Sept. 24, 1963 J. W. HUDSON ET AL 3,104,774

UNDERFLOOR ELECTRICAL JUNCTION BOX

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Fig. 1.

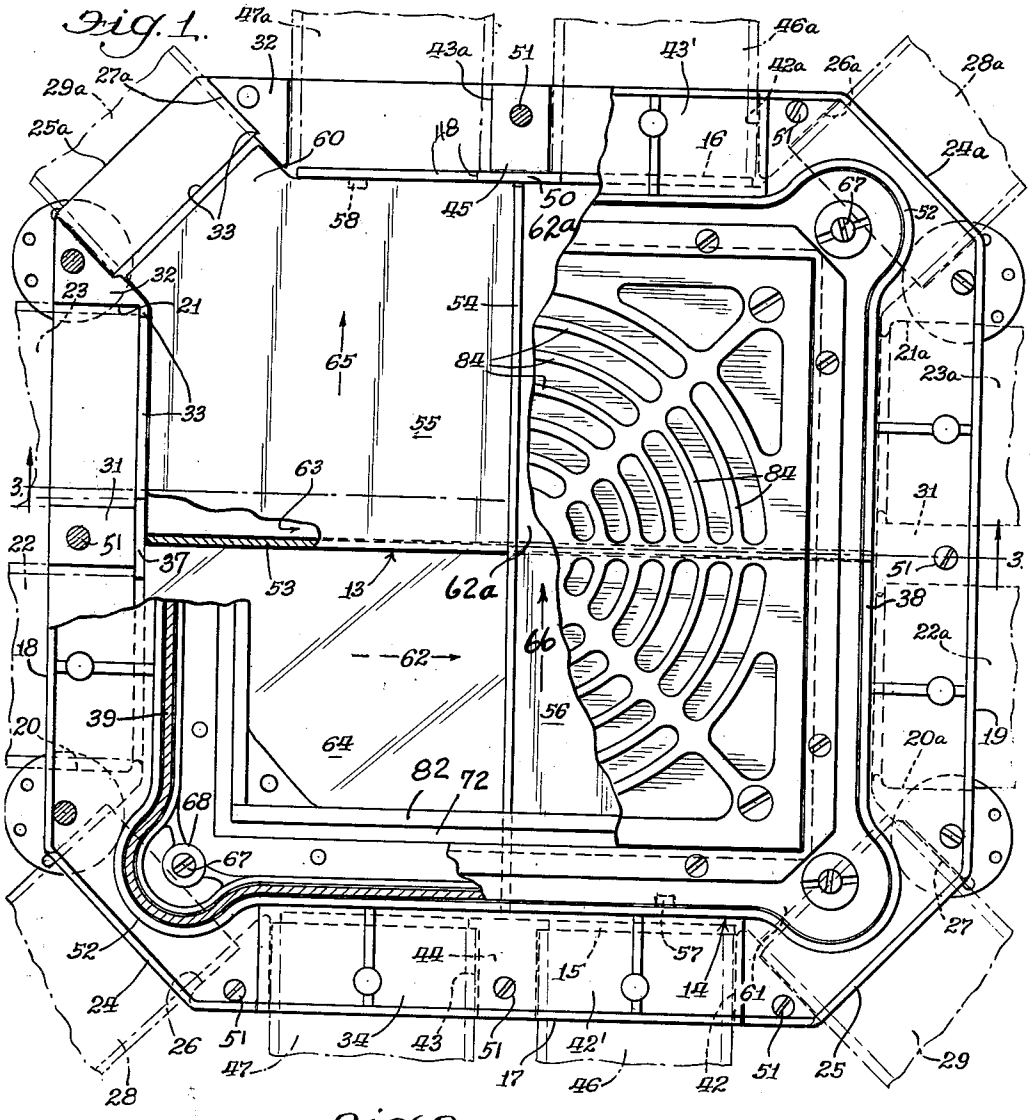
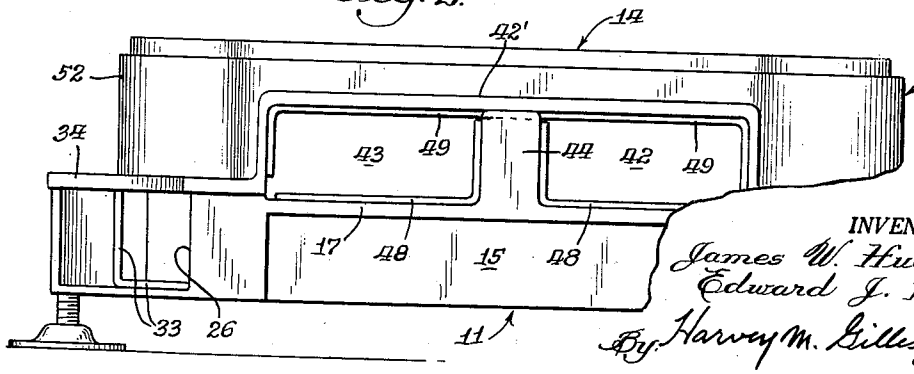


Fig. 2.



