

1

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SPLICE SLEEVES FOR CONNECTING ELECTRO-CHANNEL JOISTS

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The present invention relates to a novel means for and manner of connecting the ends of adjoining joists containing a channel providing an electrical duct or raceway for underfloor electrification.

It is an important object of the present invention to provide a novel sleeve assembly for connecting the ends of electro-channel joists whereby to provide a continuous duct for receiving and housing electrical wires.

Another object of the present invention is the provision of a novel means for and manner of encompassing and joining the ends of adjoining ducts provided by channeled joists for underfloor electrification and sealing said connected ends against the entry of concrete, water, debris, etc.

A further object of the present invention is the provision in joists for supporting concrete floors and in which joists the top chord is provided with a channel forming a duct or conduit for receiving and housing electrical wiring, of a novel splice sleeve assembly for effectively connecting these channels and sealing the joint therebetween, and for facilitating installation of and guiding the ends of the electrical wires as they are fed through adjoining channels.

Further objects are to provide a construction of maximum simplicity, efficiency, economy and ease of assembly and operation, and such further objects, advantages and capabilities as will later more fully appear and are inherently possessed thereby.

In the drawing:

Figure 1 is a fragmentary view in side elevation of adjoining open web metal joists particularly adapted for supporting a concrete floor and provided with an electrical channel or duct in the top of the joists through which electric wiring is run to service outlets, and showing the novel means for and manner of joining and sealing the connection between contiguous joists through which the electrical wires are run for underfloor electrification.

Fig. 2 is an enlarged view in vertical cross section through the novel splice sleeve assembly for connecting adjoining joists, the view being taken in a plane represented by the line 2—2 of Fig. 1 and viewed in the direction of the arrows.

Fig. 3 is a fragmentary, enlarged view in perspective of the novel assembly of the splice sleeve assembly to show in detail the manner in which the contiguous or adjoining joists are connected.

Fig. 4 is a fragmentary view, part in side elevation and part in vertical cross section, of the novel splice sleeve and showing its manner of assembly and the arrangement of the component parts, the view being taken on a reduced scale from that in Fig. 3.

Fig. 5 is a bottom plan of an alternate construction of splice sleeve for use in connecting flat bottom channels and adjoining joists.

Fig. 6 is a fragmentary view in vertical cross section through the alternate construction of splice sleeve, the view being taken on the line 6—6 of Fig. 7.

2

Fig. 7 is a fragmentary view in side elevation of the alternate construction.

Referring more particularly to the drawing in which an illustrative embodiment of the present invention has been disclosed, the open web metal joist for supporting a concrete floor is shown as comprising vertically spaced top and bottom chords rigidly connected together by intermediate web members. The top chord 10 comprises a metal channel 11 of sufficient internal dimensions or cross section to serve as a raceway or duct for housing electrical wiring, and provided with a relatively narrow base 12 from which the side walls 13 and 14 diverge upwardly where they terminate in a substantially horizontal flange 15. The base 12 of the channel is centrally elevated to provide a longitudinally extending rib 16.

The bottom chord 17 is preferably formed of two spaced apart parallel bars 18 and the web members 19 comprise a bar that is bent into a substantially zigzag shape with the lower bends at 20 projecting into the space between the parallel bars 18 and welded or rigidly connected thereto, and the upper bends at 21 being welded or rigidly affixed to the bottom of the top chord 10 in the groove formed on the underside of the rib 16. The ends 22 of the spaced parallel bars 18 are supported upon the usual girders in the manner hereinafter explained.

Mounted on the flanges 15 and extending longitudinally of the top chord 10 is a metal cover plate 23 of such length as to extend for the complete length of the channel 11 and of such width as to extend beyond the outer or marginal edges of the flanges 15 with the marginal edges 24 of the cover plate bent over the marginal edges of these flanges. The cover 23 is joined to the channel 11 as by spot welding or by other suitable securing means.

