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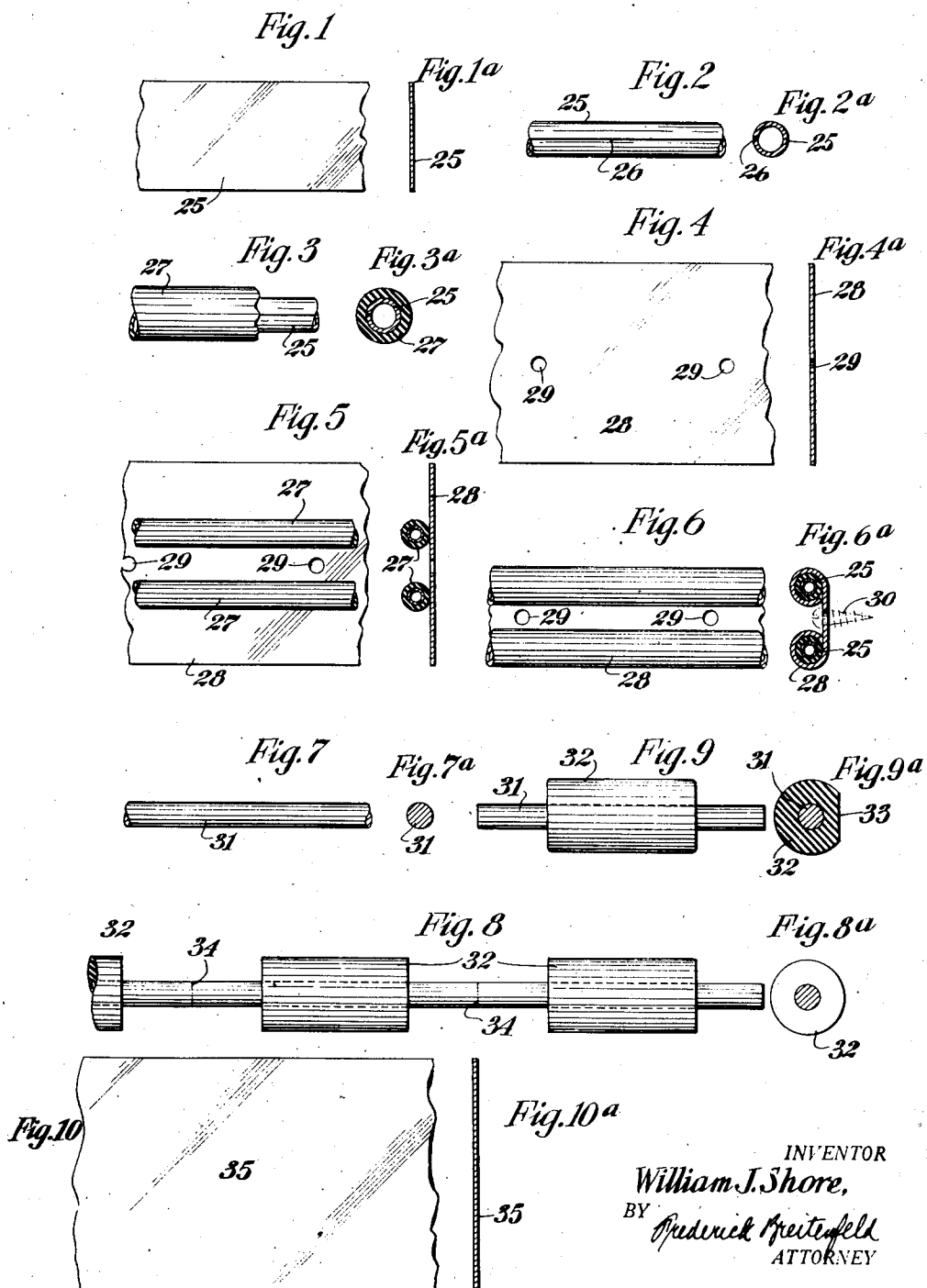
W. J. SHORE

