

April 17, 1962

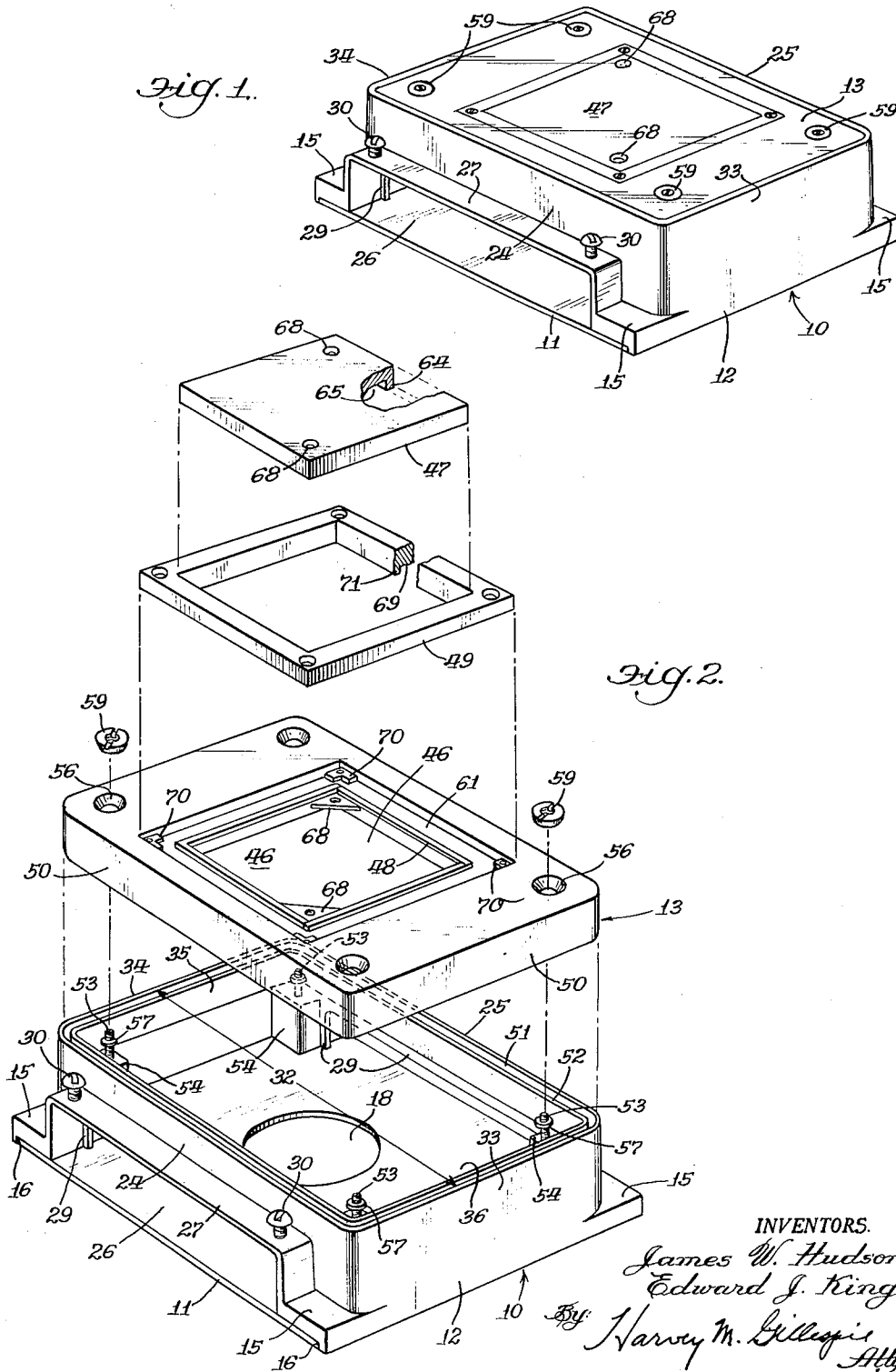
J. W. HUDSON ET AL

3,029,964

JUNCTION BOX FOR UNDERFLOOR WIRING SYSTEM

Filed June 30, 1960

3 Sheets-Sheet 1



April 17, 1962

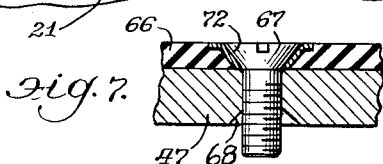
