United States Patent [19]

Clement

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[45] **Jan. 1, 1974**

[54] **CLAMPING MEANS FOR MECHANICAL SECUREMENT OF ENCLOSURES TO BUS DUCT**

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[52] **U.S. Cl.** ..... **317/99,** 248/226 C, 248/243

[51] **Int. Cl.** **H02b 1/04**

[58] **Field of Search** ..... 339/22 B, 22 T, 91 R, 339/91 F; 24/243 D, 243 G, 248 SA, 249 LS, 249 PP, 226 C; 174/68 B; 200/51 R; 317/99

[56] **References Cited**

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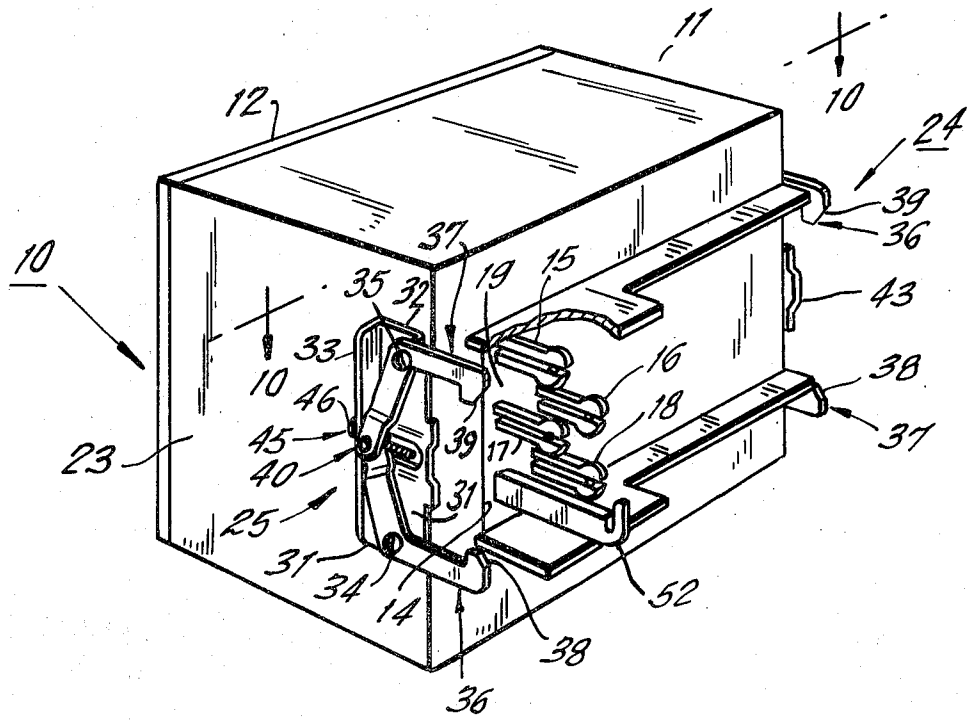
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Primary Examiner—David Smith, Jr.
Attorney—Sidney G. Faber et al.

[57] **ABSTRACT**

Each end of a bus duct plug is provided with a clamping assembly to mechanically secure the plug to a bus duct housing. Each clamping assembly includes a pair of pivoted L-shaped crank members having hooks at one end thereof and being joined at their other ends to a connecting member that is mounted for guided linear movement. A single adjusting screw in threaded engagement with the connecting member moves the latter, with such movement being effective to simultaneously pivot both crank members and thereby selectively move the hooks into and out of clamping engagement with the bus duct housing.

15 Claims, 10 Drawing Figures



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SHEET 1 OF 2

FIG. 1.