1,840,536

WIRING SYSTEM

Filed Dec. 16, 1927

2 Sheets-Sheet 1



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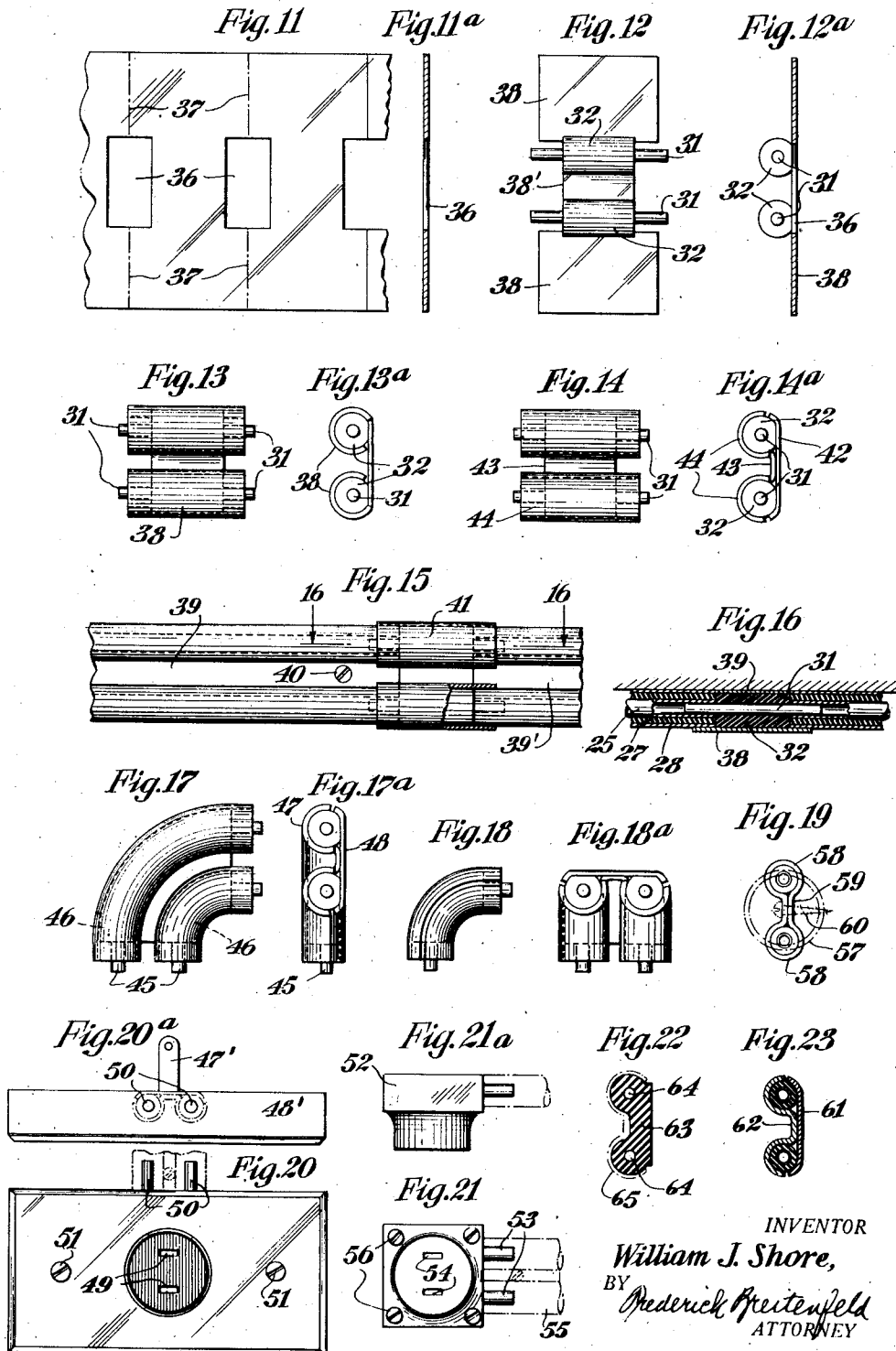
W. J. SHORE

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WIRING SYSTEM

Filed Dec. 16, 1927

2 Sheets-Sheet 2



INVENTOR

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UNITED STATES PATENT OFFICE

WILLIAM J. SHORE, OF NEW YORK, N. Y.

WIRING SYSTEM

Application filed December 16, 1927. Serial No. 240,468.