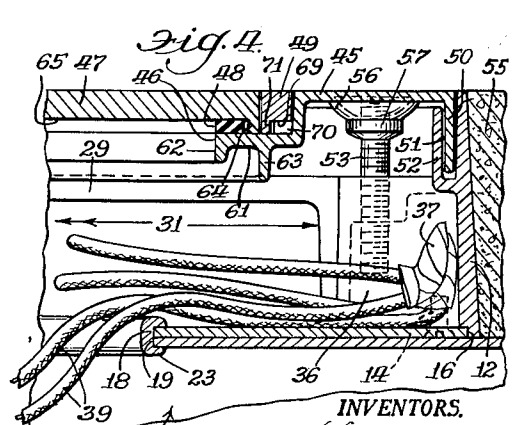
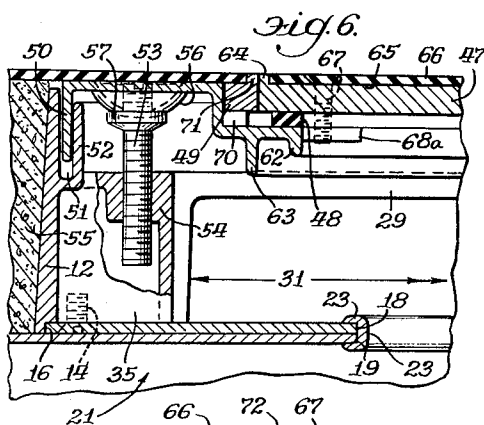
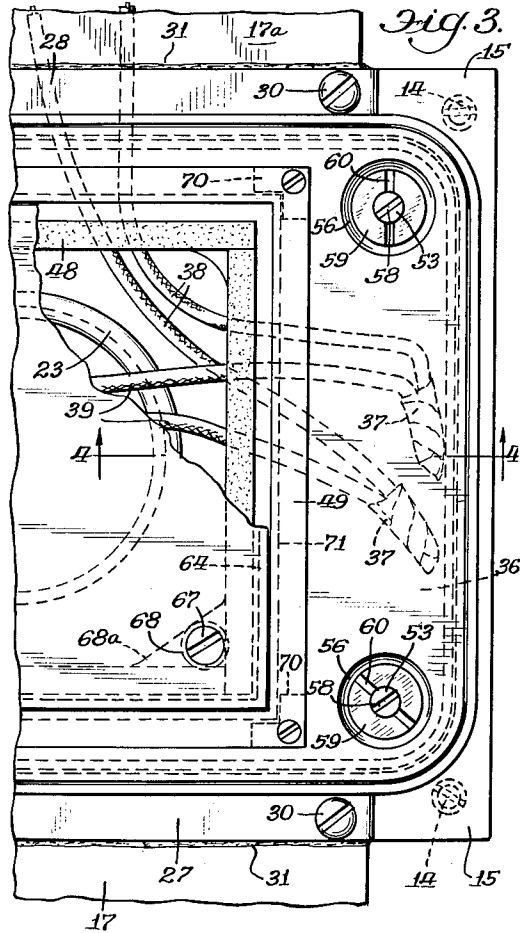
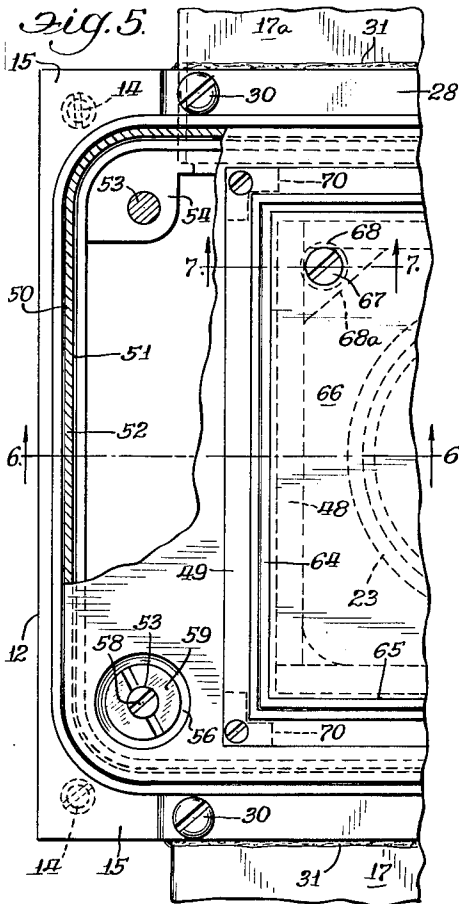
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JUNCTION BOX FOR UNDERFLOOR WIRING SYSTEM