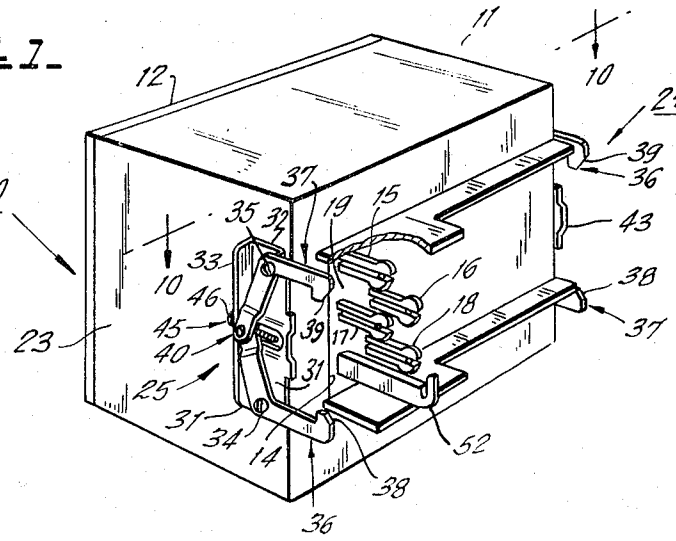


FIG. 2.

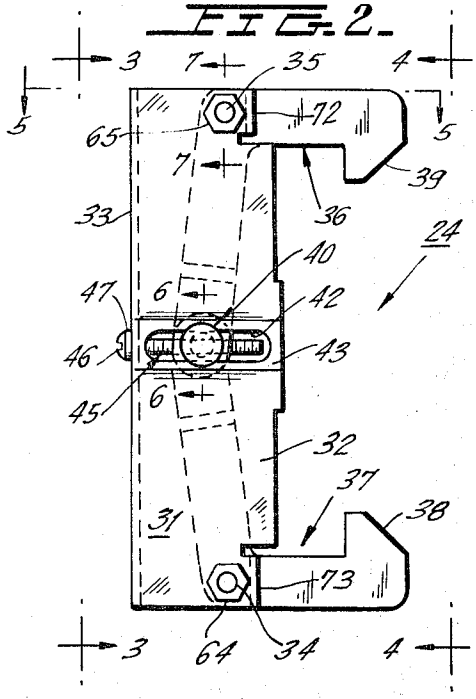


FIG. 3.

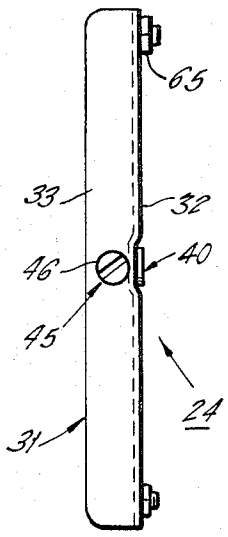
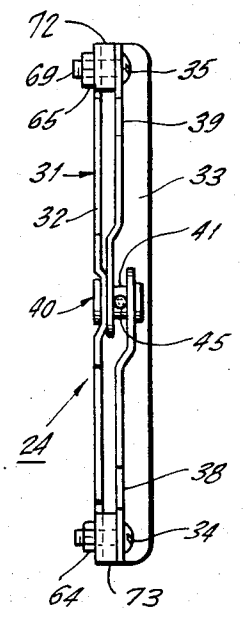


FIG. 4.



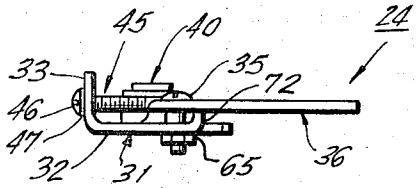


FIG. 5.

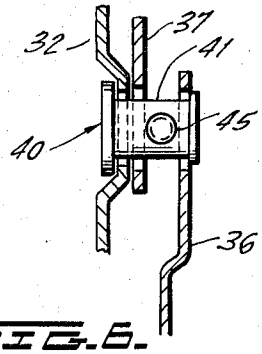


FIG. 6.

FIG. 7.

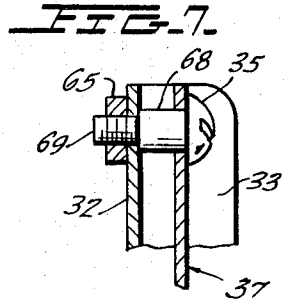


FIG. 8.

