Feb. 27, 1962 F. C. JOHNSTON ET AL 3,023,032

COUPLINGS FOR SHEET WIREWAY DUCTS

Filed Nov. 9, 1956 4 Sheets-Sheet 1

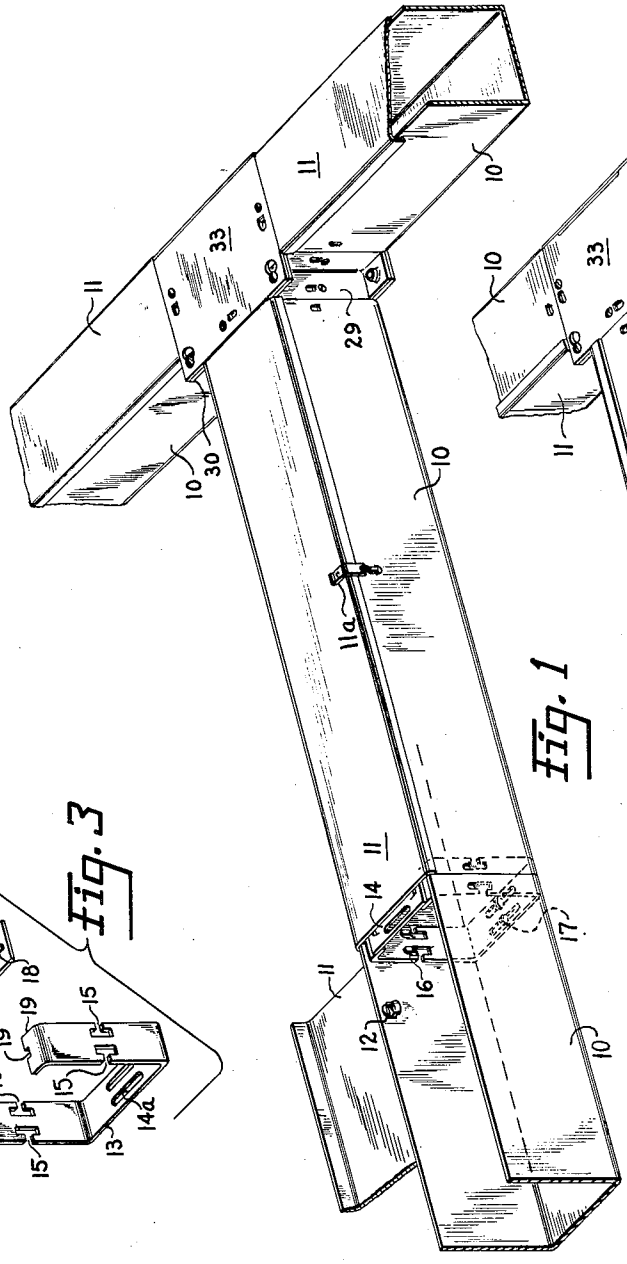


Fig. 1

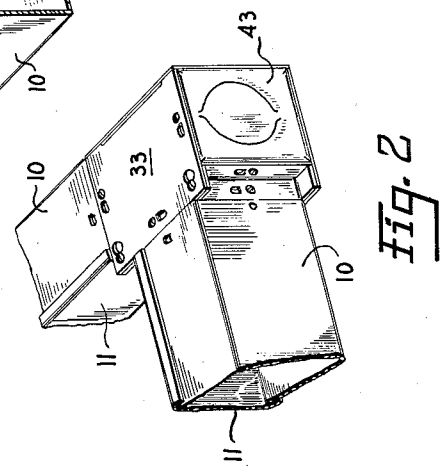


Fig. 2

Fig. 3

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COUPLINGS FOR SHEET WIREWAY DUCTS

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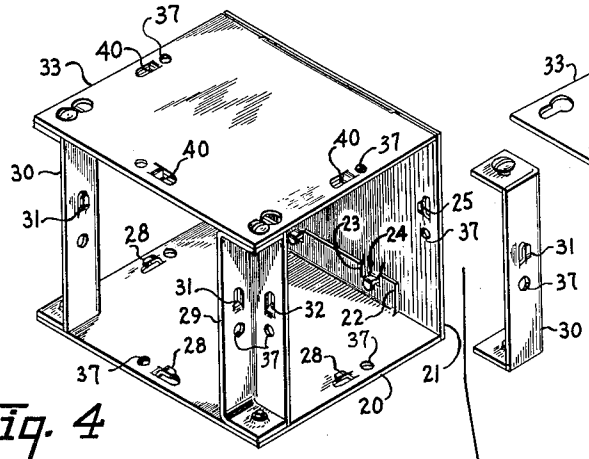