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3 Sheets-Sheet 2



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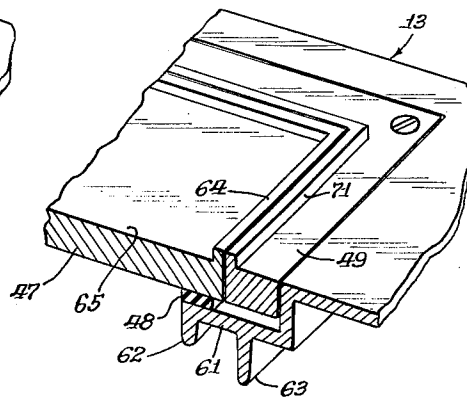
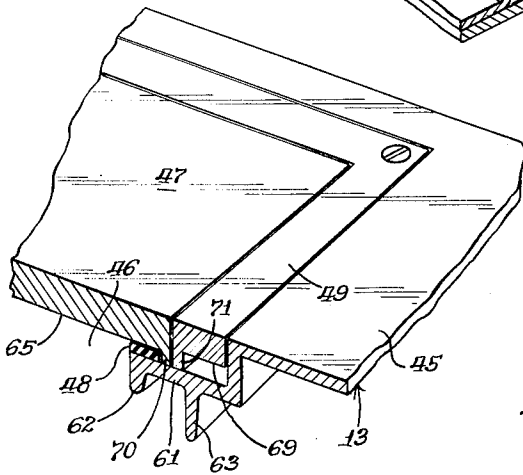
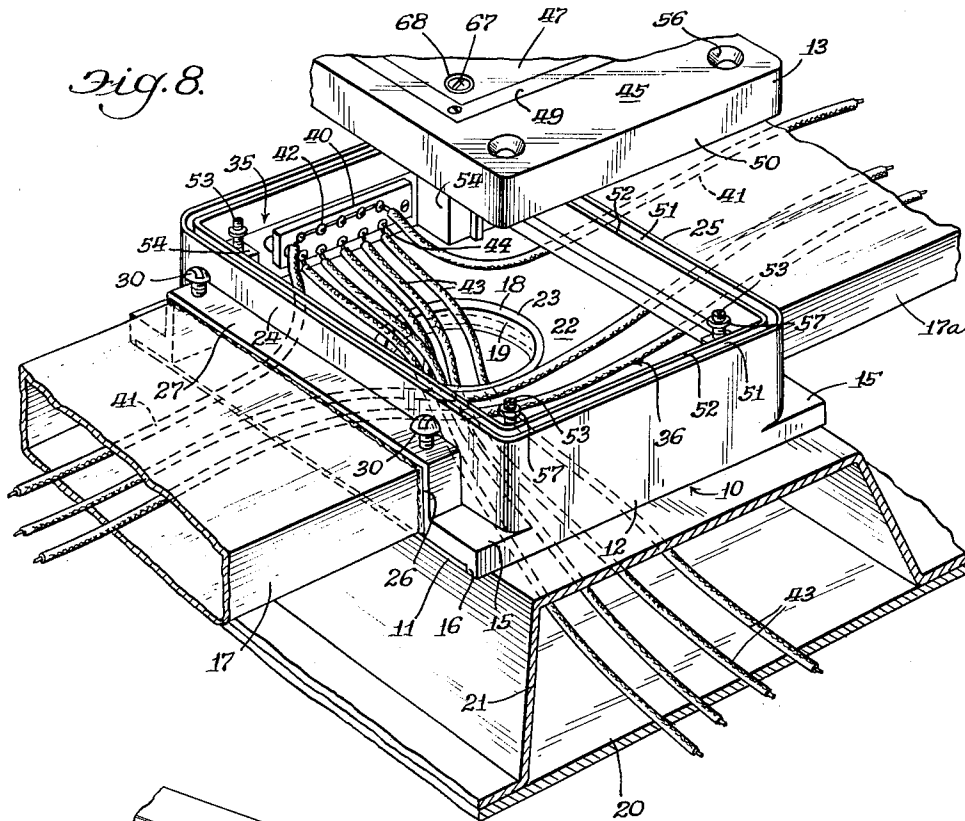
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JUNCTION BOX FOR UNDERFLOOR WIRING SYSTEM

