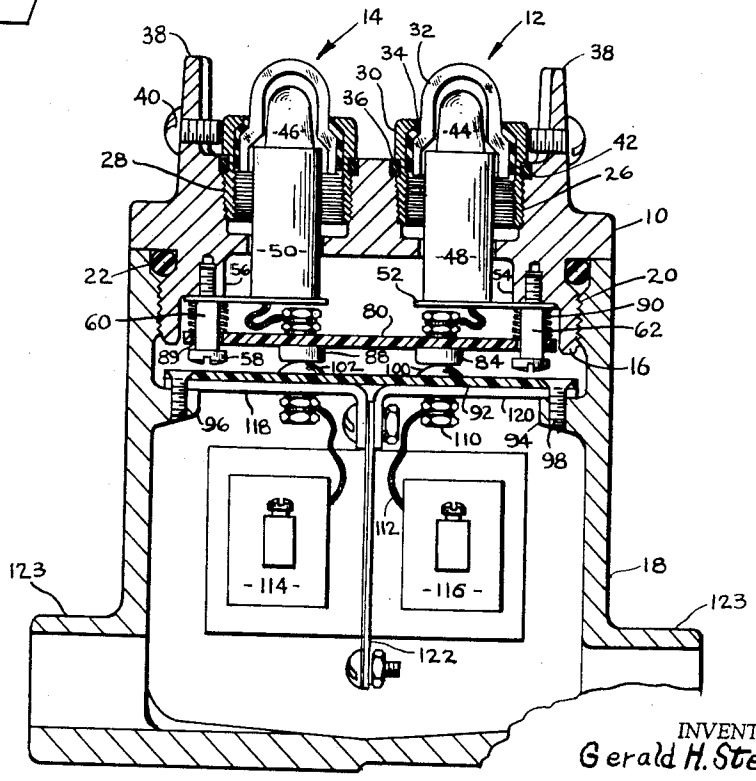


Fig. 1



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Fig. 2

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2 Sheets-Sheet 2

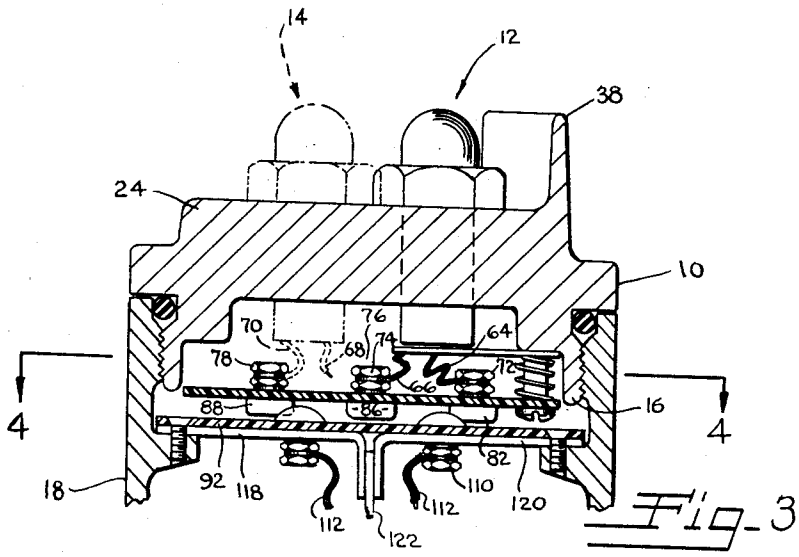


Fig. 3

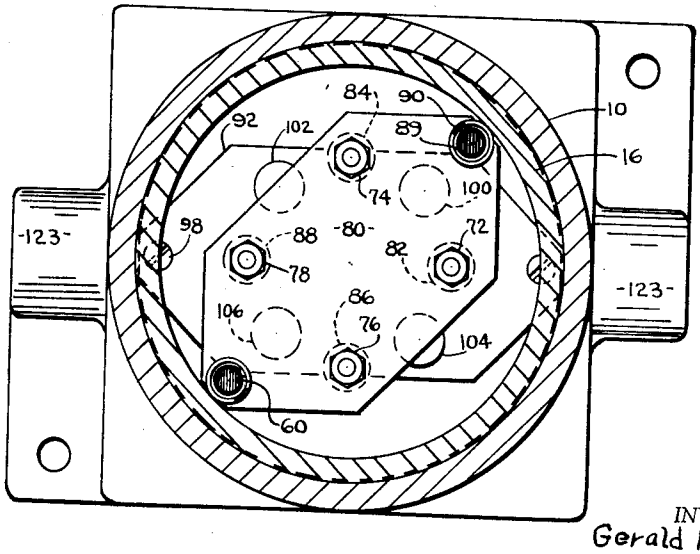


Fig. 4

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2,932,819

INDICATING UNIT

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5 Claims. (Cl. 340—366)

This invention relates to an electrical unit for indicating the condition of or controlling electrical circuits, or the like. In hazardous atmospheres the power connections for such units are normally housed in explosive-proof housings whereby to prevent any explosion or flame from reaching the hazardous atmospheres from the interior of the housing. Prior to this time, for example, single pilot units have utilized a threaded joint to effect an explosion-proof fitting between the cover carrying the pilot light and the body in which the circuit connection for the pilot light have been housed. With a single pilot light it was merely necessary to use a brush and ring type electrical connection to connect the pilot light carried by the cover in circuit with the transformer and circuit connections in the housing body, it being merely necessary to locate the pilot light and the brushes and rings in the center of the unit whereby upon rotation of the cover into threaded engagement with the body the brushes and rings serve to connect the pilot light in circuit in the old and well known manner. With two or more pilot lights, however, the brush and ring type contacts are deemed impractical and expensive to use.

Accordingly, it is the general object of this invention to provide a new and improved electrical unit having one or more electrical devices therein which unit is economical to manufacture and convenient to assemble and use.

More specifically, it is an object of this invention to provide a new and improved construction in an electrical unit for connecting an electrical device carried in the cover of said unit in circuit with a power supply in the housing of said unit wherein said cover is to be rotated into said housing.