Figure 1 discloses a pair of joists disposed in end to end relation with the opposed ends of the channel 11 supported upon an upper filler plate 25 and a lower bearing plate 26 which distribute the load of the joists on the usual girders 27, the ends 22 of the spaced bars 18 being supported upon the bearing plate 26 and rigidly affixed thereto as by welding. The upper filler plates 25 are set back from the joist ends to provide a space or recess for the reception of the present novel splice sleeve assembly 28. As the ends of the adjoining joists are preferably spaced apart a limited amount, these ends are connected in the novel manner by the splice sleeve assembly 28 to permit the electrical wiring to be guided through adjoining joists, and to exclude from these joists all concrete, water, debris, etc. that would collect therein, especially when pouring the concrete flooring.

The novel assembly of the splice sleeve 28 for connecting adjoining joists is preferably installed promptly after the joists are welded or anchored in place. It comprises a two-piece channel formed of similar substantially Z-shaped sections 29 and 31 that substantially follow the external contour of the channel 11 of the top chord, and a cap 32 that is disposed over the cover plate 23 for the channel 11. Each section 29 and 31 comprises a base 33 that is upturned at the lower end adjacent its longitudinal side flange 34. The inclined side wall 35 of each Z-shaped section diverges upwardly with the upper end provided with a substantially horizontal flange 36 bent or formed at its free edge with a depending offset 37 projecting outwardly and beneath one of the depending flanges 38 on the opposite sides of the cap 32. The upwardly and inwardly sloping portions 40 of the depending offsets 37 aid in locating the upper portions of the Z-shaped sections 29 and 31 in their correct position and help to wedge them against the sloping side walls 13 and

3

14 of the channel 11. The horizontal flange 36 of each channel section 29 and 31 is provided with a tapped hole 39 to receive the threaded end of a sheet metal screw 41 inserted through a pre-punched hole 42 in both sides of the cap 32 aligned with the tapped holes 39 in Z-shaped sections 29 or 31.

To assure positive contact of the splice sleeve assembly about the adjoining surfaces of the encompassed channel 11 and its cover plate 23, the Z-shaped sections 29 and 31, and the cap 32 are of flexible metal and are furnished with the base 33 of each Z-shaped section 29 and 31 upturned at its bottom end adjacent the side flange 34. The splice sleeve components consequently have a different contour prior to assembly than when drawn up tightly into final position.

In the assembly of the components of the splice sleeve 28, caulking composition 30 is applied to the underside of the cap 32 inwardly of and along both edges 32^a and the cap is then centered over the gap between adjoining joists. Next, one of the Z-shaped channel sections is placed into position by passing its upturned flange 34 through the space 43 provided between the bottom of the joist body and the spaced ends of the filler plates 25, with the flange 34 located in the groove beneath the rib 16 of the base 12 of the channel 11. With the offset 37 of this Z-shaped section or half-channel seated beneath the down-turned flange 38 of the cap 32, a screw 41 is inserted in the hole 42 of the cap and the aligned tapped hole 39 of the Z-shaped section and tightened. The second Z-shaped section is similarly placed from the opposite side of the joist with its upturned side flange 34 located in the groove beneath the rib 16 and with its side or upturned flange 34 disposed in abutting relation with the side or upturned flange 34 on the adjacent and initially installed Z-shaped section.

Next the other side of the cap 32 is manually depressed and a screw 41 is inserted through the pre-punched hole 42 in this other side and into the aligned tapped hole 39 in the adjacent opposite Z-shaped section, and the screw is then partially tightened. Upon tightening both screws 41 against their washers the Z-shaped sections 29 and 31 and the cap 32 of the splice sleeve 28 are brought into intimate contact with the adjacent and overlapped external surfaces on the channel 11 and its cover plate 23, yet breathing openings or areas are retained at 45 and 46 which allow any water vapor which may collect in the duct to escape, thus minimizing a natural cause of corrosion of the steel and deterioration of the insulation of the electrical wires.