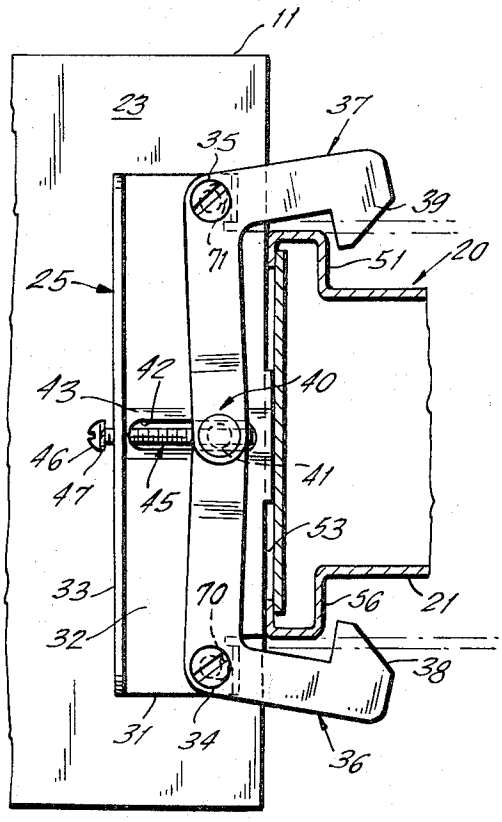


FIG. 9.

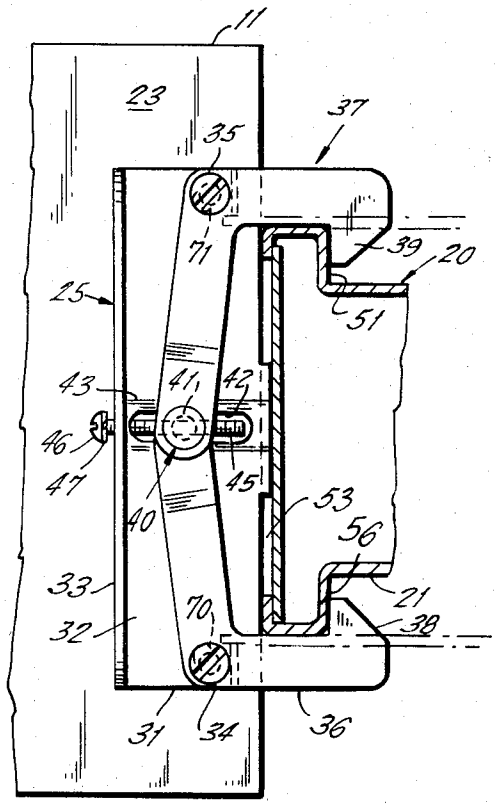
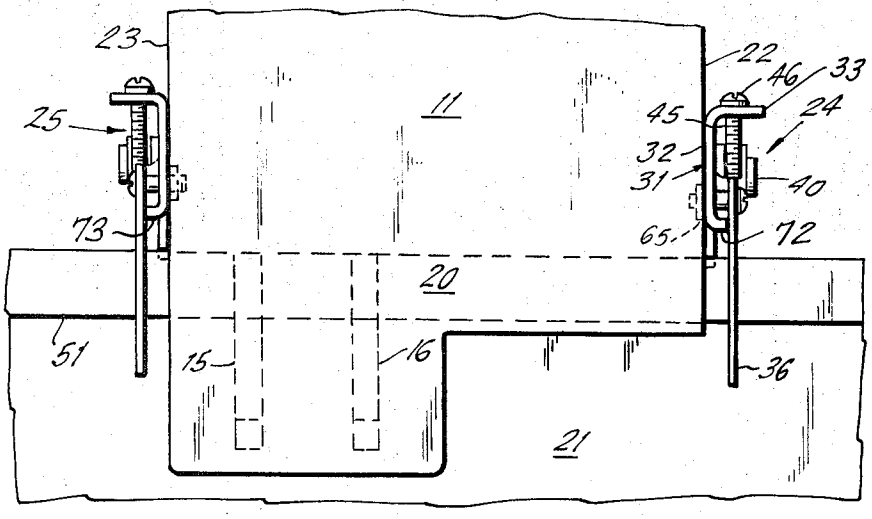


FIG. 10.