Fig. 4

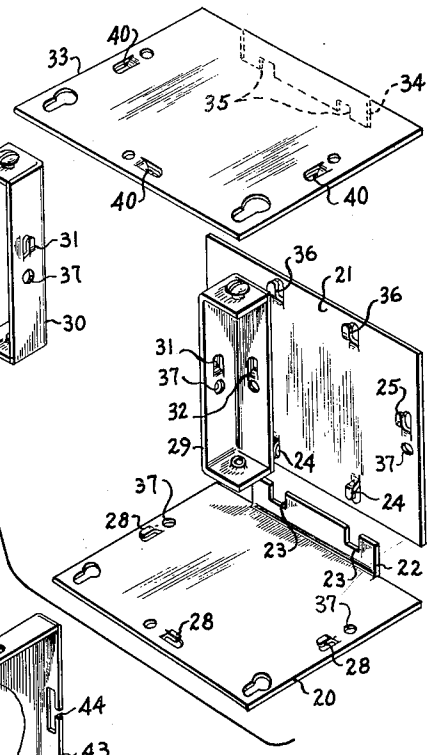


Fig. 5

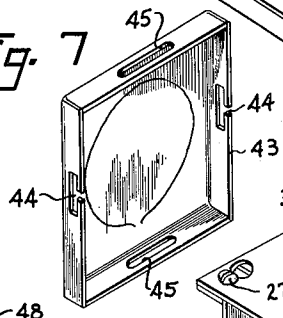


Fig. 7

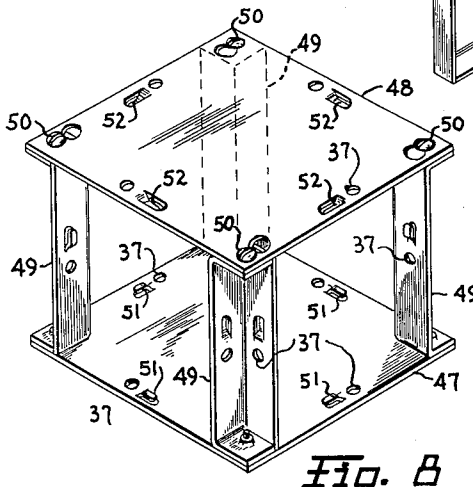


Fig. 8

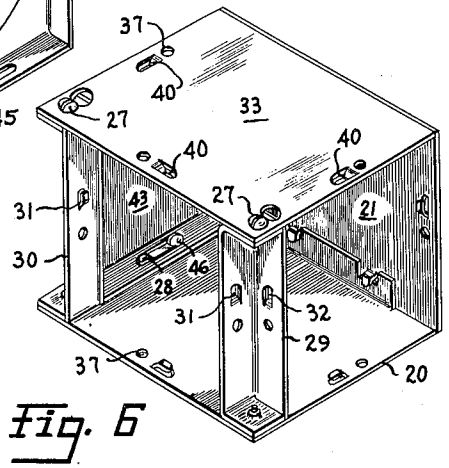


Fig. 6

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COUPLINGS FOR SHEET WIREWAY DUCTS