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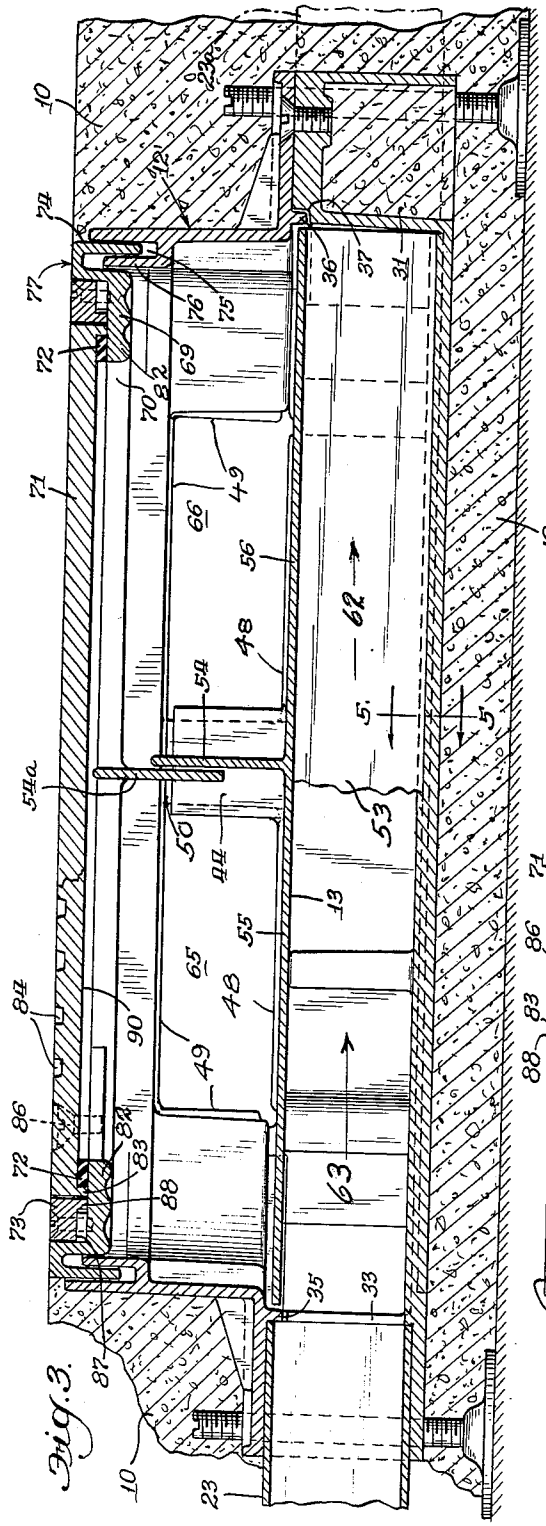

Fig. 3.

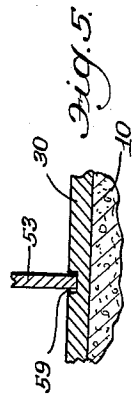

Fig. 5.

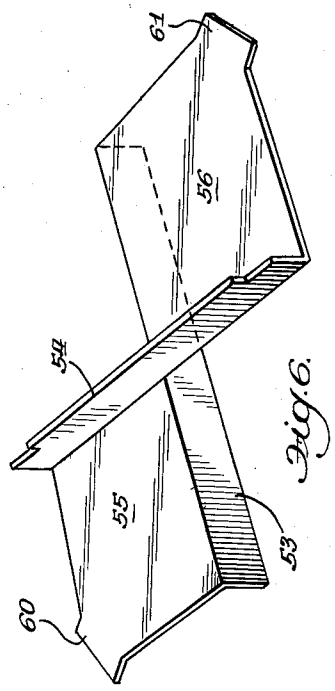

Fig. 6.