CLAMPING MEANS FOR MECHANICAL SECUREMENT OF ENCLOSURES TO BUS DUCT

This invention relates to means for mechanically securing a plug to a bus duct and is an improvement over the invention disclosed in U. S. Pat. No. 3,312,872 issued Apr. 4, 1967, to R. S. Davis for a Bus Duct Plug Mounting Device With Improved Interlocking Means.

For the most part, horizontal runs of bus duct for the distribution of electrical power are located considerably above floor level thereby requiring an electrician to stand on a ladder in order to inspect the duct or to mount and dismount removable power tapping devices to the duct. Such power tapping devices, known as bus duct plugs, of even moderate current and voltage ratings are bulky and heavy so that the electrician often has difficulty mounting and securing these plugs to the duct. Early plug constructions utilized direct screw securement of the plugs to the ducts by utilizing threaded apertures in the duct housing. This was followed by a positioning slot arrangement in which a screw body would pass through slots in the duct housing which were too small, except at enlarged end portions, to permit passage of the screw heads. In another prior art construction, bus duct plug-in units were fastened to the duct by straps extending completely over the top of the duct housing. Unfortunately, this latter type of fastening means interfered with mounting of another plug on the opposite side of the duct.

Still more recently, as described in the aforesaid U. S. Pat. No. 3,312,872, pivotable and slidable hooks mounted to the plugs have been provided. An individual pressure applying screw for each hook acts between the hook and the plug housing to draw the hook tip into firm holding engagement with the housing of the duct.

In accordance with the instant invention, a single adjusting screw is effective to manipulate two holding hooks simultaneously, thereby speeding up the mounting process and at the same time automatically distributing holding forces and centering the plug with respect to the duct, thereby preventing undue mechanical stress at the plug-in electrical connections between the plug and duct.

Accordingly, a primary object of the instant invention is to provide novel fastening means for securing a power-tapping plug to a bus duct housing.

Another object is to provide a plug of this type in which the manipulation of a single adjusting screw simultaneously operates a pair of mounting hooks.

Still another object is to provide mounting means of this type in which pivot forming members also secure the fastening means assembly to an end wall of the plug.

A further object is to provide fastening means of this type in which there are a pair of L-shaped pivotally mounted crank members each having a duct-engaging hook at one end thereof, with the other ends of the crank members being pivotally secured to a connecting member that is threadably mounted to a single adjusting screw.

These objects as well as other objects of this invention will become readily apparent after reading the following description of the accompanying drawings in which:

FIG. 1 is a perspective, looking at the front of a bus duct plug having mounting means constructed in accordance with teachings of the instant invention.

FIG. 2 is a side elevation of one mounting means assembly.

FIGS. 3, 4, and 5 are elevations of the assembly of FIG. 2, looking in the directions of the respective arrows 3—3, 4—4 and 5—5.

FIGS. 6 and 7 are fragmentary cross-sections taken through the respective lines 6—6 and 7—7 of FIG. 2 and looking in the directions of arrows 6—6 and 7—7, respectively.

FIGS. 8 and 9 are fragmentary end views of the plug of FIG. 1 and the bus duct. In FIG. 8 the plug hooks are loose, and in FIG. 9 the plug hooks are tightened to their clamping positions.

FIG. 10 is an elevation, looking in the direction of arrows 10—10 of FIG. 1.

Now referring to the figures of the drawings, bus duct plug 10 of FIG. 1 includes rectangular housing 11 having openable rear cover 12 and front opening 14 through which plug-in fingers 15–18 extend forwardly of housing 11. Insulator block 19, mounted within housing 11, maintains plug-in fingers 15–18 in spaced insulating relationship in operative position to engage bus bars (not shown) of bus duct 20 (FIGS. 8–10). Plug 10 is also provided with circuit interrupter means (not shown) mounted within housing 11 and connected in electrical series with plug-in fingers 15–18.