My present invention relates generally to wiring systems, and has particular reference to a composite or sectional system primarily though not solely applicable to inside exposed circuit work.

It is well known that electric wiring of the exposed type, when permanently attached to supporting surfaces, is generally required to comply with strict underwriters' requirements. Frequently, other requirements are called for by local ordinance. As a rule, such requirements call for proper insulation of the electrical conductors as well as complete metallic enclosure thereof.

Where metallic enclosures are in the form of tubes or conduits, considerable labor is required during installation inasmuch as the wires which constitute the conducting elements must be fished through the conduits. The difficulty and the inefficient nature of this procedure need hardly be elaborated upon. It may be pointed out, however, that the process of "fishing through" is accompanied by considerable wear upon the conducting elements, and therefore in order to safeguard the ultimate complete insulation, it has been generally deemed advisable to strengthen the insulating sheath by applying to an inner main insulating sheath of rubber or the like an outer protective covering which is made of cotton thread or similar material. Obviously, this calls for additional expense and space.

Where the metallic enclosure is in the form of complementary base and cover portions, a "fishing through" is avoided, but the procedure is still unsatisfactory and inefficient and involves the holding of the conductors in position while the cover is applied. Frequently, the latter is hammered into place, and this may call for the employment of unattractive metal suitable to withstand hammering. Apart from this consideration, it is evident that a wiring system of attractive appearance is hardly possible if the very portion

which is ultimately exposed is to be subjected to hammering.

In both of the foregoing constructions, a large portion of the inordinate amount of time and labor required is devoted to splicing. Frequently, the workmen will omit the soldering of the splices, or the splices may not be mechanically secure. Many times, friction tape is applied to the splice without first applying a rubber sheath. And splices in general are unsatisfactory because of the possibility of breakage of the insulation placed thereabout. The greatest evil lies in the fact that none of the foregoing defects are perceivable when the work is ostensibly completed.

Other disadvantages of the foregoing constructions lie in the fact that loosely arranged wires, presumably fully insulated from each other but not assuredly so, are disposed within a metallic enclosure which is seldom less than half an inch in depth and about an inch in breadth; the insulation is relatively thick and expensive, and not assuredly perfect throughout; and wherever fixtures are to be installed, additional tedious steps of fitting, splicing, taping, and the like, are necessitated.

The general objects of my invention are to provide an approved wiring system which obviates all of the foregoing disadvantages and also embodies a number of advantages not heretofore attained. More particularly, my objects are generally to provide a system which requires no fishing, splicing, or hammering; a system which, in brief, requires hardly any time, labor, or skill to install; a system which results in a neat and attractive appearance, permitting, if desired, the employment of attractive metal such as nickel; a system which disposes of any possibility of defective insulation even though the insulation actually employed is of relatively small thickness; a system which is compact to the fullest possible degree; a system composed of constituent parts which are ex-

extremely simple in construction and hence inexpensive to manufacture; and in general, a system embodying the foregoing and other features which render its employment possible in a large variety of ways and under a variety of specific circumstances.

More particularly, it is an object of my invention to provide a sectional wiring system, i. e., one which is composed of separate complementary constituent units or sections so constructed and arranged as to be capable of mutual assembly in a variety of ways so as to provide a resultant and composite wiring system embodying all of the foregoing, and other, advantages.

In accordance with certain features of my invention, the constituent sections are themselves of a highly efficient character, inexpensive to manufacture, simple to install, and extremely attractive in appearance; withal, meeting all technical requirements of safety. And in accordance with my invention, these same advantages are retained when the sections are assembled to provide a complete system. One of the features of my invention lies in so constructing the sections as to render the complementary assembly thereof feasible not only in a variety of ways but also in constant view of the technical requirements of safety referred to above.

Although I have illustrated and shall hereinafter describe several types of sections embodying the features of my invention and serving to explain the nature thereof, nevertheless it will be understood that my invention is not limited to the specific embodiments shown or described but is by its very nature capable of a wide variety of specific applications.

In the form herein illustrated and described the essential elements of my wiring system comprise complementary sections made up of tubes and rods respectively, these sections being capable of automatic engagement when they are aligned and thereby necessitating no work other than the proper selection of sections and the application of one to the other, much as a set of toy tracks might be assembled by a child.