Filed Nov. 9, 1956 4 Sheets-Sheet 3

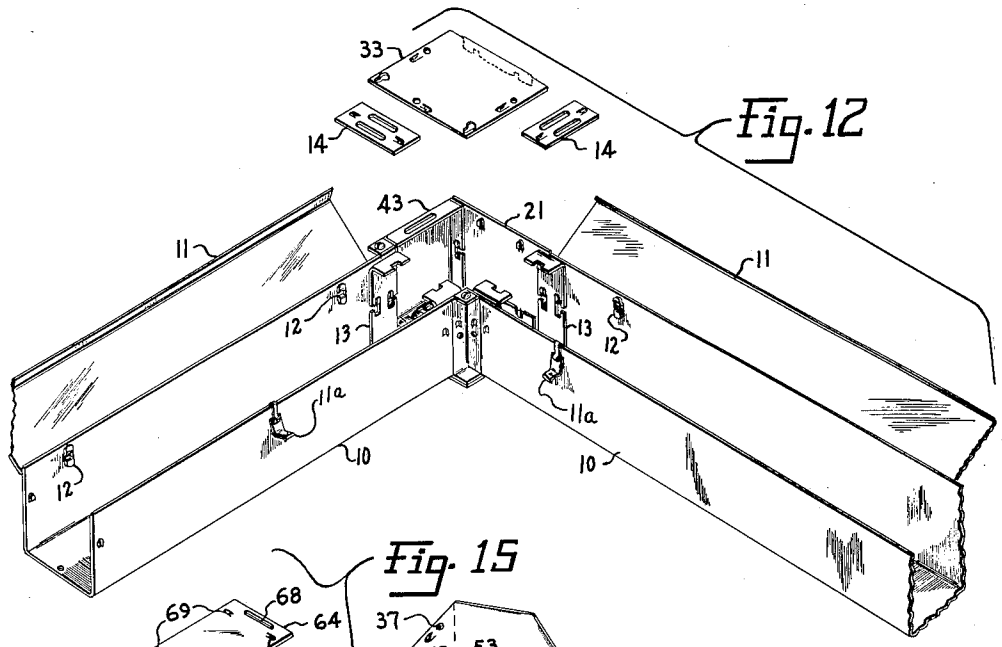


Fig. 12

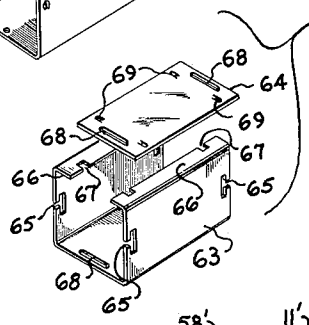


Fig. 15

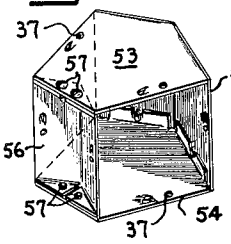


Fig. 9

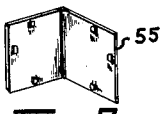


Fig. 9a

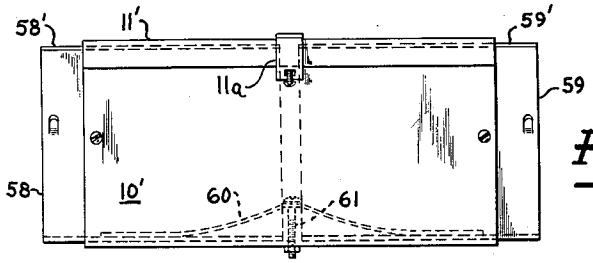


Fig. 13

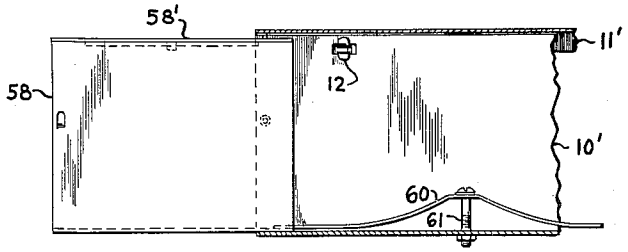


Fig. 14

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COUPLINGS FOR SHEET WIREWAY DUCTS