In order to mechanically secure plug 10 to the housing or casing 21 of bus duct 20, plug 10 is provided with identical clamping assemblies 24, 25 mounted to the respective end walls 22, 23 of plug housing 11. Since each of the assemblies 24, 25 is of identical construction and is mounted to housing 11 in the same manner, only assembly 24 will be described, with particular reference to FIGS. 2–7.

Clamping assembly 24 includes support member 31 having generally rectangular main section 32 and lip section 33 extending along the long edge at the rear of main section 32. Shoulder screws 34, 35, whose threaded portions 69 extend through clearance apertures in main section 32 adjacent the shorter edges thereof, provide pivots for L-shaped crank members 36, 37, respectively, located at the leg junctions of the respective crank member 36, 37. Lip portions 72, 73 along the front edge of support provide stabilization for the respective cranks 36, 37. The free ends of the crank legs extending forward of main section 32 are provided with inwardly facing hooks 38, 39, and the other ends of crank members 36, 37 are offset and provided with elongated slots that receive body portion 41 of cylindrical connecting member 40. Crank members 36, 37 are of identical construction, but the slotted offset ends thereof are on different sides of adjusting screw 45 so that the remaining portions of crank members 36, 37 are generally a common plane.

Body portion 41 also extends through elongated guide slot 42 disposed equidistant from pivot screws 34, 35 in the central portion of main section 32 that is offset away from end wall 23 to provide clearance between end wall 23 and main section 32 for the head at one end of connecting member 40. Adjusting screw 45 extends through a clearance aperture at the center of lip 33 and is received by a threaded aperture extending diametrically through connecting member 40. Head 46 of screw 45 abuts flat washer 47 seated on the rear surface of lip 33.

In order to mount plug 10 to duct casing 21, adjusting screw 45 is rotated to move connecting member 40

toward the free end of screw 45 so that hooks 38, 39 move apart. Hook 39 is placed over upward protrusion 51 extending along the upper edge of bus casing 21 for the entire length thereof. Plug 10 is then moved longitudinally along bus duct 20 until interlock finger 52 (FIG. 1) is aligned with a cooperating aperture (not shown) in bus casing 21. An access aperture cover (not shown) of duct 20 is then moved to an open position permitting interlock finger 52 to move fully into bus casing 21 as plug 10 pivots about hook 39 to a position where the front wall of bus housing 11 is generally parallel to the confronting wall 53 of bus casing 21. In this position plug-in fingers 15–18 electrically engage individual bus bars (not shown) of bus duct 20, and hook 38 is generally forward of lower protrusion 56 of bus casing 21. The function and construction of interlock finger 52 are shown and described in detail in the J. B. Cataldo et al. U. S. Pat. No. 3,048,672 issued Aug. 7, 1962, for a Safety Bus Duct Plug.

At this point in the installation, duct 10 does not require further support from the installing electrician. Adjusting screw 45 is now rotated to draw connecting member 40 rearward from the position shown in FIG. 8 to the position shown in FIG. 9. As connecting member 40 moves rearward, crank members 36, 37 are caused to pivot in opposite directions, simultaneously moving hooks 38, 39 toward one another and into firm clamping engagement with protrusions 51 and 56 of duct housing 21. Since any given point along the centerline of guide slot 42 is equally spaced from pivot 34, 35, adjustment of connecting member 40 will cause equal movements of hooks 38 and 39. Slots 70, 71 in the respective cranks 36, 37 provide elongated clearance apertures for the respective pivot screws 34, 35 and provide automatic compensation for different locations of duct casing members 51, 56.