To assure effective contact of the Z-shaped sections 29 and 31 with the adjacent surfaces on the channel 11, the angle or arc of curvature at 44 on these flexible Z-shaped sections is slightly smaller than that of the adjoining surfaces of the encompassed channel 11, whereby the Z-shaped sections 29 and 31 are securely clamped to the channel 11.

As the parts of the splice sleeve do not need to be slipped or slid over the ends of the adjoining joists prior to the erection and securing of the joists, but may be assembled in the manner described above, these parts are preferably assembled in operative relation immediately after installation and welding into place of the joists so as to exclude dirt, water and debris from inside the channel 11 forming the electrical duct, and thus protect and preserve a clean and smooth interior for the enclosure of the electrical circuits.

To insure against leakage and provide maximum protection after the electrical wiring has been installed, the parts are calked between the cap 32 and the cover plate 23, and between the Z-shaped sections 29 and 31 and the channel 11. This calking is preferably accomplished at the time the parts of the splice sleeves are installed, it being a simple matter for the worker to inspect the adjoining joist ends and remove any entrapped dirt or debris, calk the component parts and install the splice

4

sleeve so as to thereafter exclude from the adjoining ends of the joists, water, debris, etc., as well as prevent the entrance of any plastic concrete when the top slab is poured.

Figs. 5, 6 and 7 disclosed an alternate construction of splice sleeve 47 adapted for connecting adjoining channel members 48 of joists similar to those disclosed in Figs. 1 to 4, inclusive, except that the bottom 49 of these channels are flat rather than provided with a longitudinal rib 16 and groove therebeneath. In this form the substantially Z-shaped sections 51 and 52 of the two-piece channel of the splice sleeve each have a flat base 53 provided with spaced depending interlocking tongues or flanges 54 and 55 along the marginal edges of the base. Upon insertion of the Z-shaped sections into the space 43 between the filler plates 25 and the movement of these sections laterally or toward each other a distance sufficient to interengage these complementary tongues or flanges 54 and 55, the Z-shaped sections 51 and 52 are held in interlocking engagement. In other respects this alternate construction of splice sleeve assembly is similar to that shown in Figs. 1 to 4, inclusive.

From the above description and the disclosure in the drawings, it will be apparent that the novel splice sleeve when assembled provides a most effective connection between adjoining or abutting joist ends as well as protection of the electrical wiring between the ends of adjoining joists.

Having thus disclosed the invention, we claim:

1. In combination with channelled joists for under-floor electrification in which the top chord of adjoining joists includes a channel member providing a duct for receiving and housing electrical wires and a cover projecting over and providing a closure for the channel member, a splice sleeve joining the ends of adjoining channel members and their cover to enclose the adjoining ends and seal the space therebetween against the entry of concrete, water and debris and to facilitate installation and guiding of the electrical wires as they are fed along and through adjoining ends of channel members, said splice sleeve including a pair of complementary, flexible substantially Z-shaped closure sections divided longitudinally and each section of a length greater than the spacing between adjoining channel members whereby said sections overlap the ends of said adjoining channel members when assembled and substantially conform to the base and side walls of the adjoining channel members, the adjoining longitudinal edges of the base of said sections having engaging flanges, a cap also of a length greater than the space between the ends of the adjoining covers, said cap having a depending flange at each side projecting over the marginal edges of the adjoining covers, and means connecting the marginal edges of the cap to the marginal edges of the sections to draw and retain the latter and the cap in sealing contact with the adjoining channel members and covers.