Filed Nov. 9, 1956 4 Sheets-Sheet 4

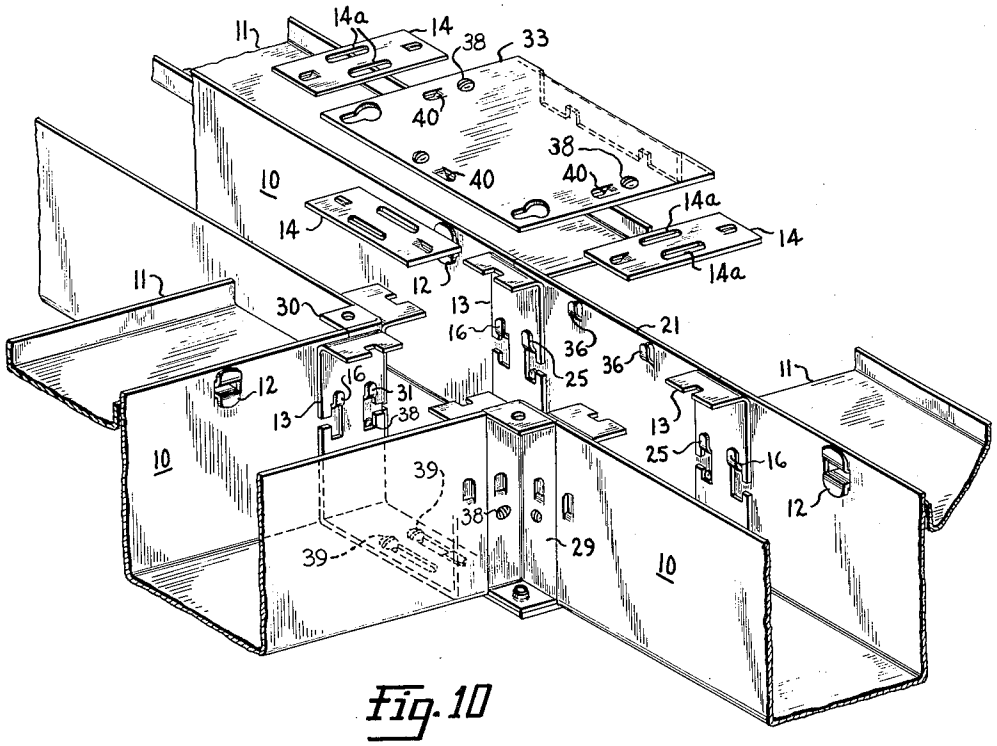


Fig. 10

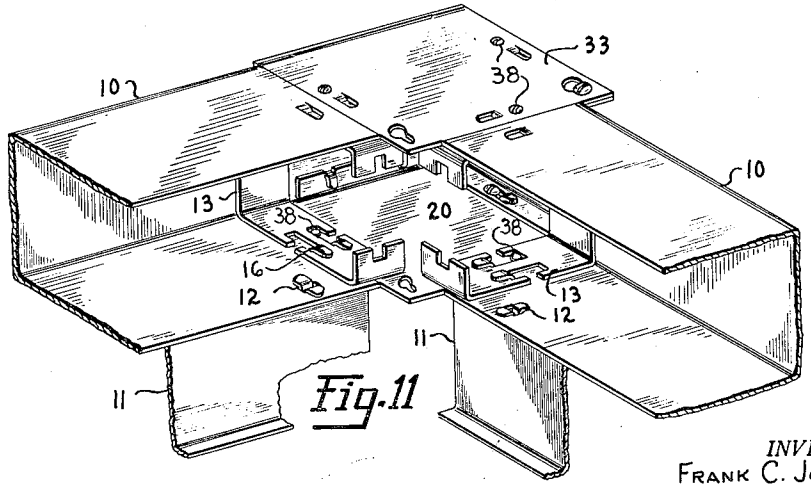


Fig. 11

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United States Patent Office 3,023,032 Patented Feb. 27, 1962

3,023,032

COUPLINGS FOR SHEET WIREWAY DUCTS

Frank C. Johnston, West Hartford, and Paul Krauss, Farmington, Conn., assignors to General Electric Company, a corporation of New York

Filed Nov. 9, 1956, Ser. No. 621,354
8 Claims. (Cl. 285—156)

Our invention relates to wiring ducts or "wireways" and especially to wiring ducts or wireways of the prefabricated sectional type.

Wiring ducts, raceways or wireways of the type of the present invention are commonly installed in commercial or industrial buildings by assembling prefabricated sections, connectors, and fittings in place at the location of intended use, after which installation, conductors are placed in the wireway and connected as desired.

Copending application, Serial No. 383,175, filed by James L. McNaughton on September 30, 1953, now Patent No. 2,905,201, issued September 22, 1959, and assigned to the same assignees as the present invention, discloses a wireway comprising a generally rectangular open-top channel having integral hook portions struck from the side walls thereof adjacent the ends of each section and connecting collars having L-shaped slots in opposite edges thereof adapted to interconnect two sections of duct by engagement of the hooks in said slots, the collar being fastened by screws to the back wall of each of the channels.

In accordance with the prior invention, the channel is provided with a removable cover and the connecting collars include bridging portions which are also removable to permit the laying in of wires without the necessity of threading the wires through any of such connecting collars.

In utilizing the prior design, however, it is necessary to "thread" wires or conductors through certain portions of the various connectors including T connectors, elbows, and cross connectors.

In addition, in the prior design, the various connectors such as the T connectors, elbow connectors and the cross connectors are separate and distinct pieces, requiring the manufacture and storage of a relatively large number of different connectors and joints. The number of such different connectors is increased, for example, by the necessity of providing "right" elbows, and "left" elbows, as well as "up" and "down" elbows, etc.

It is an object of the present invention to provide a wireway of the prefabricated sectional type which makes possible the laying in of wires throughout the complete system, including laying in wires through connectors and joints of all types such as the elbows, T's, and cross connectors.

It is a further important object of our invention to provide such a wireway in which more than one portion of each of the different connectors is made removable to permit the laying in of wires regardless of the orientation of the connector with regard to the openable side of the connected wireway channel. By this means, for example, a "right" or "left" elbow may also serve as an "up" or "down" elbow, etc.

It is a particular object of our invention to provide a combination connector for a wireway system which may be readily modified by the addition or removal of parts to provide a connector of any one of several different types such, for instance, an elbow, a T, a cross, an end box, etc.

It is a further object of our invention to provide such a versatile wireway having complete conductor lay-in accessibility which also includes a continuous positive ground connecting means and which when assembled has no unfilled openings through any wall portion thereof or any screw of other projection extending therewithin any substantial distance.

In accordance with our invention, we provide a wireway system including a plurality of elongated generally rectangular duct sections square in cross section each having integral hook or lug portions struck inwardly from central portions of opposite side walls adjacent the ends thereof, an openable cover for one side of said duct, and a branch connector for joining two or more of said duct sections in alignment or at an angle including a generally cube-shaped body having at least two square open sides thereof adapted to be connected to a duct section end, the portions of the connector body adjacent each open side being also provided centrally with integral hook portions struck inwardly, and connecting collars including a generally U-shaped member having generally T-shaped slots cut inwardly from the centers of opposed edges of two opposite side walls thereof and also having a removable bridging member for joining the ends of said U; the back wall of said U member and said bridging member each being provided with elongated clearance slots longer than said T-shaped slots.

In accordance with another aspect of our invention we provide a combination elbow and T connector including a generally cube-shaped body having removable top and bottom portions, at least two removable corner posts, and at least three open faces, which connector may be used as a T connector or which may be used, with one of the open faces closed by an end cap, as an elbow connector, with complete conductor lay-in accessibility in both cases.