For the attainment of the foregoing objects and such other objects as may hereinafter appear or be pointed out, I have constructed devices embodying the features of my invention and illustrated in the accompanying drawings, in which—

Figures 1 and 1A are plan and cross-sectional views respectively of a strip of conducting material, such as copper;

Figures 2 and 2A are similar views showing the same strip treated in accordance with my invention;

Figures 3 and 3A are similar views showing a further step in the treatment;

Figures 4 and 4A are plan and cross-sectional views respectively of a strip of metal

ultimately to serve as a metallic enclosure;

Figures 5 and 5A are similar views showing the elements of Figure 3 associated therewith;

Figures 6 and 6A are similar views showing the construction of the completed section;

Figures 7 and 7A are plan and cross-sectional views respectively of the first step in the construction of a complementary section;

Figure 8 and 8A are similar views showing the next step;

Figures 9 and 9A are similar views showing the next step;

Figures 10 and 10A are plan and cross-sectional views respectively of a strip of metal designed to serve as a metallic enclosure;

Figures 11 and 11A are similar views showing the next step of treatment of the strip of Figure 10;

Figures 12 and 12A are similar views showing the next step of assembly between the elements of Figures 9 and 10;

Figures 13 and 13A are similar views showing the final construction of this section;

Figures 14 and 14A are views similar to Figures 13 and 13A showing a modified construction;

Figure 15 is a plan view of a portion of a completely assembled sectional wiring system;

Figure 16 is a longitudinal cross-section taken substantially along the line 16—16 of Figure 15;

Figures 17 and 17A are plan and end views respectively of an elbow embodying the features of my invention;

Figures 18 and 18A are similar views of a different type of elbow;

Figure 19 is a view similar to Figure 6A showing a modified type of construction;

Figures 20 and 20A are plan and end views respectively of one type of fitting showing my invention adapted thereto;

Figures 21 and 21A are similar views showing a different fitting;

Figure 22 is a view similar to Figures 13A and 14A showing a modified type of construction; and

Figure 23 is a view similar to Figure 6A showing a modified construction.

In Figures 1-6A I have illustrated the nature of one type of section embodying the features of my invention. I prefer to start with a continuous strip 25 of conducting material such as copper. For normal employment with available commercial current, the thickness of the strip 25 may be as little as .02", and the width may be approximately .45". The strip is treated in a continuous manner, as by passage through or over suitable rollers so as to curve its opposite edges around into abutting relationship as at 26 as shown in Figures 2 and 2A, thereby providing a tube having an inside diameter of approximately .1 of an inch and an outside diameter of

approximately .143". The abutting edges are preferably not attached to each other so that slight spread thereof is rendered possible during the snug insertion of a rod into the end of the tube.

After the shaping of the tubular structure, a sheath of insulation 27 is applied thereto as shown in Figures 3 and 3A, this procedure being preferably effected during the same continuous process of manufacture. The sheath 27 may be of soft rubber or similar material and may be as small as .047" in thickness.

In Figure 4 I have shown a portion of a continuous strip 28, this strip being designed to serve as the ultimate metallic enclosure for the section, and being made of suitable metal, such as nickel, if desired. Whereas Figures 1, 2, and 3 are shown in the drawings upon an enlarged scale, Figures 4, 5, and 6 are shown approximately full size and the sizes and proportions for practical employment of my invention may be obtained and will be understood from a study of these figures. At suitably spaced points along a medial longitudinal line, I provide openings 29 ultimately designed to receive screws therethrough.

The final steps in the manufacture of my wiring section are shown in Figures 5-6A. In the form illustrated, two of the sheathed units shown in Figures 3 and 3A are applied longitudinally upon the strip 28 on opposite sides of the row of openings 29. The opposite edges of the strip 28 are then curved upon themselves to snugly encompass these spaced sheathed conducting elements. A structure like that shown in Figures 6 and 6A thereby results, and it will be noted that the conducting elements 25 are retained in fixed spaced insulated relationship, each one thereof being snugly enclosed within an insulating sheath and each of the sheaths being snugly encompassed by a portion of the metallic enclosure 28. When the section is applied to a wall, the curved portions of the enclosure resemble ornamental beading or the like, and it is to be noted that the flat midportion which includes the openings 29 is freely accessible for the application of attaching screws 30 or the like. In Figure 6A, the device is shown in cross-section as it would appear when attached to a vertical wall, the screws 30 extending into the wall to hold the section in direct abutment against the wall.

