SECURITY CLOSURE FOR ELECTRICALLY SHIELDED CABLE RACEWAY

Inventor: Donald Howard Rodgers, Smithsburg, Md.
Assignee: The Danzer Metal Works Co., Inc., Hagerstown, Md.
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References Cited

UNITED STATES PATENTS
3,351,699 11/1967 Merckle 174/35 GC
3,370,121 2/1968 Merckle 174/35 GC

ABSTRACT

A shielded raceway duct is provided in one wall thereof with an access opening surrounded by an adapter collar having a shielding gasket abutment flange. A cover unit has interlocking hinged engagement with the collar and contains an RF energy tight gasket engageable with said flange of the adapter. The adapter carries a side extension which supports spaced quick release fasteners and the cover carries an overlying housing extension having openings to receive the heads of the fasteners. A locking member slidable within the housing extension of the cover is shiftable between positions where the fastener heads are exposed for manipulation and where they are covered and rendered inaccessible. The locking member is securely lockable to the cover in the fastener covering position.

11 Claims, 14 Drawing Figures
SECURITY CLOSURE FOR ELECTRICALLY SHIELDED CABLE RACEWAY

The invention relates generally to that class of electrically shielded cable raceway disclosed in U.S. Pat. Nos. 3,351,699 and 3,370,121 to Merckle. These patents disclose communication cable raceways which are constructed to retain RF energy and to prevent the leakage of such energy at the various joints and connections of the raceway system through the provision of a unique metallic shielding gasketing between all sections and their covers and around all joints and connections between raceway sections. Primarily, the two patents in question disclose open top cable lay-in raceways having full cover sections which are readily removable.

The need has arisen, particularly in connection with certain military communication cable systems, for strictly controlling access to the interior of the cable raceway except by authorized personnel. This has led to the adoption of solid tubular raceway sections and terminal cabinets which do not have removable side walls or covers throughout the system. Generally, rectangular ducting is employed with a sufficiently large cross-sectional area to enable pulling through of the communication cables. The joints between adjacent raceway sections and between terminal cabinets and raceway sections are shielded and rendered RF energy tight in generally the same manner disclosed in said prior patents.

However, with the use of the solid or non-lidded raceway sections and terminal cabinets, a corresponding need has arisen for access openings into the raceway throughout the system and for lockable security closure means for these openings to effectively prevent unauthorized entry. Along with this need arises a requirement for simplicity of construction, compactness and economy of manufacture. The security closure furthermore must not compromise the ability of the raceway to retain RF energy. Ideally, the closure means must be of such a nature that it lends itself to ready installation on existing systems in the field, as well as in initial manufacture.

The objective of the invention is to satisfy all of the above requirements by providing an efficient, economical and entirely practical security closure and RF energy sealing means for the access openings of communication cable raceways and the like. The structure of the invention can readily be mounted on the top, bottom or sides of a duct section to meet the needs of a particular installation.

Other features and advantages of the invention will be apparent during the course of the following description.

**BRIEF DESCRIPTION OF DRAWING FIGURES**

FIG. 1 is a perspective view of a communication raceway section equipped with the security closure embodying the present invention.

FIG. 2 is an exploded perspective view of the closure on an enlarged scale.

FIG. 3 is a perspective view of a wrench for manipulating the quick release closure fasteners.

FIG. 4 is a side elevational view of the closure, with parts in section and parts broken away.

FIG. 5 is a longitudinal vertical section taken on line 5—5 of FIG. 4.

FIG. 6A is a fragmentary vertical section similar to FIG. 5 showing a locking channel in a release position and showing an adjacent quick release fastener in an unlocked position.

FIG. 6B is a similar fragmentary view in cross section showing the cover assembly, and the cover assembly being separated from the adapter and the quick release fastener means.

FIG. 7 is a fragmentary plan view of the structure shown in FIG. 6A.

FIG. 8 is an enlarged vertical transverse section taken on line 8—8 of FIG. 4.

FIG. 9 is a fragmentary vertical section taken on line 9—9 of FIG. 8.

FIG. 10 is a similar view taken on line 10—10 of FIG. 8.

FIG. 9A is a view similar to FIG. 9 showing the indexing movement of a quick release fastener between stable positions at ninety degree intervals.