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3 Sheets-Sheet 3



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3,029,964

JUNCTION BOX FOR UNDERFLOOR WIRING SYSTEM

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8 Claims. (Cl. 220—3.4)

The present invention relates to an improved junction box for use in underfloor electrical distributing systems.

A principal object of the invention is to provide an underfloor junction box of simplified construction, the principal parts of which may be economically constructed of cast metal and readily assembled to provide a strong and durable watertight structure suitable for embedment in concrete floors and which, by virtue of certain of its novel constructions, provides a passageway through the box of suitable area to accommodate a large volume of wires in proportion to the size of the box and to also provide chambers at opposite sides of the passageway for the reception of the spliced wire ends, whereby the said passageway is kept relatively clear of spliced wire ends and thereby provides more space for performing the splicing operations and for facilitating the work of fishing or pulling the wires through the box.

Another object is to provide certain other novel and simplified constructions whereby the top cover structure of the box includes a ring element which may be readily adjusted, either before or after the concrete has become hardened, to accommodate concrete slabs of different thickness and to bring the top structure of the box into alignment with the top surface of such concrete slab. In order to facilitate ready adjustment of the top structure at all times, the top structure includes a top ring element which is adjustably supported on screws which remain clear of the concrete at all times and the outer perimeter of the ring is turned downwardly to project into an annular channel between spaced apart walls adapted to contain a soft sealing compound. The inner wall associated with said channel stops short of the upper edge of the outer wall so as to permit the top surface of the ring to assume a position flush with the top edge of said outer wall and thereby remain for the most part out of contact with the concrete.

A further object of the invention includes the provision of a novel closure plate for closing an access opening through said top cover ring. In this connection the plate is formed at one side with a tread surface for alignment with a concrete floor and is formed on the other side with an integral rim which, when the plate is inverted, provides a tray of suitable depth for containing tile or other floor covering. In combination with the said closure plate and special construction of the top cover ring, the invention contemplates the provision of an invertible cast metal trim ring surrounding the periphery of the closure plate; the trim ring being adapted in one position to provide a continuation of the said tread surface of the closure plate and consequently align with the top surface of the cover ring and in another position to provide an upstanding trim edging extending around the access opening of the cover ring and serving to protect the adjacent edges of the floor covering.

Other objects and advantages of the invention, not at this time enumerated, will become more readily apparent as the following description ensues.

The invention is illustrated in the accompanying drawings wherein:

FIG. 1 is a view in perspective of an underfloor junction box structure constructed in accordance with this invention, the top structure of the box being shown in a position flush with the side walls of the box;

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FIG. 2 is an exploded view in perspective illustrating the several parts of the box structure shown in FIG. 1;

FIG. 3 is a fragmentary plan view of a portion of the box in which the spliced wire ends are shown positioned at one side of a central passage through the box and showing also the closure plate element and its associated invertible trim ring arranged to provide a top surface aligned with the tread surface of the closure plate and with the top surface of the closure ring;

FIG. 4 is a fragmentary cross-sectional view taken on line 4—4 of FIG. 3;

FIG. 5 is a fragmentary top plan of the box structure showing the closure plate and its associated invertible trim ring arranged to provide concentric trim edgings for protecting adjacent edges of a floor covering in the region of said cover plate;

FIG. 6 is a fragmentary sectional view taken on line 6—6 of FIG. 5;

FIG. 7 is an enlarged fragmentary sectional view taken on line 7—7 of FIG. 5 to illustrate a special form of sleeve clamp engaging the floor covering and providing a metallic seat for the conical under-surface of the head portions of screws utilized to fasten the closure plate in position;

FIG. 8 is a fragmentary exploded view illustrating the improved junction box provided at one side with a multiple connector bar whereby a number of branch lines may be operatively connected through said connector bar with a main line passing through the box;

FIG. 9 is a fragmentary view in perspective showing the closure plate and the invertible trim ring in the positions shown in FIGS. 3 and 4; and

FIG. 10 is a similar perspective view to further illustrate the closure plate and trim ring in their inverted positions.