Although the dimensions given will serve to better explain the nature of my invention, it will be understood that they may be varied to suit differing requirements. The continuous device shown in Figures 6 and 6A will preferably be sold in lengths of approximately eight feet. It is to be observed that the structural nature of the device permits a cutting off of these lengths, and permits also

a subsequent cutting by the workmen into any desired or required lengths or length.

In Figures 7-13A I have illustrated the structural nature and preferred method of manufacture of the complementary sections 70 which serve as liaison sections between the properly prepared lengths of the sections just described.

In Figures 7 and 7A, I have shown an ordinary rod-shaped conducting element 31 75 which may be entirely of copper or the like but which is preferably formed in a well-known manner of two parts, an inner steel core, (not shown) and an outer coating of copper, thereby imparting greater rigidity thereto. The wire shown in Figures 7 and 7A, and suitable for complementary employment with the sections previously described and illustrated, is an ordinary Number 10 wire having an outside diameter of approximately .1 of an inch. It will be noted that this diameter is substantially the same as the inside diameter of the tubular structure of Figure 2.

At spaced points along a continuous length 90 of the wire 31 I apply insulating sheaths 32 which may be of hard rubber, porcelain, or the like, and which may be applied by a molding operation. For purposes presently to be made clear, the thickness of each of the sheaths 32 is substantially equal to the combined thickness of the tube 25, the sheath 27, and the metal enclosure 28. More particularly, upon reference to Figure 9A, it will be noted that the major portion of the sheath 32 is concentric with the conductor 31, whereas one face 33 is flattened. The concentric portion embodies a thickness above mentioned, whereas the thickness between the flattened portion 33 and the conductor 31 is substantially equal to the combined thickness of only the tube 25 and the sheath 27.

The rod 31 is severed between the sheaths 32 along lines 34, thereby producing the device shown in Figures 9 and 9A. The latter may be constructed in any desired manner, although the continuous manufacture as indicated in Figure 8 is deemed preferable. It will be noted that the device of Figure 9 comprises a rod-shaped conductor 31 and an insulating sheath 32 thereon and terminating short of the ends of the rod 31.

Figures 10 and 10A depict a strip of metal 35 similar to that shown in Figure 4 but slightly wider than the latter. This strip is ultimately severed into elements shaped like that shown in Figure 12, and this may be accomplished as shown in Figure 11 by first stamping the substantially rectangular openings 36 at spaced intervals along a medial longitudinal area and thereupon severing the strip 35 along the transverse lines 37. The element resulting, as shown in Figure 12, comprises the relatively long end portions 38 and the relatively short medial portion 38'. The lat-

ter is made of a length substantially equal to the length of the sheaths 32. In the form illustrated, two of the devices constructed as in Figure 9 are laid upon the medial portion 38' with the flattened faces 33 downwardly. The ends 38 are then curved around, similarly to the manner in which the ends of the strip 28 are curved, so as to snugly encompass the sheaths 32 respectively. The resulting structure is shown in Figures 13 and 13A. In these figures, it will be noted that the extreme ends of the rods 31 project slightly beyond the extreme ends of the encompassing portions 38. This is a preferred construction but is not essential.

Referring now to Figures 15 and 16, the method of assembly of two aligned tubular sections of the character shown in Figure 6 together with one liaison section as shown in Figure 13, is clearly indicated. The assembly is effected by first attaching the section 39 to the wall or ceiling or to the supporting surface as by means of the screws 40. The liaison section 41 is then applied thereto, the unsheathed ends 31 being frictionally forced into the ends of the tubular conductors embodied in the section 39. The section 41 will be associable with the section 39 to a degree which causes the left-hand end of the sheaths 32 to abut respectively the right-hand ends of the sheaths 27. Moreover, the metallic enclosure portions 38 will be of such a size as to be capable of overlapping the metallic enclosure beads of the section 39. This is clearly disclosed in Figures 15 and 16, and upon reference to the last two figures, it will be noted that the medial portion 38' of the section 41 aligns itself with the flattened medial attaching portion of the element 39. Also, throughout the concentric portion of the sheath 32, its end will abut the combined ends of the tube 25, the sheath 27, and the metallic enclosure 28. The next section 39' is then applied to the liaison section 41 and after pushing the sections together as far as the sheath abutment will permit, additional screws (not shown) are employed to secure the length 39' to the supporting surface.