**DETAILED DESCRIPTION**

Referring to the drawings in detail wherein like numerals designate like parts, the numeral 20 designates a typical rectangular duct section forming a part of a shield cable raceway having the invention applied thereto. It should be mentioned that the invention is applicable to any side wall of the duct section 20 or may be applied similarly to a terminal cabinet or other component of the raceway system. The security closure structure constituting the invention shown in its entirety at 21 in FIG. 1 is applied to the raceway system at required intervals throughout the system to provide the necessary access to the interior of the raceway by authorized people. Since the closure structure is standard throughout the system, a complete detailed description of one closure unit will suffice to describe all similar units.

As shown, the closure is applied in FIG. 1 to one vertical side wall 22 of duct section 20 and this side wall has a rectangular access opening 23 formed therethrough, either at the time of initial manufacturing or in the field as the case may be. Immediately outwardly of the opening 23 is a rectangular adapter collar 24 which extends continuously around the four sides of the rectangular opening 23 with the side walls of the adapter 24 spaced somewhat outwardly of the edges of opening 23 and disposed perpendicularly to the duct side wall 22. At its interior end, the adapter collar 24 has a continuous marginal intumeshed mounting flange 25 formed integral therewith and abutting the outer face of side wall 22 with the edges in registry with the rectangular opening 23. A continuous edge bead 26 of welding serves to rigidly join the adapter flange 25 to the duct side wall 22 as best shown in FIG. 8. It may be mentioned here that the parts involved are fabricated from low carbon galvanized sheet steel of substantially the type mentioned in said prior Merckle patents.

On its outer side, the adapter collar 24 carries an outwardly rolled flange or hem 27 extending around its two short sides and one longitudinal side, FIG. 2, and a similar inwardly rolled hem 28 is provided integrally on the remaining long side of the adapter collar. The rounded shoulders 29 around all sides of the adapter collar lie in a common plane for even compressive contact with a metallic shielding gasket, to be described, on the cover component.

Along the side of the collar having the hem 28 and inwardly of the hems 27 and 28, a channel bracket 30 is securely welded to the adjacent collar side wall, FIG. 8. The open side of the channel bracket 30 faces the duct side wall 22, as shown. Depending upon the length of the security closure, which may vary, a plurality of equidistantly spaced quick release quarter turn cam fasteners 31 are mounted upon the channel bracket 30 in equidistantly spaced relation. Each fastener 31 per se is conventional and comprises a cylindrical shank 32 engaging rotatably through an opening 33 provided in the channel bracket 30. The fastener 31 carries a transverse cam locking head 34 at its outer end and has a shoulder 35 engaging the outer face of bracket 30. An indexing washer 36 on the shank 32 is held against rotation thereon by a flat 37. A retainer ring 38 engaging in a groove of the shank 32 prevents axial movement of the washer 36 on the shank 32 of the fastener. The indexing washer 36 has four circumferentially equidistantly spaced notches 39 in its periphery, each opposing pair of notches adapted to receive the sprging arms 40 of an indexing washer having a plate body 41 lying between the washer 36 and the main web of channel bracket 30. The washer 36 rotates with the shank 32 and cam locking head 34 relative to the spring arms 40 and the plate 41 which carries the arms on an extension 42. The arms and plate 41 do not rotate relative to the shank and washer or relative to the sta-
tionary channel bracket 30. As shown in FIG. 8, the head 34 of each fastener 31 is spaced outwardly somewhat from the mounting channel 30.

The invention further comprises a detachable cover 43 which is rectangular and generally coextensive with the adapter collar 24. The cover 43 is similar to a shallow pan and embraces a main flat plate body 44 having marginal edge flanges 45 extending around three sides thereof, the flange on the long side of the cover having an integral turned right angular lip 46 adapted to coact with the adjacent hem or flange 27 of the adapter collar to form an unpinched hinge or interlocking pivotal connection.

Along its longitudinal side remote from the lip 46 is a relatively deep flange plate 47 perpendicular to the cover 43 and projecting substantially inwardly thereof and being integral therewith. Within the corner of the cover defined by the flange plate 47 is an L-shaped bar 48 extending for the full length of the cover along its long side and securely welded thereto. This bar 48 forms with the cover 43 and flange plate 47 an elongated rectangular chamber or passage 49 for a channel-shaped locking bar 50 slidably mounted therein. The locking bar 50 also extends for the full length of the cover and has an integral locking tab 51 at one end provided with an opening 52 to receive the shackle of a combination padlock or the like. The remote end of the locking bar 50, FIG. 2, will abut the remote edge flange 45 of the cover when the locking bar is fully inserted in the chamber 49, FIG. 5. The cover itself has a mating extension tab 53 at one corner thereof with an aperture 54 adapted to register with the previously identified aperture 52 for receiving the shackle of the lock.