In connection with a further aspect of our invention we provide a universal connector comprising a generally cube-shaped body having top and bottom plates and four removable corner posts, each of said top and bottom plates and said corner posts being provided with integral hook-shaped portions generally centrally thereof and surrounding each of the open faces of said body, which connector may be used as a cross connector, a T, a universal elbow, an end box or a junction box, with complete conductor lay-in accessibility in each case.

FIGURE 1 is a view in perspective of a portion of a wireway system embodying our invention, including a straight-length connection and a T connection;

FIGURE 2 is a view in perspective of a portion of a wireway system embodying our invention, showing particularly an "elbow" joint;

FIGURE 3 is a view in perspective of a connecting collar;

FIGURE 4 is a view in perspective of a T connector apart from any straight sections;

FIGURE 5 is an exploded view of the T connector of FIG. 4;

FIGURE 6 is a view in perspective of an "elbow" connector apart from any straight sections;

FIGURE 7 is a view in perspective of an end cap;

FIGURE 8 is a view in perspective of a "cross" connection apart from any straight sections;

FIGURE 9 is a view in perspective of a 22½° connector;

FIGURE 9*a* is a view in perspective of a back wall plate of the connector of FIG. 9;

FIGURE 10 is an exploded view in perspective of a portion of a wireway system incorporating our invention and showing particularly a T connection with parts removed to permit the laying in of conductors;

FIGURE 11 is a view in perspective of a portion of a wireway system including our invention and showing particularly an "elbow" connection with parts removed

to permit the laying of wires therein through the wall of said duct interior to said elbow;

FIGURE 12 is a view in perspective of an elbow connection and adjacent duct sections showing the top wall open for laying in conductors;

FIGURE 13 is an elevation view of an adjustable length section of wireway duct constructed in accordance with our invention;

FIGURE 14 is a fragmentary elevation view of the adjustable length section of FIG. 13 with the parts thereof shown in the extended position, and

FIGURE 15 is a view in perspective of an odd-length connector.

Referring now to the drawings, we have shown our invention as embodied in a wireway system incorporating a generally rectangular duct or wireway square in cross section including a channel-shaped body portion **10** having a cover **11** supported on the channel **10** by hinges **12** and adapted to be held closed by suitable means such as by resilient cover catches **11***a*. The wireway section is preferably provided in discrete straight lengths each of which is adapted to be connected to another similar length by means of a connecting collar **13** (see FIG. 3).

The connecting collar **13** includes a generally U-shaped portion **13** and a bridging member **14** and is adapted to fit within the channel **10**. The connecting collar further includes in the center of its opposed sides generally T-shaped slots **15** adapted to interengage lugs **16** struck inwardly from the opposed walls of the U-shaped portion **10**. During assembly of the collar to the channels to be connected, the lugs **16** pass through the entrance portion of the T-shaped slots and the collar **13** thereafter is moved at right angles into engagement with the back wall of the duct **10**. The slots **15** are preferably made T-shaped rather than L-shaped for a purpose to be described. The collar is then anchored to the duct sections by means of screws **17**. The bridging member **14** is retained in place in engagement with the collar **13** by means of lugs **18** which interengage inwardly turned flanged portions **19** of the collar **13**, entering notches **19′** thereon. It will be observed that when the covers **11** of two adjacent duct sections are opened, the bridging member **14** may be removed by spreading the opposed walls of the channel **10** slightly and "snapping" the bridging member out. This permits the laying in of wires and other conductors throughout the straight-length portions of the wireway in an unobstructed manner.

For the purpose of joining two or more straight-length duct sections at various desired angles, we provide branch connectors. Thus, for the purpose of joining three straight-length sections in a T type of branch connection we provide a T branch connector shown assembled in a system in FIG. 1, and shown individually in FIGS. 4 and 5 and shown partially disassembled in FIG. 10. Referring particularly to FIGS. 4 and 5, the T branch connector includes a bottom plate **20** and a back plate **21** having integral lugs **24**, **25** and **36**. The bottom plate **20** includes a flanged portion **22** having notches **23** therein adapted to receive integral lug portions **24** carried by the back plate **21** by means of which the two plates **20** and **21** are adapted to be removably connected together. The T connection also includes corner supporting posts **29** and **30** each having integral lugs **31** and **32** for a purpose to be described. The T connection further includes a top plate **33** having integral lugs **40** and a downwardly bent flange **34** including notches **35** adapted to be interengaged with lugs **36** carried by the back wall **21**.

Adjacent each of the lugs **25**, **28**, **31**, **32** and **40**, we provide a tapped hole **37** for a purpose to be described. Each of the holes **37** is normally filled by a short filler screw **38** which is removed when the tapped hole is utilized.

Straight lengths of wireway are adapted to be connected to the T branch connector (see FIG. 10) by means of three connecting collars **13** similar to that shown in FIG. 3, which interengage selected lugs carried by the T branch connector and by the duct section ends and which are adapted to be fastened and electrically grounded to the branch connector and the duct section by means of an anchoring screw **39**.