Nuts 64, 65 are shown in FIGS. 3, 4, and 5 as being mounted to shoulder screws 34, 35, respectively, and as abutting main section 32 of support member 31 as part of clamping assembly 25 prior to mounting thereof to housing 11. When clamping means assembly 25 is mounted to housing 11 by shoulder screws 34, 35, nuts 64, 65 are disposed within plug housing 11. As seen in FIG. 7, the head of shoulder screw 35 abuts crank member 37 and the unthreaded portion 68 adjacent to head 35 extends through a clearance aperture in crank member 37 and abuts the exterior surface of section 32. Threaded portion 69 at the free end of shoulder screw 35 extends through a clearance aperture in main section 32 and other clearance apertures in plug wall 23 to be engaged by nut 65, with the surface of main section 32 facing away from crank members 36, 37 abutting plug housing wall 23.

Even though the instant invention has been described in connection with bus duct plugs, it should now be understood by those skilled in the art that clamping assemblies 24, 25 of the instant invention may also be used for securement of other electrical devices, such as panelboards, cubicles, top boxes and enclosed switches, to bus duct 20.

Although there has been described a preferred embodiment of this novel invention, many variations and modifications will now become apparent to those skilled in the art. Therefore, this invention is to be limited not by the specific disclosure herein, but only by the appending claims.

The embodiments of the invention in which an exclusive privilege or property is claimed are defined as follows.

1. An electrical device adapted to be mounted to a bus duct; said device comprising a plurality of bus bar engaging fingers; a housing to which said fingers are secured; said housing having a front wall with an aperture through which said fingers extend forwardly of said front wall; said housing also having first and second end walls extending rearwardly from opposite first and second edges, respectively, of said front wall; mounting means for securing said device to a bus duct casing; said mounting means including a first portion disposed at said first end wall and including first and second crank members, first and second parallel and laterally offset pivots to which the respective first and second crank members are mounted, connecting means to which one end of each of said crank members is connected, a fixed support means, and an adjusting means extending between said support means and said connecting means whereby manipulation of said adjusting means is effective to simultaneously pivot said crank members in opposite directions; said first and second crank members at the other ends thereof having respective first and second duct casing engaging hook portions facing toward one another; manipulation of said adjusting means in a first direction moving said hook portions simultaneously toward one another in clamping directions, and when manipulated in a second direction moving said hook portions simultaneously away from one another releasing directions.

2. An electrical device as set forth in claim 1 in which means defining said pivots also secure said mounting means to said first end wall.

3. An electrical device as set forth in claim 1 in which the crank members are of identical construction.

4. An electrical device as set forth in claim 1 in which the mounting means includes a guide formation engaging said connecting means to guide movement thereof upon manipulation of said adjusting means.

5. An electrical device as set forth in claim 4 in which said guide formation is operatively shaped and disposed so that for all positions of said adjusting means said connecting means is equally spaced from both of said pivots.

6. An electrical device as set forth in claim 5 in which connections between said connecting means and said crank members include elongated slots in said crank members.

7. An electrical device as set forth in claim 1 in which the adjusting means comprises a single screw threadably engaged with the connecting member.

8. An electrical device as set forth in claim 1 in which the support means includes a first section abutting said first end wall and a second section generally at right angles to said first section; said adjusting means being in engagement with the first section.

9. An electrical device as set forth in claim 8 in which means defining said pivots also secure said mounting means to said first end wall.

10. An electrical device as set forth in claim 8 in which the mounting means includes a guide formation engaging said connecting means to guide movement thereof upon manipulation of said adjusting means; said guide formation being carried by said first section.

11. An electrical device as set forth in claim 1 in which said crank members are generally L-shaped and

said pivots are disposed at the leg junctions of each of said members.

12. An electrical device as set forth in claim **11** in which said pivots comprise pin-like elements extending outward from said housing and through elongated clearance apertures in said members.

13. An electrical device as set forth in claim **11** in which each of said crank members is constructed with its hook portion and leg portion extending therefrom to its said pivot being formed by an unbent stamping.

14. An electrical device as set forth in claim **13** in which means defining said pivots also secure said mounting means to said first end wall.

15. An electrical device as set forth in claim **8** in which the adjusting means comprises a single screw threadably engaged with the connecting member; said screw extending through a clearance aperture in the second section with the head of said screw having movement thereof in a mounting means releasing direction limited by said second section.

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