As shown, the plate body 44 of cover 43 adjacent the chamber 49 and locking bar 50 has a series of openings 55 formed therethrough on the same center spacing as the quick release fasteners 31. Additionally, the locking bar 50 is provided at the same spaced intervals with similar openings 56 and 57 and apertures 54 in each of these cases as well as the number of fasteners, will depend on the length of the particular security closure and this may vary, as explained. The bar 48 is provided at the same spaced intervals with elongated slots 57 adapted to receive therethrough the heads 34 when the heads are turned into parallelism with these slots. Next condition shown in FIGS. 6A and 6B allows detachment and removal of the cover.

Immediately inwardly of the bar 48, the interior face of the cover plate body 44 carries a continuous metallic shielding gasket 58 extending in an uninterrupted manner around all four sides of the cover. This metal gasket is of the material described in the prior Merckle patents and is attached at its interior edge to a rubber-like strip 59 whose sole purpose is to anchor the metallic shielding gasket to the plate body 44 with suitable adhesive exactly as described in said patents. The shielding gasket 58 is positioned to directly abut the rounded shoulder 29 of the adapter collar so that the shoulder can properly compress the gasket, FIG. 8. The gasketing forms a permanent and fixed part of the removable cover 43. In a similar manner, the fasteners 31 and their carrier bracket 30 form a permanent fixed unit on the adapter collar 24. The locking bar 50 is a separable element and may be removed endwise from the channel or chamber 49.

FIG. 3 depicts a wrench 60 passable through the circular openings 55 and 56, FIG. 6B, when the same are in registry. The wrench has a slot 61 in its shank to engage over the fastener heads 34 for turning the fasteners.

FIG. 11 shows a slight modification of the invention wherein the adapter collar 24 is bolted removably at 62 to the wall 22 of the duct with an intervening section of metallic gasket 63 clamped therebetween to render the joint RF energy tight. In some instances it may be desirable to employ this arrangement instead of the welded construction shown in FIG. 8. In all other aspects, the construction of the closure in FIG. 11 is identical to that already described.

In the operation of the security closure, assuming that the cover assembly 43 has been removed and replacement thereof is desired, the cover is manipulated relative to the adapter collar 24 as suggested by the arrows in FIG. 2. The lip 46 is brought into interlocking hinged relationship with the outward turned hem or flange 27 on the long side of the adapter collar 24 and the opposite side of the cover is merely swung downwardly around this pinless hinge and the slots 57 will pass over the fastener heads 34, it being understood that the heads are positioned as in FIGS. 6A and 6B.

The locking bar 50 will now be positioned to bring its openings 56 into registry with the openings 55 which in the condition shown in FIGS. 6A and 6B and the wrench 60 is utilized to turn the fasteners 31 90° or to their locking positions shown in FIGS. 4, 5 and 8. In these positions, the fastener heads 34 are across the slots 57 transversely and exert a camming action or pressure against the bar 48 to force the gasket 58 into compressive relationship with the continuous shoulder 29 of the adapter collar 24. The described turning of the fastener heads 90° will cause their spring arms 40 to drop into one pair of the notches 39, FIG. 9. The spring arms served to releasably hold the fasteners in either of two 90° positions, FIGS. 5 and 6B, and in between these two positions when the fasteners are turned in either direction, the arms 40 will ride on the circular periphery of the washer 36. This feature enables the mechanic to "feel" the proper locked or unlocked position of each fastener.

When all of the fasteners are locked, the bar 50 is shifted longitudinally to the position shown in FIG. 5 and also in FIG. 4 where the bar openings 56 are out of registry with the cover openings 55 and solid portions of the bar are covering the fasteners 31. The cover 43 and rendering them inaccessible from the outside. The bar 50 is now fully within the channel 49. The apertures 52 and 54 are in registration and the shackle of a suitable padlock, not shown, may be introduced through these apertures to securely lock the bar 50 in covering relationship to the several fasteners 31. In this situation, an unauthorized person cannot possibly manipulate the fasteners or remove the cover 43 to gain access to the raceway. To remove the cover, a simple reverse procedure is followed and this thought not to require description in view of the foregoing. The construction is rugged and durable, very simplified, economical to manufacture and substantially fool-proof to operate. It affords maximum security against unauthorized access and yet renders the raceway easily accessible to properly authorized personnel.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of the invention or scope of the subjoined claims.