The T unit shown in FIG. 4 is adapted to be used in several different ways. For instance, it may be desired to provide for a T connection of sections having their top wall openable as shown in FIG. 10. On the other hand it may be desired to provide a T connection wherein it is possible to lay in wires through open side walls of the duct sections rather than the top wall, such, for instance, as shown in the elbow connection of FIG. 11. In order to make this possible the T connector of FIG. 4 is provided with a number of parts all of which are removable and it is also provided with a number of lugs struck out from the central side walls of various portions and including particularly the lugs **28**, **32**, **40** and **25** surrounding one opening, lugs **28**, **31**, **40** and **31** surrounding a second opening, and lugs **28**, **32**, **40** and **25** surrounding the third opening. In addition, each of the lugs has adjacent to it a tapped hole **37** adapted to receive a collar-retaining screw. The connecting collars **13** may therefore be joined to the T connector at each open face thereof in any desired one of four different positions. When the connecting collar is in a given position the T-shaped slots **15** engage the lugs on the corresponding sides of the connector, and the clearance slots **14***a* receive the lugs carried by the remaining pair of side walls for clearance purposes.

It will be observed that each duct section shown can be mounted in any desired one of four positions, and it is still possible to connect it to the same face of the T connector without disturbing the relation of the T connector to the other duct sections. This is made possible by the fact that the collar connector **13** is provided with T-shaped slots rather than merely L-shaped slots and the branch connector with lugs on all four walls together with a tapped mounting hole adjacent each lug. By providing a collar connector of this type and branch connectors having lugs on all four sides of each opening together with an available adjacent tapped hole, we provide a system of greatly increased versatility and economy.

It will, moreover, be observed that because each of the four boundary walls surrounding a given open face is removable, this not only permits the laying in of conductors therethrough but also this feature permits the assembly of the collar connectors **13** to such branch connector. Thus, with a given wall removed, the collar **13** is slid first horizontally and then vertically into assembled position. Without the provision of such removable sides, it would be impossible to assemble the connecting collars in position.

In FIG. 6 we have shown a perspective view of an elbow connector, apart from any straight-length sections, and in FIG. 11 the same elbow connector is shown with two straight-length sections connected thereto, with the hinged covers open and bridging pieces **14** of the collars **13** omitted to permit laying in of wires from the side while FIG. 12 shows the same connector assembled so as to permit laying in of wires from the top. This elbow connector is formed from the basic T connector of FIG. 4, an end cap **43** (see FIG. 7) being added to close an additional wall thereof. The end cap **43** comprises a generally rectangular plate having depending peripheral flanges. Two of the flanges are provided with generally T-shaped slots **44** corresponding to the slots **15** in the connector **13**, and elongated slots **45** are provided in the other two flanges corresponding to the slots **14***a*. The end cap **43** is adapted to fit within the opening of one of the walls of the T connector and specifically between the top and bottom walls **20** and **33**. When the unit is assembled, one of the T-shaped slots **44** engages a lug

32 carried by the corner post 30 and the other T-shaped slot 44 engages a lug 25 on the back wall 21. The top plate 33 is removed in order to permit the assembly of the end cap 43 which after engaging the lugs on the corner post 30 and the back wall 21 as described, is moved vertically down against the bottom wall 20, the slot 45 in the bottom flange being long enough to fit over the lug 28 carried by the bottom wall 20. In order to firmly anchor the end cap 43 in place a screw 46 is passed through the slot 45 and threaded into a hole 37 in the bottom plate 20. The top plate 33 is then assembled, being held in place by the screws 27 engaging the corner posts 29 and 30 and the lug 40 on the top wall 33 entering the slot 45 in the top flange of the back plate 43.

The elbow connector of FIG. 6 is shown in assembled relation to two straight lengths in FIG. 11. As shown in this figure, the elbow connector is assembled or connected to the straight lengths sections by means of two connecting collars 13. If it is desired to provide an elbow assembly in which the "interior" wall of the elbow may be opened to permit laying in of wires, the connecting collars are assembled to the elbow in the relationship shown in FIG. 11 that is, with the open end portions of the collars adjacent each other and adjacent one of the corner posts of the assembly. After the wires are laid in through the elbow assembly, bridging plates 14 are assembled to the collars 13 and the corner post 30 is assembled between the top and bottom plates 33 and 20 respectively. It will be observed that the lugs 31 and 32 of the corner post 30 are received within the elongated slot 14*a* of each of the bridging members when assembled. The assembled corner joint then would appear as shown in FIG. 2.

