March 17, 1925. 1,530,200

H. F. RICHARDSON ET AL

SYSTEM OF WIRING CONDUITS FOR BUILDING CONSTRUCTION

Filed Nov. 4, 1921 5 Sheets-Sheet 1

Fig. 1.

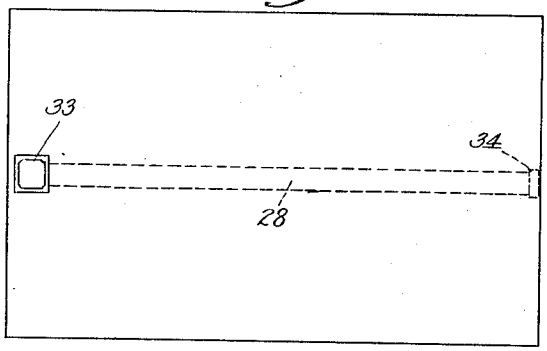


Fig. 2.

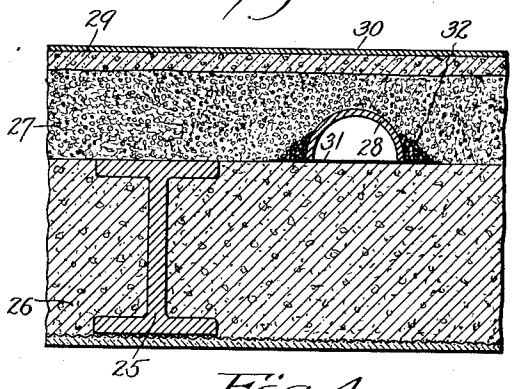


Fig. 3.

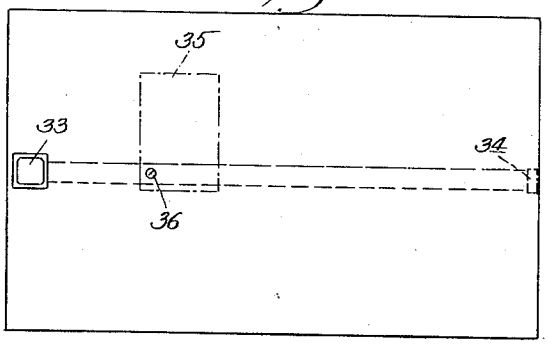


Fig. 4.

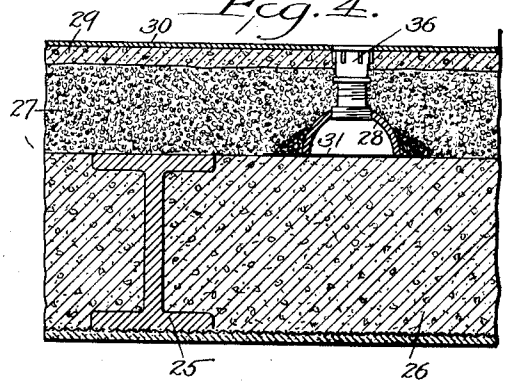


Fig. 5.