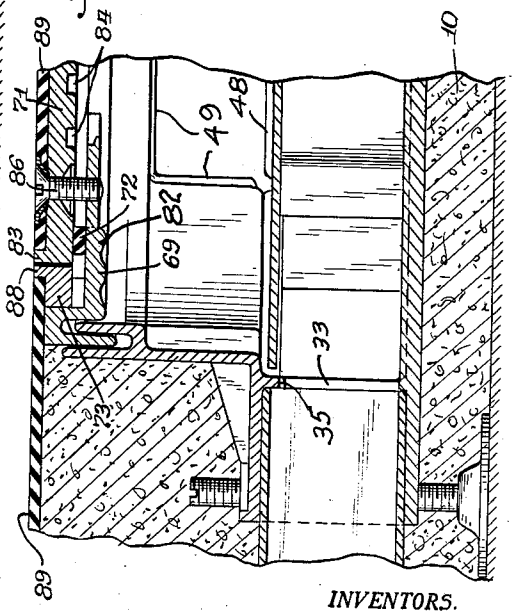

Fig. 4.

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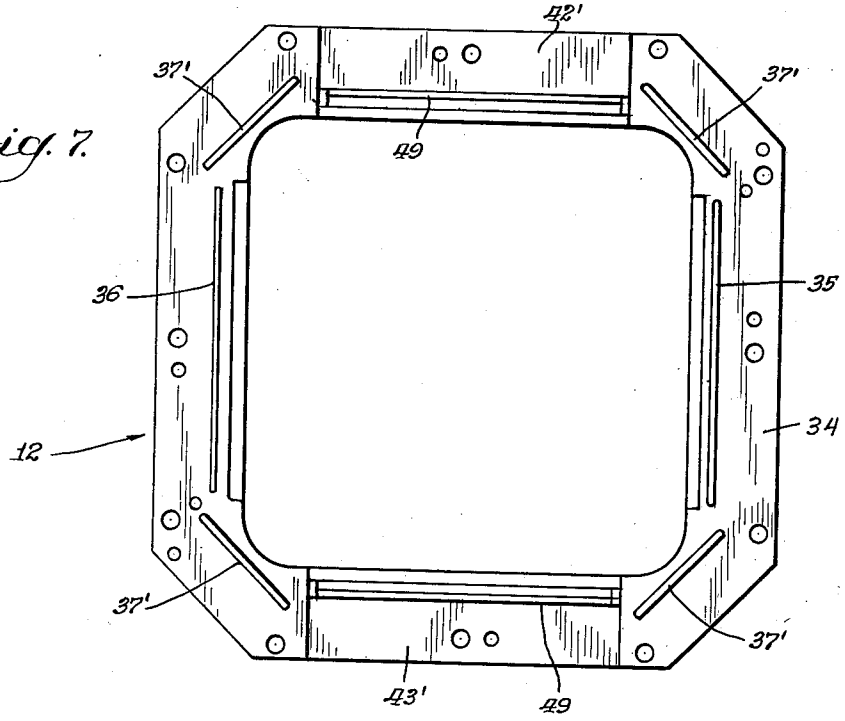
Fig. 7.



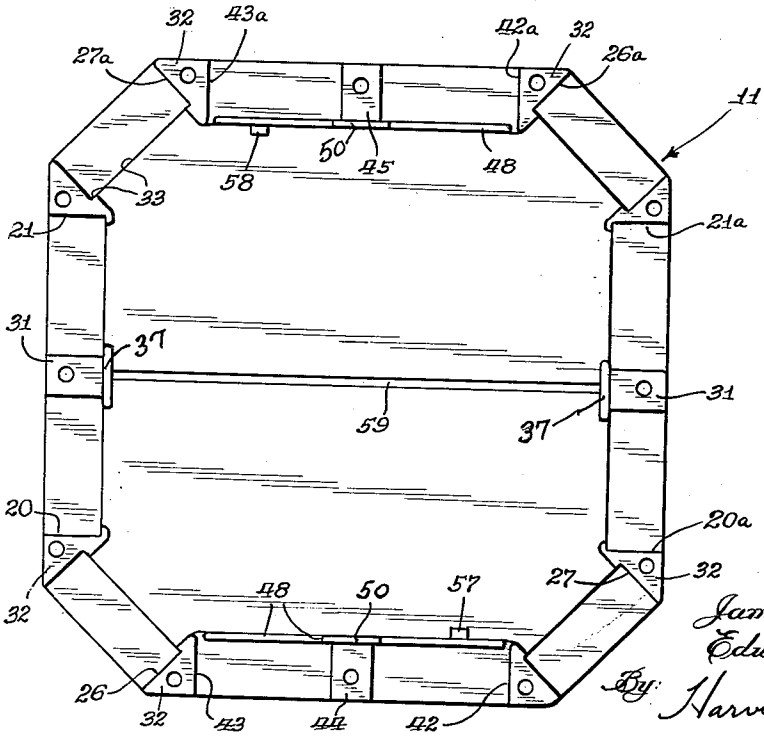


Fig. 8.