The invention consists in the novel features and in the combinations and constructions hereinafter set forth and claimed. In describing this invention, reference is had to the accompanying drawings in which like characters designate corresponding parts in all the views.

In the drawings:

Figure 1 is a top plan view of the invention;

Figure 2 is a cross-sectional view taken on line 2—2 of Figure 1;

Figure 3 is a fragmentary cross-sectional view similar to Figure 2;

Figure 4 is a cross-sectional view taken on line 4—4 of Figure 3.

In the embodiment shown in the drawings, the electrical unit is shown as being an indicating unit and is made up of a cover 10, carrying electrical devices such as signal indicators shown to be pilot light units generally indicated at 12 and 14. The cover 10 is formed with a depending flange or skirt 16 being externally threaded. The cover 10 is received in a body or housing 18 which is internally threaded complementary to the threads on the skirt 16 in a manner whereby when the cover 10 is fully rotated in the body the threaded joint 20 renders the engagement between cover 10 and the housing 18 flame tight. An O-ring gasket 22 is carried between cover 10 whereby to effect moisture proof seal between the cover and the body. Cover 10 is formed with an upstanding elongated boss 24 which has a pair of threaded apertures 26 and 28 formed therein. A pair of pilot light assemblies consisting of an externally threaded sleeve nut 30, a jewel 32, sealer material 34 and retainer ring 36 are mounted at apertures 26 and 28. The retainer ring 36 serves to retain the jewel 32 in the sleeve nut 30 and the sealer 34 serves to seal the joint between the jewel 32 and the sleeve nut 30. As best seen in Figure 1 the sleeve nuts 30 are formed with hexagonal heads whereby to facilitate the insertion and removal of the pilot light assemblies in the cover. The cover 10 is formed at opposite ends of the boss 24 with a pair of upstanding lugs 38 and a pair of set screws 40 extend through the lugs 38 to fix the sleeve nuts 30 against rotation in the cover 10 after the units 12 and 14 have been fully threaded in the cover 10.