Before describing in detail the other features of the invention and the illustrative modifications to which my invention readily lends itself, I will point out that after the mutual assembly in aligned relationship of the sections 39, 39', and 41, and other additional sections, the entire wiring system is completely installed. The unsheathed ends 31 are made of such lengths that the contacting area between each unsheathed end and the inside wall of the corresponding engaged tube 25 is sufficient to carry the current contemplated. Although I have shown an interengagement relying primarily upon friction, nevertheless it will be obvious that the engagement may be varied or improved in accordance with requirements. For example,

the advent of so-called "liquid solder" may render it extremely advantageous to spray some of said solder into the exposed ends of the tubes before the insertion of the rods. It is to be noted that when the assembly is completed, a wiring system is provided which presents an extremely attractive appearance to the eye and which is nevertheless of the utmost efficiency and safety. A continuous conducting strip is provided by the interengaging tubes and rods; this composite conductor is completely sheathed in insulation which cannot possibly be defective except by virtue of deficiencies in original manufacture; and the entire sheathed composite conductor is enclosed in a continuous metallic enclosure, thereby fulfilling all safety requirements. By virtue of this construction, the sheath 27 may be made of minimum thickness, no allowance being necessary for wear and tear during insulation; and inasmuch as no lost space or clearance is entailed, the entire device may be as small and compact as that shown in Figure 6, wherein the total width is approximately seven-eighths of an inch and the total depth is approximately five-sixteenths of an inch. And chiefly, it is to be noted that the entire assembly has entailed hardly any labor or time. It is only necessary for the workmen to cut the required lengths of tubular sections, to attach these to the supporting surface, and to manually build up one section upon the other until the entire installation is complete.

In Figures 14 and 14A I have shown a modified type of construction wherein the device of Figure 13 is provided by the employment, as a metallic enclosure, of two strips in place of the strip 35. In this case, a base strip 42 underlies the sheathed rods 31, and a cover strip 43 overlies them and is bent to provide portions 44 which snugly encompass the sheaths 32. The portion 43 is also shaped to provide a medial portion which overlies, and may be spot-welded to, the midportion of the strip 42.

In Figures 17 and 17A, I have shown an elbow embodying the features of my invention and capable of employment in the installation of a composite wiring system of the character indicated in Figures 15 and 16. It may be stated briefly that the device of Figure 17 is substantially like that of Figure 14, except that the rods 45, the sheaths 46, and the metallic enclosure plates 47 and 48, are curved so as to provide an elbow liaison section instead of a straight liaison section as shown at 41 in Figure 15.

In Figures 18 and 18A a similar fitting is illustrated wherein the constituent parts are suitably curved to provide a different type of elbow.

In Figures 20 and 20A I have shown a fitting which is illustrative of the large variety of fittings which may be provided for use in connection with a sectional wiring system of

the character illustrated and embodying the features of my invention. The fitting illustrated in these figures is designed to replace the wall plate which overlies and covers the wellknown type of outlet box within which a pair of spaced recesses are provided for the accommodation of suitably spaced prongs on the connector of a lamp or the like. The fitting of Figures 20 and 20A typifies the fitting which is employed at the point of commencement of the exposed wiring system to be installed. Thus, if an additional outlet is desired at a specified point, the device of Figure 20 is substituted for the usual wall plate, and extension wiring of the character illustrated in Figure 15 is installed up to the desired point of additional outlet. Although the fitting may be constructed in a variety of ways, I have shown one wherein a pair of prongs 47' are insertable into the recesses already provided, these prongs being associated at their rear ends with a box-like structure 48' provided with substitute recesses 49 and provided with rod-shaped connectors 50 mounted in the box 48 similar to the manner in which the rods 31 are mounted in the liaison sections 41. Each of the prongs 47 is electrically connected by means not shown to the contact element in one of the recesses 49 and also to one of the rods 50. In this way, the usual wall plate may be removed, the device of Figure 20 may be applied thereto, and fixed in position by means of screws 51, and a suitable length of extension wiring may be immediately commenced by association with the rods 50. The recesses 49 serve to retain the original outlet at the original place despite the fact that an extension is being led therefrom.