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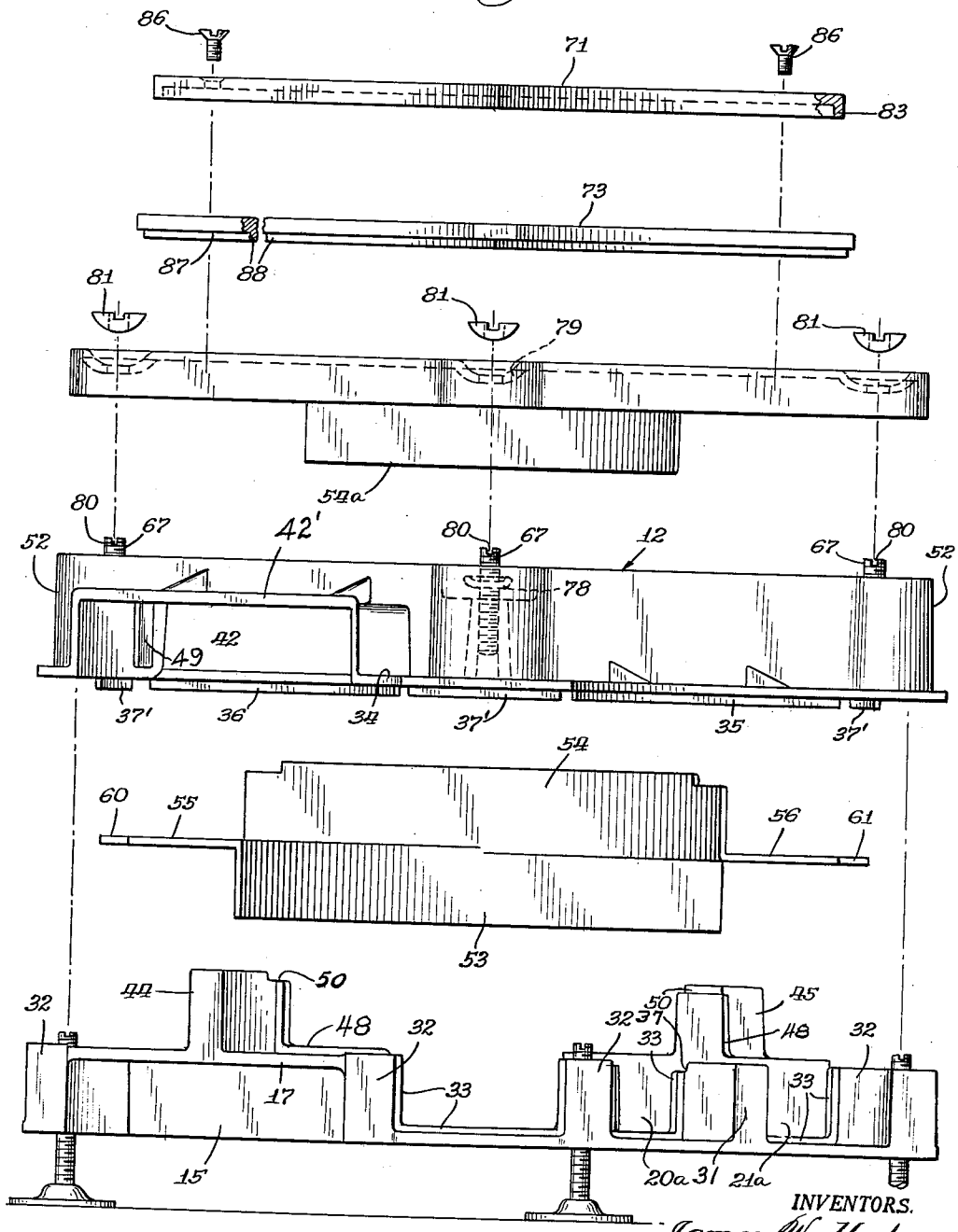
Fig. 9.



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United States Patent Office 3,104,774 Patented Sept. 24, 1963

3,104,774

UNDERFLOOR ELECTRICAL JUNCTION BOX

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Filed July 12, 1960, Ser. No. 42,415
13 Claims. (Cl. 220—3.94)

This invention relates to improvements in underfloor electrical junction boxes and more particularly to junction boxes of this general class having lower and upper level raceways for electrical wiring.

A principal object of the invention is to provide an underfloor junction box having bi-level raceways for electrical wiring and including novel constructions adapted to be formed by conventional metal casting operations and to provide a strong, durable box structure composed of a minimum number of interfitting parts which are so formed as to simplify the assembly of the parts and, consequently, reduce the cost of assembly operations.