The improved junction box of the present invention is adapted to be embedded in a concrete floor in connection with an underfloor wiring system. It is of rectangular configuration and is composed principally of interfitting castings of zinc or other corrosion resistant metal so as to provide a strong and durable watertight construction. It is designed primarily for connection in a cross-over duct or in connection with a headerduct positioned to communicate with selected wire distributing cells of a multicellular steel floor. However, the improved structures embodied in the junction box herein shown are obviously suitable for incorporation into the structures of underfloor junction boxes generally.

The junction box herein shown is designated generally by the reference numeral 10 and may be briefly described as comprising a bottom plate 11, a body casting 12, and a top closure structure composed of several cooperative parts and designated as a whole by the reference numeral 13.

The bottom plate 11 may be sheared from plate material of suitable width and is secured to the lower edge of the body casting 12 by means of screws 14 which are threaded into relatively thick flanges 15 formed at the lower corners of the box. In order to provide a leak-proof connection along the lower edge of the box, the lower edge of the body casting 12 is formed with a kerf 16 which tightly fits the perimeter of the bottom plate 11. This construction together with the firm clamping functions of the screws 14 will be sufficient to prevent water seeping into the box in the event that the concrete becomes fractured in the region of the box.

When the box is utilized in a cross-over or headerduct 17 (see FIG. 8), the bottom plate 11 is provided with at least one relatively large aperture 18 adapted to register with a similar aperture 19 formed in the top of an underlying duct 20, for example one of the cells of a multicellular steel floor panel 21. The registering apertures 18

and 19 provide a communication passageway between the interior 22 of the junction box and the underlying duct 21 and also cooperate with a grommet 23 for securing the box 12 to said underlying duct 21.

The front and rear walls 24, 25 of the body casting 12 are provided with rectangular openings 26 for receiving the ends of duct sections or raceways 17, 17a, the latter of which serve to house portions of the wiring of the electrical system and cross-over the wire distributing duct 21. The said duct receiving openings 26, 26 are provided with lateral rim flanges which extend along the top and sides of the openings and cooperate with the bottom plate 11 to provide sleeve portions 27, 28 which embrace the ends of said duct sections 17, 17a. Each sleeve portion is of substantial width to permits the ends of the ducts to be inserted to variable extent therein. An internal rib 29 formed in each sleeve serves to limit the extent to which a duct section 17, 17a may be inserted therein and also provides smooth surfaces for contacting the insulation of the electrical conductors as the latter are drawn through the duct sections. Screws 30 serve to hold the duct sections in their applied positions and also serve to electrically ground the boxes and duct sections. The duct sections 17, 17a are sealed in said openings 26 by the application of a waterproof sealing compound 31 along the outer edges of the duct receiving openings 26.

It will be observed by inspection of the drawings that the width 32 of the junction box 10, measured across the sides 33, 34, is substantially wider than the duct receiving openings 26, 26 and thereby provides chambers 35, 36 at the opposite sides of the said central passage through the box. These chambers 35, 36 are adapted to receive the spliced ends 37 of the wires 38, 39 (see FIGS. 3 and 4) so that the central passageway through the box may be kept clear of the spliced wire ends and thereby facilitate the splicing operations and the fishing and wire pulling operations. The lateral chambers 35, 36 also provide adequate space for the mounting of one or more connector bars 40 (see FIG. 8) whereby a single main line 41 may be connected to one or more of the upper contact screws 42 and one or more branch wires 43 housed in the duct 21 may be electrically connected to the main wire by merely attaching the branch wires to the lower contact screws 44. This arrangement eliminates over-crowding the box with spliced wire ends and thereby simplifies the work of making the electrical connections and of subsequently locating specific circuits leading to specific office equipment when it becomes necessary to check the electrical circuits.