As best seen in Figure 2 an O-ring 42 is mounted in each of the apertures 26 and 28 whereby to effect a moisture proof seal between the pilot light assemblies 12 and 14 and the cover 10.

A pair of lamps 44 and 46 carried by sockets 48 and 50 are carried by the cover 10 to be connected in circuit so as to energize and light the lamps 44 and 46 in the following manner.

Each of the sockets 48 and 50 is formed with an outwardly extending link or supporting arm 52 at its inner end. The links 52 extend radially outward from the bottom of the sockets 48 and 50 and terminate in juxtaposition with a pair of bosses 54 and 56 formed on the underside of the cover 10. A pair of screws 58 are received in the threaded apertures formed in the bosses 54 and 56 and cooperate with a pair of sleeves 60 and 62 carried by the screws 58 to fix the links 52 and in turn the sockets 48 and 50 in the cover 10. Each of the sockets 48 and 50 is provided with hot and common lines 64, 66, 68 and 70, respectively, to connect the lamps 44 and 46 to a source of power whereby to energize and light the lamps. The leads 64, 66, 68 and 70 are connected to contact terminals 72, 74, 76 and 78, respectively, carried by a cover contact plate 80, made of fiber or other insulating material. Each of the terminals 72, 74, 76 and 78 extends through the contact plate 80 and terminates on the underside of the plate 80 in upper or bridging contacts 82, 84, 86 and 88.

As best seen in Figures 2 and 3, the contact plate 80 is formed with a pair of oversize apertures 89 through which the sleeves 60, 62 are received. The oversize apertures permit the plate 80 to rock or tilt as well as to move axially on the sleeves so that the plate will have a floating movement in the cover. The plate 80 is yieldably urged outwardly on the sleeves 60, 62 by reason of the compression springs 90 carried by the sleeves between the plate 80 and the arm 52.

A fixed body or contact plate 92 is mounted in the housing 18 on a pair of threaded bosses 94 and 96 by means of the screws 98. The fixed contact plate 92 has a plurality of lower or fixed contacts 100, 102, 104, and 106 mounted on the upper surface of the plate 92 in opposed confronting relation to the contacts 82, 84, 86 and 88 carried by the contact plate 80.

As best seen in Figure 4, the contacts carried by the plates 80 and 92 are spaced equidistant from the center of the plates and are circumferentially positioned an equal distance apart about the center of the plates whereby the contacts may be conveniently aligned when the cover is fully threaded in the body.

Each of the contacts 100, 102, 104 and 106 carried by the fixed contact plate 92 extends through the plate 92 and terminates in wiring terminal 110. As shown in Figure 2 the terminals 110 are connected by means of

leads 112 to transformers 114 and 116 carried in the housing 18 by means of the supporting arms 118 and 120 and the depending arm 122. The transformers are connected in circuit with a source of external power (not shown) through the conduit hubs 123 formed in the lower portion of the housing 18.

As is well known the pilot light assemblies 12 and 14 are connected in a circuit with electrical components or apparatus located at a removed distance whereby the lamps carried by the pilot light assemblies may be lighted when such components are operating so that when the pilot light unit is mounted on a panel board in a control center or the like the pilot lights will give a convenient indication of whether the components with which they are connected are on or off.

As previously described, the contacts carried by the flexible plate 80 are spaced complementally and in opposed confronting relation to the contacts carried by the plate 92. When the cover 10 is inserted in the body 18 and the cover is rotated to make the threaded joint 20, the contacts 82, 84, 86 and 88 will rotate with the rotation of the cover 10 and move inwardly therewith into engagement with the contacts 100, 102, 104 and 106. As the cover is rotated further into the body 18, the contacts carried by the plate 80 will strike the contacts carried by the plate 92 and by reason of the fact that the plate 80 is mounted for floating movement on the screws 58 and because the contacts on the plate 92 are of oval or convex shape, the contacts carried by the plate 80 will ride or pass over the lower contacts. The yieldable mounting of the plate 80 on the sleeves 60 and 62 permits the plate 80 to move or float axially upwardly into the cover 10 in a manner to permit the upper contacts to pass over the lower contacts. When the cover 10 has been sufficiently threaded to engage with the body 18 to effect a flame type joint the arrow 124 on the cover 10 is brought into alignment with a similar arrow formed on the body 18, the arrows on the cover and body being so positioned with respect to the contacts carried by the cover and the body that when the arrows are aligned and the cover 10 is in full engagement with the body 18, the contacts will be aligned in electrical engagement as shown in Figure 2.