According to the present invention, the improved junction box includes a sectional body portion composed of two castings including a lower casting defining the lower level portion of the body and an upper casting defining the upper level of the body. A separately formed partition casting cooperates with the lower and upper body castings to define lower and upper raceways within the confines of the body structure. The upper end of the box is closed by a cover structure comprising a cast metal cover ring of rectangular configuration and an invertible closure plate for closing a rectangular access opening defined by said ring. The invention also includes a unitary trim ring surrounding the closure plate and invertibly supported on the cover ring.

A series of duct receiving openings is formed in the opposed sides and corner portions of the lower body section, these openings being open at the top, to simplify the casting operations, but closed by a bottom rim flange of the upper body casting when the latter is in its assembled position. Opposed side walls of the upper body casting are provided with duct receiving openings which are open at the bottom, to facilitate casting operations, but closed by a top rim flange of the lower body casting when both body sections are assembled.

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 plan view of the box with parts in section and other parts broken away to better illustrate the internal construction;

FIG. 2 is a side view in elevation of the structure shown in FIG. 1;

FIG. 3 is a sectional view taken on line 3—3 of FIG. 1;

FIG. 4 is a fragmentary sectional view of an end portion of FIG. 3, but illustrating the closure plate and the trim ring associated therewith arranged in inverted positions to provide metallic trim edgings for a floor covering;

FIG. 5 is a fragmentary sectional view taken on line 5—5 of FIG. 3;

FIG. 6 is a view in perspective of a separately formed partition element adapted to be fitted within the body to define lower and upper level raceways for the electrical wiring;

FIG. 7 is a bottom plan view of the upper casting forming the upper portion of the box structure;

FIG. 8 is a plan view of the casting forming the bottom portion of the box; and

FIG. 9 is an exploded view of the several parts of the

structure shown in elevation, the view being taken from the lower right corner of FIG. 1 looking toward the upper left.

The improved junction box is composed of interfitting metal castings, preferably of zinc or other non-corrosive metal, and is adapted to be embedded in the concrete floor 10 of a building. The said box may be described briefly as being of a bi-level design adapted to communicate with a series of ducts embedded in the concrete 10 at different levels and housing the electrical wiring. The main body of the box includes lower and upper level body castings 11 and 12, a partition member 13 and a top closure structure designated generally by the reference numeral 14.

The lower body casting 11, viewed in plan, is of octangular configuration having sides of different widths and includes a pair of opposed blank side walls 15, 16 which are offset inwardly from the outer perimeter 17 of the casting. A pair of opposed side faces 18 and 19 are defined by spaced apart posts 31, 32 and are flush with said perimeter 17. These faces are provided with opposed rectangular openings 20, 20*a* and 21, 21*a* for receiving the ends of longitudinally aligned lower level duct sections 22, 22*a* and 23, 23*a*, respectively. The said lower body casting also includes opposed side faces 24, 24*a* and 25, 25*a* of lesser width than the side faces 18, 19. They are defined by vertical edge portions of the triangular posts 32 and an outer edge portion of the bottom wall 30 of casting 11. These side faces are provided with single rectangular openings 26, 26*a* and 27, 27*a* for receiving the longitudinally aligned ends of additional lower level duct sections 28, 28*a* and 29, 29*a*. All of the duct receiving openings in the lower body casting 11 are formed with open tops and are defined by the bottom wall 30 of the casting 11 and the several spaced apart hollow posts 31, 32, the posts 31 being interposed between the duct openings 20, 21 and 20*a*, 21*a* and the posts 32 being triangular in cross-section and positioned to define the opposite sides of the openings 26, 26*a* and 27, 27*a*. The vertical faces of all post members 31, 32 are provided with suitable tapers extending to their open upper ends so as to facilitate ready removal of the casting 11 from the forming mold. Also the bottom wall 30 and the sides of the posts 31, 32 defining said duct receiving openings are formed with integral shoulders 33 which extend around three sides of each opening to provide stops for limiting the extent to which the associated ducts may be inserted into the duct receiving openings. The fact that the stop shoulders 33 are formed integral with the casting 11 on only three sides of the duct receiving openings makes it practical to form the said stop shoulders integral with the casting and to provide them with smooth edges to prevent damaging the insulation covering of the wires as the latter are drawn through the openings.