I claim:
1. A security closure for a shielded communication cable raceway or the like comprising in combination with a section of said raceway, an adapter collar secured to a wall of said section in surrounding relation to an access opening in said wall, a supporting member for turnable fasteners on the adapter collar, plural spaced turnable fasteners on said supporting member, a separable cover having RF energy sealing gasketing adapted to engage a sealing shoulder of the adapter collar, said cover including a part adapted for interlocking engagement with the adapter collar, a member carried by the cover and having spaced openings to receive heads of the turnable fasteners lockingly, the cover having fastener openings in substantial alignment with the fasteners through which a fastener operating tool may be inserted, and a locking bar slidably engaging the cover and having fastener access openings adapted to register with the access openings of the cover and shiftable out of registry therewith so that the locking bar extends over the fastener heads and covers them and renders them inaccessible, and means on the locking bar and cover to lock the same against relative movement when the locking bar is covering the fasteners.
2. The structure of claim 1, and the adapter collar having an inner end right angular flange abutting said wall and welded thereto.
3. The structure of claim 1, and said adapter collar having an inner end attaching flange, and bolt means securing the attaching flange of the adapter collar to said wall of said raceway section.

4. A security closure for a cable raceway or the like comprising a rectangular adapter collar attachable fixedly to a raceway section adjacent an access opening in said section, a fastener assembly including plural spaced quick release fasteners on the adapter collar externally thereof, a gasketed cover for said adapter collar having interlocking engagement therewith and sealing against the exterior end of the collar when in a closed position, means on the cover externally of the adapter collar and in opposed relation to said fastener assembly forming a locking bar channel, said channel including a wall having spaced openings to receive locking heads of said fasteners therethrough, said cover having fastener access openings in alignment with the last-mentioned openings, and an elongate bar member slidable within said channel and having spaced openings which register with the cover access openings in one longitudinal position of the bar member and which are out of registry with said access openings in another longitudinal position of the bar member, and apertured parts on the bar member and cover adapted to register and receive the shackle of a lock when the openings of the bar member are out of registry with the cover access openings.

5. The structure of claim 4, and said adapter collar having a rounded shoulder on its outer end extending entirely around the perimeter of the adapter collar in a single plane, and a compressible RF energy retaining metallic gasket on the interior of the cover adapted to abut said shoulder and to be clamped thereagainst by said quick release fasteners.

6. The structure of claim 4, and said fastener assembly comprising an elongated bracket secured to one side of the adapter collar, said plural fasteners mounted on said bracket in spaced relation and being rotary quarter turn quick release cam fasteners having elongate heads, the openings of said channel wall being elongate openings to receive said heads in one right angular position thereof and to lock said heads to the cover in a second right angular position thereof.

7. The structure of claim 6, and said quarter turn cam fasteners including notched indexing washers secured to their rotary shanks and coacting non-rotary spring arms engageable releasably within opposing notches of the washers to stabilize the fasteners in two operative positions 90° apart on the rotational axes of the fasteners.

8. The structure of claim 4, and said channel being approximately rectangular in cross section and said locking bar comprising a channel bar fitted loosely within said rectangular channel in straddling relationship to the heads of said fasteners.

9. The structure of claim 8, and a marginal flange on the cover along its side adjacent said fastener assembly, said flange extending at least partially over the fastener assembly to prevent access thereto from the exterior side thereof.

10. The structure of claim 4, and said cover comprising a shallow pan-like cover having marginal edge flanges, a right angular lip secured to one edge flange and being inwardly directed, an exterior hem flange on one side of the adapter collar adapted to interlock hingedly with said lip and to form therewith a pinless hinge between the cover and adapter collar allowing complete separation of the cover from the adapter collar when said fasteners are in a release position.

11. The structure of claim 4, and said fastener assembly comprising a channel member secured to the outside of the adapter collar along one side thereof, plural quick release fasteners on said channel member including turnable heads projecting above the channel member, an opposing elongated box-like housing part on the cover beyond the adjacent side of the adapter collar, said box-like housing part having a fastener head receiving slots and said cover having fastener access openings opposite said slots, and a longitudinally movable bar member engaging through the box-like housing part and having openings adapted to register with the access openings of the cover in one position of the bar member, and means to lock the bar member to the cover rigidly with the openings of the bar member staggered and out of registration with the access openings of the cover and the bar member covering and concealing said heads of the quick release fasteners.

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