In FIG. 8 we have shown a "cross" connector. The cross connector includes a bottom plate 47 and a top plate 48 and four corner posts 49 identical in structure to the corner posts 29 and 30. The plates 47 and 48 are attached to the corner posts 49 by means of screws 50. The cross shown in FIG. 8 is attached to straight lengths of wireway by means of four connecting collars of the type shown in FIG. 3 which are attached to the lugs 51 and 52 in a manner similar to that described in connection with the assembly of the T and elbow joints. It will be observed that either the top or bottom plate may be removed independently of the other parts, and any one of the four corner posts may likewise be removed to permit laying in of wires through any side of a connected wireway section. It will also be observed that one or more of the open sides of the cross of FIG. 8 may be closed by an end cap 43. Thus the basic cross assembly may be used (1) with no end caps to provide a "cross" connector; (2) wtih one end cap to provide a T; (3) with two end caps to provide an elbow; (4) with three end caps to provide an end-box; and (5) with four end caps to provide a junction box for wires, apart from any duct sections. It will be observed that by using an end cap to close the unused side of the connectors of FIG. 4 or FIG. 8, the user is providing for possible future expansion, since such end cap may be readily removed and replaced by a connecting collar and a cooperating branch of wireway.

In FIG. 9 we have shown an angle connector suitable for providing a bend of 22½° between two adjacent straight wireway sections. In this case top and bottom plates 53 and 54 respectively are provided, two angular wall members 55 and 56 are provided to which the top and bottom plates are attached. The wall member 56 includes integral flanges by which it is adapted to be attached to the top and bottom plates 53 and 54 by suitable means such as by screws 57. The angle connector of FIG. 9 is adapted to receive straight length sections joined thereto by connecting collars of the type shown in FIG. 3, in a manner similar to that described in connection with the previous figures. This same general construction may be used for any desired angle bend.

In FIG. 13 we have shown a telescoping section the length of which may be adjsuted as desired, and including a generally rectangular channel-shaped portion 10' having a cover 11' hinged thereto and two slidable portions 58 and 59 each comprising a rectangular tubular member having a removable top wall 58' and 59'. A bowed spring member 60 is provided held to the bottom wall of the central channel portion 10' by suitable means such as by a bolt 61 and having its opposite end portions overlying the bottom portions of the slidable members 58 and 59. The telescoping section may be varied in length from the length shown in FIG. 13 to the fully extended position shown in FIG. 14. In each of these positions and in any intermediate position one wall of the telescoping section may be completely opened by opening the hinge cover 11' and removing the snap-in covers 58' and 59' of the slidable sections. Each of the slidable sections 58 and 59 is adapted to be connected to a standard straight length section by means of a connecting collar such as shown in FIG. 3 and for that purpose is provided with lugs extending inwardly from the side walls thereof.

In FIG. 15 we have shown an odd-length connector suitable for connecting two wireway ends which are spaced apart a distance too small for a "telescoping" section. The construction of this connector is essentially the same as that of connector 13, but the connector is made substantially longer. The connector accordingly includes a U-shaped body 63, a cover 64, T-shaped slots 65, inwardly directed flanges 66, notches 67, clearance slots 68 and lugs 69 carried by the cover 64. Such connectors may be readily provided in incremental lengths over a desired range. It will be noted that this odd-length adapter is much simpler than a telescoping length, and also does not require connecting collars 13 to connect to wireway section ends.

It will be seen that we have provided a very flexible and versatile wireway which incorporates a relatively small number of basic parts which includes provision for future expansion, which may be assembled to provide any desired configuration, and which, regardless of the configuration of the assembly, provides a wireway having one wall thereof which may be opened to permit the laying in of wires without the necessity of threading them in place, the orientation of such openable wall being as selected by the user.

Other modifications of this invention will, of course, occur to those skilled in the art, and we therefore intend by the appended claims to cover all such modifications as fall within the true spirit and scope of our invention.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. A branch connector for use in a prefabricated sectional wireway system including a plurality of elongated tubular duct sections of generally square cross section, comprising a generally cube-shaped body having top and bottom plates and at least two spaced corner posts extending therebetween and detachably connected thereto, said corner posts defining at least three generally square open faces of said body, each of said corner posts including a pair of generally perpendicular walls extending between the top and bottom plates to form sides of the adjacent open faces, the walls of each corner post having integral lugs adjacent the central portions of their edges struck inwardly toward the associated open faces, said lugs being adapted to interfit with slots formed in a connector inserted within a selected one of the open faces, a member between said top and bottom plates forming a wall of said body, said top and bottom plates, said corner posts, and said member being independently detachable from one another to permit the

assembly of connectors and the laying in of wires through said branch connector.

2. A branch connector for use in a prefabricated sectional wireway system including a plurality of elongated tubular duct sections of generally square cross section, comprising a generally cube-shaped body having top and bottom plates and four spaced corner posts extending therebetween and detachably connected thereto, said corner posts defining four generally square open faces of said cube, each of said corner posts including a pair of integrally connected generally perpendicular walls extending between the top and bottom plates to form sides of the adjacent open faces, the walls of each corner post having integral lugs adjacent the central portions of their edges struck inwardly toward the associated open faces, said lugs being adapted to interfit with slots formed in a connector inserted within a selected one of the open faces, said top and bottom plates and said corner posts being independently detachable from one another to permit the assembly of connectors and the laying in of wires through said branch connector.