The corner openings 25, 25*a* and 26, 26*a* are of rectangular configuration as distinguished from the circular corner openings heretofore provided in underfloor junction boxes. The rectangular configuration of these corner openings together with the fact that they are open at their tops simplifies the casting operation and makes it practical to form the lower section of the body as a unitary casting, since the line of division between the lower and upper castings 11 and 12 extends along the tops of all duct receiving openings formed in the casting 11. A further advantage obtained by forming the corner openings 25, 25*a* and 26, 26*a* of rectangular configuration is that the rectangular openings make it practical to draw a larger number of wires through the corner openings than is possible when the conventional circular openings are used, since the curvature of the circular openings has a camming action on the wires which moves them toward the central part of the opening as the wires are

being drawn through the circular opening, whereas the wires drawn through a rectangular opening and an associated rectangular duct or race will maintain their positions within the rectangular conduit. In particulars, the wires inserted near a side of a rectangular conduit will remain in that position throughout the length of the duct. Consequently, a larger number of wires can be drawn through a rectangular duct without undue crowding.

The upper body casting 12 of the improved box structure of the present invention is a ring of generally rectangular configuration provided with an octagonal lower flange 34 which corresponds to the contour of the upper rim of the body casting 11 and seats thereon to close the open tops of the duct receiving openings 20, 20*a*; 21, 21*a*; 25, 25*a*, and 26, 26*a*. The bottom face of flange 34 is provided with depending ribs 35, 36 which extend across the tops of both pairs of duct openings 20, 21 and 20*a*, 21*a* and therefore serve as stop abutments for engaging the end portions of the top walls of the duct sections 22, 23 and 22*a*, 23*a*. In order that single contiguous ribs 35, 36 may extend across a pair of adjacent duct receiving openings, for example duct openings 22, 23, and 22*a*, 23*a*, the upper ends of the intermediate post 31, 31 at opposite sides of the box are recessed at 37 (see FIGS. 1, 3 and 8) to provide clearance for the said ribs 35, 36. The bottom face of the flange 34 is also provided adjacent the corner openings 25, 26 and 25*a*, 26*a* with depending ribs 37′ which are somewhat shorter than the ribs 35, 36 and which extend across the open tops of the corner openings of the lower casting 11 in a manner to coincide with the upper ends of the vertical portions of the stop shoulder 33.

The said upper body casting 12 includes opposed blank side walls 38, 39 and opposed walls 40, 41, the latter of which are formed with duct receiving openings 42, 43 and 42*a*, 43*a*. These openings are defined by upwardly bowed portions 42′, 43′ of the lower rim flange 34 of the casting 12 together with vertical posts 44 and 45 which are formed integrally with the lower body casting 11 and project upwardly into the central portion of the upwardly bowed portions 42′, 43′ of the said rim flange 34.

When the upper casting 12 is assembled in its operative position the flanged upper edges of the blank walls 15 and 16 of the lower body casting 11 serve to close the open lower ends of the duct receiving openings 42, 43 and 42*a*, 43*a* and the openings thus formed receive duct sections 46, 47 and 46*a*, 47*a*. In order to provide abutment stops for the ends of these duct sections, ribs 48 are formed on the upper rim 17 of the casting 11 and along the sides of the posts 44, 45. These ribs cooperate with ribs 49 which extend around the vertical inner edge portions of the upwardly bowed portions 42′, 43′ of the marginal flange 34 of the upper casting 12. The upper inner corners of the posts 44, 45 are recessed as indicated at 50 to provide suitable clearance for the ribs 49. The lower and upper body castings 11 and 12 are secured together by means of a series of screws 51 which extend through the rim flange 34 and into the tops of the several vertical post elements 31 and 32 formed on the lower casting 11 and into the top faces of posts 44, 45. By this construction all pressures and thrusts imposed on the box structure are transmitted directly through the said posts 31, 32 to the concrete base 10 underlying the box structure. In order to further accomplish this result, the upper casting 12 is firmed with semi-circular rigidifying corner posts 52 positioned above the corner openings 26, 27 and 26*a*, 27*a* of the lower casting 11 whereby the said pressures are transmitted directly to the underlying posts 32.

Before the upper body section 12 is attached to the lower casting 11, the partition member 13 is placed in its operative position within the box structure. The said partition member 13 includes lower and upper partition walls 53 and 54 which extend across the box at right angles to each other. Horizontal web portions 55, 56 connect the upper edge of said lower partition wall 53 with the lower edge of the upper partition 54. The said web portions 55, 56 are each equal to one-quarter of the bottom area of the box and divide these areas of the box into lower and upper levels. The webs 55, 56 are supported along their inner edges by their integral attachments to the upper and lower edges of partition walls 53, 54, respectively, and are supported along their outer edges by means of vertical supports 57 and 58 which are formed on the inner faces of the blank walls 15, 16 of the lower casting 11.