Figure 3 shows the position of the upper and lower contacts in the unit as the cover 10 is being rotated into engagement with the body 18 just prior to the alignment of the arrows as previously described.

As will be obvious, if it is desired to align the pilot light assemblies 12 and 14 in a vertical line rather than the horizontal shown in Figure 1, the cover 10 need merely be rotated 90 degrees to position the pilot light assemblies in a vertical line as indicated by the dotted lines in Figure 1. In this position it is merely necessary to properly connect the lower contacts carried by the plate 92 to the proper leads 112 from the transformers 114, 116, in order to accurately energize the proper lamps in the pilot light unit.

The cover 10 is provided with a set screw 126 to affix the cover 10 to the body 18 against removal when the cover is in full engagement with the body 18.

While the invention has been described in connection with an explosion-proof housing, it is understood that the invention is not limited thereto and may be used in non-explosion-proof units to be installed in ordinary non-hazardous locations.

As will be obvious, I have by my invention provided an economical indicating unit having two or more signal indicators carried in a cover mounted for threaded engagement with the body to provide an indicating unit in which the electrical connections between the signal indicators and the source of energy entering the unit through the body are simply and conveniently effected.

What I claim is:

1. An electrical unit including a cover, at least one electrical device carried by said cover, a bridging contact plate for connecting said device to a source of energy, said plate having a plurality of bridging contacts connected to said electrical device and positioned on said plate and extending therethrough, said plate being yieldably mounted for limited axial movement in said cover, said unit further including a housing, means for affixing said cover in said housing, said housing having a fixed contact plate mounted therein, a plurality of fixed contacts carried by said fixed plate, said fixed contacts being spaced complementally to said bridging contacts whereby upon insertion and rotation of said cover in said housing said bridging and fixed contacts may be aligned to connect said device in circuit.

2. An electrical unit comprising a housing, a cover threadably mounted on said housing, contact plates carried by said cover and housing, each contact plate carrying a plurality of complementally spaced opposed confronting contacts, at least one electrical device carried by said cover and electrically connected to the contacts carried by said plate in said cover, one of said plates being yieldably mounted for limited axial movement with respect to the other plate, whereby upon insertion and rotation of said cover in said housing said movable plate will move axially upon striking the contacts on the other plate to permit said cover to be fully engaged on said housing.

3. An electrical unit comprising a cover, said cover being movably threadedly mounted on a housing, at least one electrical device carried by said cover, a contact plate carried by a housing, a plurality of complementally spaced contacts mounted on said plates, said contacts positioned on said plate in opposed confronting relation to a plurality of contacts mounted on a contact plate carried by said cover and connected to said device, whereby to effect an electrical connection between said contacts when said plates are aligned, one of said plates being mounted for yieldable axial movement whereby upon insertion and rotation of said cover in said housing said plate will move axially to yieldably urge said contacts together into electrical engagement.

4. A signal indicating unit comprising a body member and a cover member, said cover threadedly mounted in said body, a body contact plate mounted in said body having a plurality of contacts spaced equi-distant from the center of said plate, said contacts being electrically connected to a power source, a cover contact plate having a plurality of complementally spaced contacts carried by said cover, a plurality of signal indicators carried in said cover and electrically connected to said contacts carried by said cover contact plate, one of said plates mounted for limited floating axial movement whereby said plate will move axially when said cover is rotated into said body to permit full engagement of said cover in said body and to connect said indicators in circuit with said source of power.

5. Claim 4, wherein said cover contact plate is mounted for limited axial floating movement on a pair of fasteners in said cover, said fasteners also supporting said signal indicators in said cover.

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