3. A prefabricated sectional wireway system comprising at least two elongated generally rectangular open channel duct sections square in cross section, a removable cover for each of said duct sections, said duct sections having integral lugs struck inwardly from central regions of opposite side portions adjacent the ends thereof, a branch connector for joining adjacent ends of at least two of said sections comprising a generally cube-shaped body having at least two open faces, at least two side walls of said branch connector adjacent each of said open faces including centrally positioned inwardly struck lugs adapted to align with said lugs on said duct section side portions, and a connecting collar for joining said duct sections to said branch connector comprising a generally U-shaped member having T-shaped slots in the center of opposed edges thereof adapted to interconnect with said lugs on said branch connector and with said lugs on said duct sections.

4. A prefabricated sectional wireway system comprising at least two elongated generally rectangular tubular openable duct sections square in cross section having integral inwardly struck lug portions generally at the center of at least two opposed walls adjacent the ends thereof, a generally cube-shaped branch connector for connecting said duct sections and having at least two open faces, opposed side wall portions of said branch connector forming the periphery of said open faces including generally in the center thereof inwardly struck lug portions, and a connecting collar for connecting said duct sections to said branch connector comprising a generally square collar member having generally T-shaped slots cut in the center of opposite edges of at least two opposed sides thereof and adapted to interconnect said lugs of said branch connector and said lugs of said duct sections.

5. A prefabricated sectional wireway system including a pluraltiy of elongated generally rectangular tubular duct sections, each of said duct sections square in cross section comprising a generally channel-shaped member having a back wall and two opposed side walls and an openable cover for closing the open side of said channel, the said side walls of said duct section including generally centrally thereof integral inwardly struck lugs adjacent the ends of each of said duct sections, a connecting collar for connecting said duct sections comprising a generally U-shaped member comprising a back wall and two opposed side walls and an openable bridging member for joining the outer ends of said side walls, said side wall portions each including a pair of generally T-shaped slots cut inwardly therein from the center of opposed edges thereof, said back wall and said bridging member each includnig a pair of elongated clearance slots therein, and at least one branch connector comprising a generally cube-shaped body having at least two open faces, the portions of said cube-shaped body surrounding each of said open faces including an inwardly struck integral lug adapted to be engaged by said connecting collar in one of said centrally located T-shaped slots, said branch connector including at least one wall portion adjacent each of said open faces which is removable to permit the assembly of said connecting collar and to permit the laying in of wires throughout said wireway system.

6. A universal branch connector for use in a prefabricated sectional wireway system including a plurality of elongated generally rectangular tubular duct sections square in cross section, comprising a generally cube-shaped body having top and bottom plate members and four corner posts therebetween, each of said top and bottom plate members and said corner post members being provided at central portions thereof adjacent their edges with integral lug portions, said corner posts and said top and bottom plate members defining four generally square open faces of said cube, and at least one closure member comprising a generally rectangular plate member having four peripheral flange portions, two opposed flange portions having T-shaped slots cut therein from the centers of the edges thereof and including a first entrance portion and a second portion extending generally at right angles to said entrance portion for receiving one of said lug portions in interlocking relation, the other two of said flange portions each having an elongated clearance slot therein for receiving one of said lug portions in non-interlocking relation therein and for receiving a clamping screw for clamping said closure plate member to said branch connector.

7. A universal branch connector for use in a prefabricated sectional wireway system including a plurality of elongated generally rectangular tubular duct sections square in cross section, comprising a generally cube-shaped body having top and bottom plate members and four corner posts therebetween, each of said top and bottom plate members and said corner post members including in central portions thereof adjacent their edges integral inwardly struck lug portions and an adjacent tapped hole, said corner posts defining four generally rectangular open faces of said cube, and at least one closure member comprising a generally square plate member having four peripheral depending flanges, two of said flanges each including a T-shaped slot cut therein from the center of the edge thereof, for receiving one of said lugs in slidable interlocking relation, the other two of said depending flanges each including an elongated enlarged clearance slot for receiving one of said lug portions therein in non-interlocking relation and for receiving a screw for holding said closure member to said branch connector.

8. A prefabricated sectional wireway system comprising at least two elongated generally rectangular tubular openable duct sections square in cross section, each having integral inwardly struck lug portions generally at the center of at least two opposed walls adjacent the ends thereof, a generally cube-shaped branch connector for connecting said duct sections and having at least two open faces, the central portions of said branch connector at the periphery of said open faces including at least two inwardly struck lug portions opposite each other, a connecting collar for connecting said duct sections to said branch connector comprising a generally square collar member having T-shaped slots cut in the center of opposite edges of at least two opposed sides thereof and for interconnecting said branch connector and said duct sections by means of said inwardly struck lug portions, and a closure member for use with said branch connector comprising a generally square plate member having peripheral depending flanges, at least two of said flanges including T-shaped slots cut inwardly from the edge at the center thereof, and two opposed flanges each including an elongated enlarged central clearance slot for re-

ceiving two of said lug portions in non-interlocking relation and for receiving a screw for attaching said closure member to said branch connector.

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