The partition casting 13 is readily removable upon separation of the castings 11 and 12, but when it is in its operative position it is interlocked with portions of the casting 11. This result is obtained by providing the bottom wall 30 with a groove 59 into which the bottom edge of the partition wall 53 is removably fitted. Also opposed corners of the webs 55, 56 are formed with extensions 60, 61 which project into the duct receiving openings 27, 27*a* and abut against the stop ribs 37 located at the openings 27, 27*a*.

The lower partition wall divides the lower level of the box into two parallel passageways 62, 63 which extend across the lower level of the box. The passageway 62 communicates with the lower level ducts 22, 22*a* and 28 and 29 and also by virtue of the open area 64 at one side of the horizontal web 55 communicates with the upper level passageway 65 above said web 55 and with ducts 47, 47*a*. The other lower level passageway 63 has direct communication with the ducts 23, 23*a* and 28*a* and 29*a* and by virtue of the open area 62*a* lying at one side of the horizontal web 56 has communication with upper level passageway 66 and with ducts 46 and 46*a*.

The top closure structure 14 is supported on adjusting screws 67 which are threaded into internal portions 68 of the semi-cylindrical corner posts 52.

The cover structure includes four principal elements. These elements comprise a cover ring 69 formed with a rectangular access opening 70 therein, a closure plate 71 for closing the access opening 70, a sealing gasket 72 preferably of rubber on which the closure plate 71 is seated and a unitary trim ring 73 surrounding the perimeter of the closure plate 71. The elements 69, 70, 71 and 73 are all made of cast metal and are each of unitary construction.

The closure ring 69 is formed along its outer edges with a downturned flange 74 which is received in a channel 75 extending around the upper edge of the body casting 12. The said channel is formed by means of a vertical inner flange 76 which is integral with the side walls of the casting 12 and extends upwardly in parallel relation to the side wall. The upper edge of the flange 76 stops short of the upper edge of the side walls of the body casting 12 so as to permit the top tread surface 77 of the ring 69 to be aligned with the top rim of the body casting 12. The said cover ring may be adjusted to various elevations above the upper rim of the casting 12. In order to maintain the upper level passages 65, 66 for all positions of the cover ring 69 the ring is provided with an integral depending partition wall 54*a* which cooperates with the upper partition 54 of the member 13 to close the sides of the upper level passageways 65 and 66 when the cover ring 69 is adjusted to various positions. The said cover ring may be also adjusted to various angular positions by means of the adjusting screws 67, the said adjusting screws being formed with integral collars 78 (FIG. 9) which provides seats for cup-shaped depressions 79 formed on the under-surface of the cover ring 69. The upper ends of the adjusting screws 67 are slotted as shown at 80 to receive the bit end of a screw driver, whereby the screws can be readily adjusted to position the cover ring 69 at any desired height which may be

required to bring the top tread surface 77 thereof into alignment with the top surface of the concrete 10. When the ring 69 has been adjusted to a desired position it is locked therein by means of lock nuts 81, the bottom surfaces of which are convex to fit the corresponding concavity of the depression 79 formed in the said cover ring. The inner perimeter of the cover ring is offset downwardly as indicated to provide a shelf 82 on which the closure plate 71 and the trim ring 73 are seated.

The closure plate 71 is provided on one face, for example the under-face according to the position shown in FIG. 3, with a perpendicular marginal rib 83 defining a depression or tray. In this position of the plate the perpendicular rib 83 bears flat against the top surface of the shelf 82 of the cover ring 69 and the other face of the plate, being formed with a series of circular corrugations 84 to provide an anti-skid tread surface, is aligned with the tread surface 77 of the cover ring 69. This is the normal position of the closure plate 71 during the shipment of the box and during the construction of the floor, since it is desirable in such instances, to protect the marginal rib 83 from being broken or otherwise damaged by rough handling or by the movement of equipment and materials across the box cover during the construction of the concrete floor and other parts of the building. This position of the closure plate is also the normal position thereof in the event the concrete floor is to be utilized without an additional floor covering 89. In such case the closure plate 71 is clamped against the cover ring in sealing engagement with the gasket 72 by means of cap screws 86. The trim ring 73 is positioned to surround the perimeter of the closure plate 71 in close relation thereto. The under-face 87 of the trim ring, in the position shown in FIG. 2, is provided with a perpendicular rib 88. When additional floor covering 89 is utilized, the cover plate 71 is inverted to the position shown in FIG. 4. In such case the depressed surface 90 of the plate serves as a tray for retaining a block of the floor covering 89. The trim ring 73 is also inverted so that its rib 88 together with the rib 83 of the plate 71 provide adjacent metallic trim rings for protecting the edges of the floor covering 89.