At the opposite end of the installed extension wiring, a fixture such as that illustrated in Figures 21 and 21A may be attached. This fixture comprises a supporting block 52 preferably of porcelain or the like, and provided with rods 53 projecting therefrom and mounted therein similarly to the mounting of the rods 50 and the rods 31. Each of the rods 53 is associated with the contact element in one of the openings 54. In dot and dash lines, I have shown the end of an extension section 55 constructed like the section 39 of Figure 15. Screws 56 may be employed for holding the fitting in position.

It will be understood that the fittings illustrated in Figures 20-21A are merely illustrative of the large variety which my invention may give rise to. For example, a fitting similar to that of Figure 21 may be provided with a second set of rods projecting from another side thereof so that the fitting itself will serve as a liaison section such as the section 41 and thereby provide not only a constituent part of the extension wiring, but also an outlet at a desired point.

In Figure 19 I have shown a modified construction which provides a device similar to that of Figure 6 by the initial employment of a hollow tubing 57 in place of the sheet 28. Such a tubing may be forced by suitable rollers or the like from the dot and dash line shape into the full line shape wherein portions 58 snugly encompass the two sheathed tubes corresponding to the tubes 25 of Figure 6, and wherein a flattened midportion 59 will serve as an attaching portion for the passage therethrough of screws 60 or the like. It will be understood that the liaison sections will have to be similarly constructed in order to cooperate therewith, although the illustration of such liaison sections is not deemed essential to explain clearly the nature of my invention.

In Figure 23 a further modification of the device of Figure 6 is illustrated wherein the construction is similar to that of Figure 14, the strip of metal 28 being replaced in this case by two complementary strips 61 and 62. In Figure 22 I have illustrated a modified type of liaison section similar to the section 41 of Figure 15 except that the metallic enclosure and the insulating sheaths 32 have been replaced by an integral block of preferably molded insulating material 63. In this construction, there is no overlapping of the metallic enclosures since the metallic enclosure is totally absent. Accordingly, when the rods 64, which project from the ends of the device of Figure 22, are inserted into the tubular ends of the adjacent sections, it may be desirable to apply a metallic spring sheath 65 or the like around the entire device and overlapping the ends of the adjacent sections.

From the foregoing, it will be obvious that my invention provides a wiring system of extreme simplicity both from the standpoint of manufacture and installation; one which is absolutely safe and of a character which fully complies with all of the usual requirements of underwriters or local ordinances; and one which has a wide variety of uses and applications, some of which have been illustrated. It will be understood that the illustration of all of the numerous applications to which my invention lends itself would be practically impossible and would serve no further purpose in explaining the nature thereof.

It is to be noted in particular that my system is of a character which is applicable as well for alternating as for direct current. The electrical bonding between the metallic enclosures for the respective conductors results in a neutralization of the effects of induction.

It is also to be noted that my invention is not limited to the provision of circular tubes and circular rods; nor to the location of the tubes in the major lengths and the rods in the smaller connecting lengths. In a construction where solid rods replace the tubes herein illustrated and described, the assembly of a

system calls for the minor additional procedure of reaming out the insulation around the ends of the rods before the liaison section, which in such an event would embody
5 tubes or the like, could be applied.

It will be obvious, therefore, that changes in the details herein described and illustrated for the purpose of explaining the nature of my invention may be made by those skilled
10 in the art without departing from the spirit and scope of the invention as expressed in the appended claims. It is therefore intended that these details be interpreted as illustrative, and not in a limiting sense.

15 Having thus described my invention and illustrated its use, what I claim as new and desire to secure by Letters Patent is—

1. As an article of manufacture, for use in a sectional wiring system, a section comprising
20 a pair of spaced rod-shaped conductors, a sheath of insulation about each conductor and terminating short of the ends thereof, and a metallic enclosure having portions snugly encompassing said sheathed tubes respectively;
25 each of said portions projecting beyond the ends of the encompassed sheath.