Cover Structure

The cover structure 13 includes four principal elements. These elements comprise a cover ring 45 formed with an access opening 46 thereof, a closure plate 47 for closing the access opening 46, a sealing gasket 48, preferably of rubber, or rubber substitute, on which the closure plate 47 is seated, and a unitary trim ring 49 surrounding the perimeter of the closure plate. The elements 45, 47 and 49 are all made of cast metal so that they can be made of unitary construction at minimum cost and can also be provided with integral reinforcements at proper locations without materially adding to the cost of production.

The closure ring 45 is formed along its outer edges with a downturned flange 50 which is received in a channel 51 extending around the upper edge of the body casting 12 in spaced relation to the outer walls thereof. The upper edge of the flange 52 stops short of the upper edge of the side walls of the body casting 12 so as to permit the top tread surface of the cover ring 45 to be positioned in alignment with the top rim of the body

casting as shown in FIGS. 1 and 4. The said cover ring is adjustably supported at each of its four corners on adjusting screws 53 threaded into reinforced upper end portion of corner posts 54 formed integrally with the body casting 12. In order to facilitate angular adjustment of the ring 45 so as to align it with the elevation and slope of the concrete floor 55 the corner regions of the ring are formed with cup-shaped depressions 56 which seat on collars 57 formed integrally on the adjusting screws 53. The top face of each collar 57 is concaved to fit the convex bottom surface of the depression 56 associated therewith whereby the top ring can assume various angular positions relative to the vertical axis of the several adjusting screws 53 and at the same time remain firmly seated on said collars 57. The upper end of each adjusting screw 53 is slotted as indicated at 58 to receive the bit end of a screw driver, whereby the screws can be adjusted to any desired height to bring the top or tread surface of the ring 45 into alignment with the top surface of the concrete 55. When the said ring 45 has been adjusted to a desired position it is locked therein by means of lock nuts 59 each of which is formed with a convex bottom surface corresponding to the concavity of its associated depression 56. Each lock nut is also provided with slots 60 to receive the bit end of a screw driver.

The inner perimeter of the cover ring is offset downwardly as indicated at 61 to provide a shelf on which the closure plate 47 and the trim ring 49 are seated, the said shelf 61 being preferably rigidified by downwardly extending flanges 62 and 63. These flanges are of different heights and their lower edges are rounded to provide smooth surfaces for contact with the insulation covering of the wires. These smooth surfaces of the flanges 62, 63 prevent cutting the insulation of the wires and prevent abrupt bending of the wires around a single edge surface during the pulling of wires through the ducts 17, 17a. Furthermore, the rectangular configuration of the access opening 46 as distinguished from a circular opening permits the wires to be drawn through the ducts 17, 17a in a straight path at any location within the duct and thereby avoids the tendency which circular access openings have to shift the drawn wires toward the more congested middle region of the ducts with which the junction box is connected.

The closure plate 47 is provided on one face, for example the underface according to the position in FIG. 4, with a perpendicular marginal rib 64 defining a depression or tray. In this position of the plate, the perpendicular rib 64 bears flat against the top surface of the shelf 61 and the other face of the plate serves as a tread surface and aligns with the tread surface of the ring. This is the normal position of the closure plate during the shipment of the box and during the construction of the floors, since it is desirable in such instances to protect the rib 64 from being broken or otherwise damaged by rough handling or by the movement of heavy equipment and materials across the box cover during the construction of the concrete floor and other parts of a building. This position of the closure plate is also the normal position thereof in the event that the concrete floor is to be utilized without an additional floor covering 66. In such case, the closure plate 47 is clamped against the ledge 61 of the cover ring and in sealing engagement with the gasket 48 by means of cap screws 67. These screws extend through countersunk bores 68 in the plate 47 and are threaded through gusset webs 68a located in diagonally opposite corners of the access opening 46 (see FIGS. 1, 5 and 6).