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.

We claim:

1. For an underfloor wiring system, a bilevel junction box having a first pair of opposite sides adapted to receive the end portions of lower rectangular wiring ducts at a first lower level and having a second pair of opposite sides at right angles to said first pair of opposite sides and adapted to receive the end portions of upper rectangular wiring ducts at a second upper level, said bilevel junction box comprising a separate hollow lower level body portion having a first pair of opposed side walls respectively provided with upwardly facing lower level duct receiving rectangular recesses of a depth substantially equal to the height of said rectangular wiring ducts whereby said lower level duct receiving rectangular recesses are respectively capable of completely receiving full cross sections of the end portions of said lower rectangular wiring ducts at said first lower level and having a second pair of opposed side walls at right angles to said first pair of opposed side walls of said lower level body portion and respectively provided with upper rim portions spaced vertically above the bottoms of said lower level duct receiving rectangular recesses in said first pair of opposed side walls of said lower level body portion, and a separate hollow upper level body portion secured to said lower level body portion and having a first pair of opposed side walls respectively provided with downwardly facing upper level duct receiving rectangular recesses of a height substantially equal to the height of said rectangular wiring ducts whereby said upper level duct receiving rectangular recesses are respectively capable of completely receiving full cross sections of the end portions of said second upper level and having a second pair of opposed side walls at right angles to said first pair of opposed side walls of said upper level body portion and respectively provided with lower rim portions spaced vertically below the tops of said upper level duct receiving rectangular recesses in said first pair of opposed side walls of said upper level body portion, said upwardly facing rectangular recesses in said first pair of opposed side walls of said lower level body portion being closed by said lower rim portions on said second pair of opposed side walls of said upper level body portion and said downwardly facing rectangular recesses in said first pair of opposed side walls of said upper level body portion being closed by said upper rim portions on said second pair of opposed side walls of said lower level body portion.

2. A bilevel junction box as claimed in claim 1, wherein said upper rim portions on said second pair of opposed side walls of said lower level body portion and said lower rim portions on said second pair of opposed side walls of said upper level body portion are substantially contiguous to a common plane.

3. A bilevel junction box as claimed in claim 1, wherein said second pair of opposed side walls of said lower level body portion having said upper rim portions and said second pair of opposed side walls of said upper level body portion having said lower rim portions are formed as closed blank walls having said rim portions extending outwardly therefrom.

4. A bilevel junction box as claimed in claim 3, wherein said rim portions are provided with abutment ribs for limiting the extent of insertion of said wiring ducts.

5. A bilevel junction box as claimed in claim 1, wherein each wall of said first pair of opposed side walls of said upper level body portion having said downwardly facing recesses has lower rim portions bowed upwardly around said recesses and each of said upper rim portions of said second pair of opposed side walls of said lower level body portion has an upwardly projecting post dividing the respective downwardly facing recess in said upper level body portion into two duct receiving openings.

6. A bilevel junction box as claimed in claim 1, including a partition member removably positioned within said hollow body portions and having two horizontal web portions in diagonally opposed corners of the box which separate the interior of the box into upper and lower levels communicating respectively with said duct receiving recesses in said upper level and lower level body portions.

7. A bilevel junction box as claimed in claim 6, wherein a depending vertical partition wall projects downwardly from said horizontal web portions to provide individual passageways for electrical wiring in said lower level body portion.

8. A bilevel junction box as claimed in claim 7, wherein a vertical partion wall projects upwardly from said horizontal web portions at right angles to said depending vertical partition wall to provide individual passageways for electrical wiring in said upper level body portion.

9. A bilevel junction box as claimed in claim 8, wherein said depending and upwardly projecting vertical partition walls are formed integrally with aligned edges of said two horizontal web portions.

10. A bilevel junction box as claimed in claim 9, wherein said individual passageways in said lower level body portion communicate respectively with said individual passageways in said upper level body portion through two open areas in diagonally opposed corners of the box between said two horizontal web portions.

11. A bilevel junction box as claimed in claim 10,

wherein said lower level body portion is provided at its corners with upwardly facing rectangular recesses and said upper level body portion is provided at its corners with lower rim portions closing said corner recesses in said lower level body portion.

12. A bilevel junction box as claimed in claim 11, wherein the diagonally outer corner regions of said horizontal web portions are each formed with an extension projecting into an adjacent corner recess in said lower level body portion.

13. A bilevel junction box as claimed in claim 12, wherein said lower level body portion is provided with a bottom wall having a groove therein adapted to receive the lower edge of said depending vertical portion wall of said partition member.

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