2. In combination with electro-channel joists in which the top chord of each of said joists is provided with a longitudinal channel and the channels of adjoining joist ends aligned for the passage therethrough of electrical wires with each channel provided with a longitudinal groove in its base, a splice sleeve comprising a pair of complementary substantially Z-shaped sections each having a side wall and base spanning the space between said adjoining channels, said base of said sections having a marginal flange anchored in the groove in the base of the channelled top chord, a cap which combines with said sections to encompass the spaced ends of the adjoining channelled top chords and enclose the space between said ends, said sections and cap being of flexible metal, and tensioning means connecting the outer marginal edges of said sections to the cap to tightly draw said sections and cap about the adjoining ends of the channelled top chords and covers of adjoining joists and tensionally hold the

5

channel sections and cap in anchored position and tight covering engagement.

3. In combination with electro-channel joists each having a channel member provided with a rib formed by a groove in its base and extending longitudinally thereof and a cover for the channel member with said channel member providing a raceway for receiving and housing electrical wires extending through it and into adjoining joists, means joining the ends of the channel members of adjoining joists comprising a pair of complementary substantially Z-shaped sections combining and closely encompassing the exterior of the base and side walls of adjoining channel sections, each of said sections being of flexible metal provided with a base having an upturned flange providing a marginal edge and adapted to project into the groove and an outwardly projecting flange along its other marginal edge, and a cap also of flexible metal overlying the contiguous ends of the covers of the adjoining joists, and means connecting the cap to the outwardly projecting marginal flanges of said sections whereby said cap and said sections enclose the ends of the channels of adjoining joists and bridge the space therebetween.

4. In combination with electro-channel joists with each joist including a top chord formed of a channel member providing a wireway and a cover for said channel member with the latter having a groove in its base means connecting the channel members of adjoining joists including a pair of separate substantially Z-shaped sections which together closely conform to the base and side walls of adjoining channel members and a cap overlying the contiguous ends of the covers of said adjoining channel members, each of said sections having a side wall substantially conforming to a side wall of said channel members,, an outwardly projecting substantially horizontal flange providing one marginal edge of a Z-shaped section and a base provided with a marginal flange projecting beneath and anchored in the groove in the bases of adjoining channel members with said marginal flanges in abutting position when said sections are assembled, and screws connecting the opposite sides of the cap to the adjacent horizontal flange of said sections and drawing the cap and the sections tightly over and about the adjoining ends of the channel members and their covers.

5. In combination with electro-channel joists in which the top chord of each of said joists is provided with an upwardly opening channel member for receiving electrical wires, a groove in the base of the channel member and a cover for closing the open side of the channel member, a splice sleeve connecting adjoining channel

6

members comprising a pair of complementary substantially Z-shaped sections each having a base anchored in the groove in the base of the channel members and a cap which combines with said sections to encompass and enclose the spaced adjacent ends of the adjoining channel members and their cover and enclose the space between said open spaced ends, and means connecting the outer marginal edges of said sections to the cap to tightly draw said sections and cap about the spaced edges of the channel members and covers of adjoining joists.

6. In combination with electro-channel joists as set forth in claim 5, in which said sleeve is provided with one or more protected breathing spaces for the escape of water vapor from said channel members.

7. In combination with adjoining electro-channel joists in which the top chord of each of said joists is provided with an upwardly opening channel member for receiving electrical wires and a cover for closing said channel member, and where said adjoining channel members are anchored in fixed and aligned position and each provided with a longitudinal groove in its base, a splice sleeve connecting the ends of adjoining channel members to provide a supported, continuous wireway, said splice sleeve comprising a pair of complementary substantially Z-shaped sections with an edge of each section arranged in abutting relation in the groove in the base of the adjoining channel members and the side of each section substantially conforming to the adjacent aligned sides of adjoining channel members, and a cap combining with said sections to encompass and enclose the spaced ends of the adjoining channel members and their cover, said sections and cap being of flexible metal and capable of being drawn tightly about and bent over the contiguous surfaces on the adjoining channel members and their covers, and means connecting the outer marginal edges of said sections to the cap to tightly draw said flexible sections and cap about the spaced edges of the channel members and covers of adjoining joists and retain them in covering contact to prevent the entry of water, concrete or other debris, and to facilitate the passage of electrical wires through adjoining channel members.

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