2. In a sectional wiring system, the combination of a section comprising a pair of spaced rod-shaped conductors, a sheath of
30 insulation about each of the rod-shaped conductors and terminating short of an end thereof, a metallic enclosure having portions snugly encompassing respective sheaths, each of said portions projecting beyond said termination
35 of the encompassed sheath; and a complementary section including spaced tubular conductors adapted to engage respectively over the unsheathed ends of said rod-shaped conductors.

3. In a sectional wiring system, the combination of a section comprising a pair of spaced rod-shaped conductors, a sheath of insulation about each of the rod-shaped conductors and terminating short of an end
45 thereof, a metallic enclosure having portions snugly encompassing respective sheaths, each of said portions projecting beyond said termination of the encompassed sheath; and a complementary section comprising a pair of
50 spaced tubular conductors, and a sheath of insulation about each of the latter and extending to the end thereof; whereby said tubular conductors may be engaged over the unsheathed ends of the rod-shaped conductors to connect electrically therewith, and
55 whereby the sheaths of the tubular conductors may be made to abut the sheaths of the rod-shaped conductors within said metallic enclosure.

4. In a sectional wiring system, the combination of a section comprising a pair of spaced rod-shaped conductors, a sheath of insulation about each of the rod-shaped conductors and terminating short of an end
60 thereof, a metallic enclosure having portions

snugly encompassing respective sheaths, each of said portions projecting beyond said termination of the encompassed sheath; and a complementary section comprising a pair of
70 spaced tubular conductors engageable over the unsheathed ends of said rod-shaped conductors, an insulating sheath about each of said tubular conductors and extending to the ends thereof, and a metallic enclosure snugly
75 encompassing each of the last named sheaths and also extending to the ends thereof for insertion into the projecting portions of the first-named metallic enclosure.

5. In a sectional wiring system; a pair of aligned and spaced sections, each of said sections comprising a pair of tubular conductors and a rigid enclosure for the conductors constructed and arranged to retain them in fixed spaced insulated relationship; and an
80 intermediate section comprising a pair of spaced rod-shaped conductors each of which extends at its opposite ends into the aligned tubular ends presented thereto by the conductors of said first-named sections; said connecting section including a second rigid enclosure constructed and arranged to retain
85 said rod-shaped conductors in fixed spaced insulated relationship.

6. In a sectional wiring system, the combination of a section comprising a rod-shaped
90 conductor, a sheath of insulation about said conductor and terminating short of an end thereof, a metallic enclosure having a portion snugly encompassing said sheath, said portion projecting beyond said termination
95 of said sheath; and a complementary section including a tubular conductor adapted to engage over the unsheathed end of said rod-shaped conductor.

7. In a sectional wiring system, the combination of a section comprising a rod-shaped
100 conductor, a sheath of insulation about said conductor and terminating short of an end thereof, a metallic enclosure having a portion snugly encompassing said sheath and projecting beyond said termination of said
105 sheath; and a complementary section comprising a tubular conductor, and a sheath of insulation about the latter and extending to the end thereof; whereby said tubular conductor may be engaged over the unsheathed end of the rod-shaped conductor to connect electrically therewith, and whereby the sheath of the tubular conductor may be made to abut the sheath of the rod-shaped conductor within said metallic enclosure.
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8. In a sectional wiring system, a section comprising a pair of conductors, a sheath of insulation about each conductor and terminating short of the ends thereof, and a metallic enclosure having portions snugly encompassing said sheathed conductors, each of said portions projecting beyond the ends of the encompassed sheath.

9. In a sectional wiring system, a section 130

comprising a pair of conductors, a sheath of insulation about each of said conductors and terminating short of an end thereof, a metallic enclosure having portions snugly encompassing the respective sheaths, each of said portions projecting beyond the encompassed sheath, and a complementary section including spaced conductors adapted to engage, respectively, over the unsheathed ends of the first-named conductors.

In witness whereof I have signed this specification this 12 day of December, 1927.

WILLIAM J. SHORE.

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