The trim ring 49 is of unitary construction and is positioned to surround the perimeter of the closure plate 47 in close relation thereto. The underface 69 of the trim ring, in the position shown in FIGS. 3 and 4, seats at its corners on bosses 70 (see FIGS. 2 to 6, inclusive) which project upwardly from each corner of the shelf 61. The inner perimeter of the trim ring 49 is also formed

with a perpendicular rib 71 having a height equal to the heights of the bosses 70 so that it will seat throughout its length against said shelf 61, when in the position shown in FIGS. 3, 4 and 9.

When an additional floor covering 66 is utilized the cover plate 47 is inverted as shown in FIGS. 5, 6 and 10. In such case the depressed face 65 and the associated rib 64 provide a tray for retaining a small area of the floor covering 66, this block or small area of floor covering being clamped to the closure plate by the co-action of the screw 67 and a sleeve bushing 72 surrounding the conical under-surface of the screw head and serving to clamp the floor covering to the dished portion of the plate 47. The trim ring 49 is also invertible and when inverted as indicated in FIGS. 6 and 10, the rib 71 provides a metallic edging for the portion of the floor covering 66 which overlies the top surface of the cover ring 45 as shown in FIG. 6.

While the invention is shown in connection with certain specific embodiments, the said specific constructions are intended primarily to be exemplary and not limitations. It will be understood, therefore, that the applicants contemplate all such variations in structure as come within the scope of the appended claims.

What we claim is:

1. A junction box for an underfloor wiring system comprising a body portion having an open top and having side openings for receiving end portions of duct sections, and a cover structure for said open top including a cover ring having inner and outer portions offset from each other by an offsetting portion, said inner portion of said cover ring forming a ledge depressed from said outer portion and defining an access opening through said ring, a closure plate for said access opening, said closure plate being larger than said access opening but fitting within said offsetting portion of said cover ring, one side of said closure plate being flat and the other side of said closure plate having a projecting peripheral rib extending therearound and spaced outwardly from the edge of said access opening, and supporting means for said closure plate spaced inwardly of said peripheral rib on opposite sides of said access opening, said closure plate being invertibly supported over said access opening in either of two relative positions and having its flat side flush with the top surface of said outer portion of said cover ring and its peripheral rib on its other side adjacent the ledge formed by said inner portion of said cover ring and in alignment with said supporting means transversely of said opening in one of said positions and having its flat side resting on said supporting means and its peripheral rib on its other side projecting upwardly from the top surface of said outer portion of said cover ring in the other of said positions.

2. A junction box as claimed in claim 1, wherein said access opening and closure plate are substantially square.

3. A junction box as claimed in claim 1, wherein said supporting means is a gasket surrounding said access opening.

4. A junction box as claimed in claim 1, wherein said body portion is formed of cast metal and its upper edge portion includes a double wall structure defining a channel adapted to contain a sealing compound and wherein said cover ring is supported on adjusting screws and is provided with a depending peripheral flange extending into said channel and adapted to penetrate a sealing compound therein, whereby the top cover structure may be adjusted vertically relative to said body portion without breaking a sealed relationship therewith.

5. A junction box as claimed in claim 4, wherein the inner wall of said double wall structure stops short of the upper edge of the outer wall, whereby said cover ring may be adjusted to a position wherein the top surface of the said outer portion thereof is flush with said upper edge of said outer wall.

6. A junction box as claimed in claim 1, including a unitary trim ring fitting within said offsetting portion of said cover ring and surrounding said closure plate, said trim ring being flat on one side and having a projecting rib extending around the inner periphery thereof on the other side, and support means for said trim ring on said ledge spaced outwardly of said trim ring rib, said trim ring being invertibly supported around said closure plate in either of two relative positions and having its flat side flush with the top surface of said outer portion of said cover ring and its projecting rib on its other side adjacent the ledge formed by said inner portion of said cover ring in one of said positions of said trim ring and having its flat side resting on said trim ring support means and its projecting rib extending upwardly from the top surface of said outer portion of said cover ring in the other of said positions of said trim ring.

7. A junction box as claimed in claim 6, wherein said trim ring support means is a plurality of bosses formed on said inner portion of said cover ring.

8. A junction box as claimed in claim 6, wherein said access opening, closure plate, and trim ring are substantially square.

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