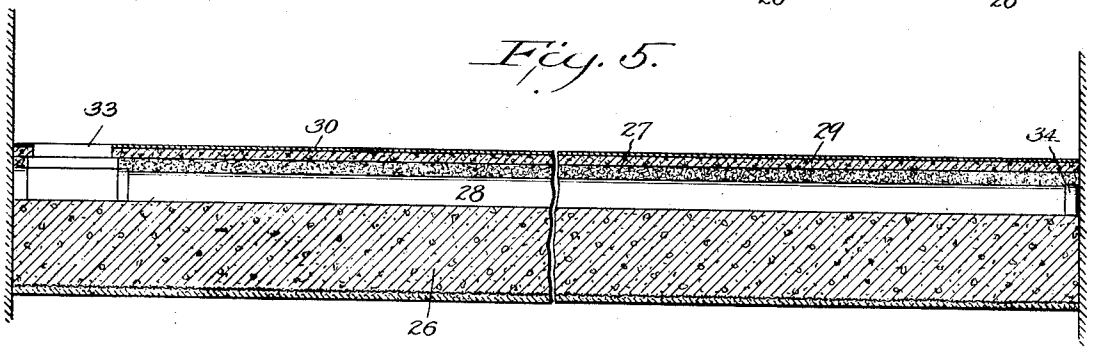
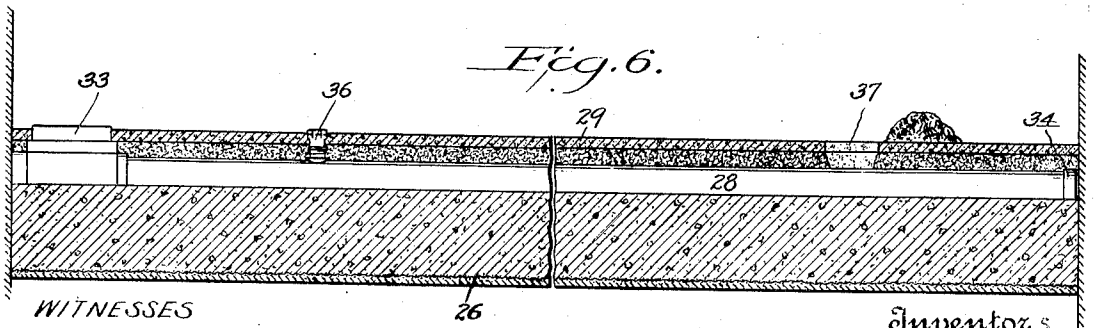


Fig. 6.



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SYSTEM OF WIRING CONDUITS FOR BUILDING CONSTRUCTION

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Fig. 7.

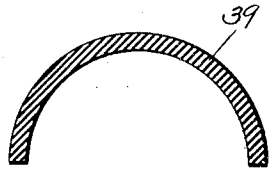


Fig. 8.

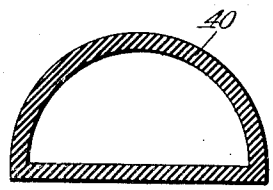


Fig. 9.

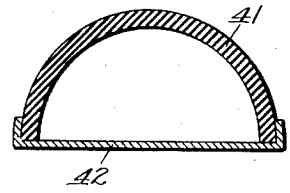


Fig. 10.

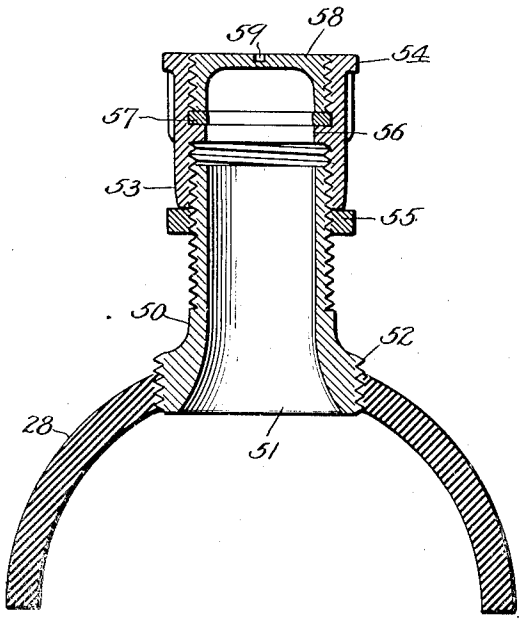
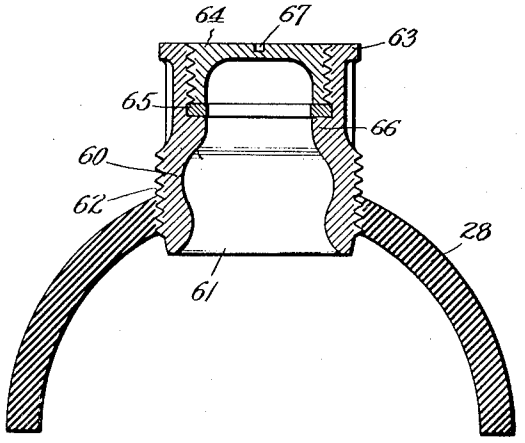


Fig. 11.



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SYSTEM OF WIRING CONDUITS FOR BUILDING CONSTRUCTION

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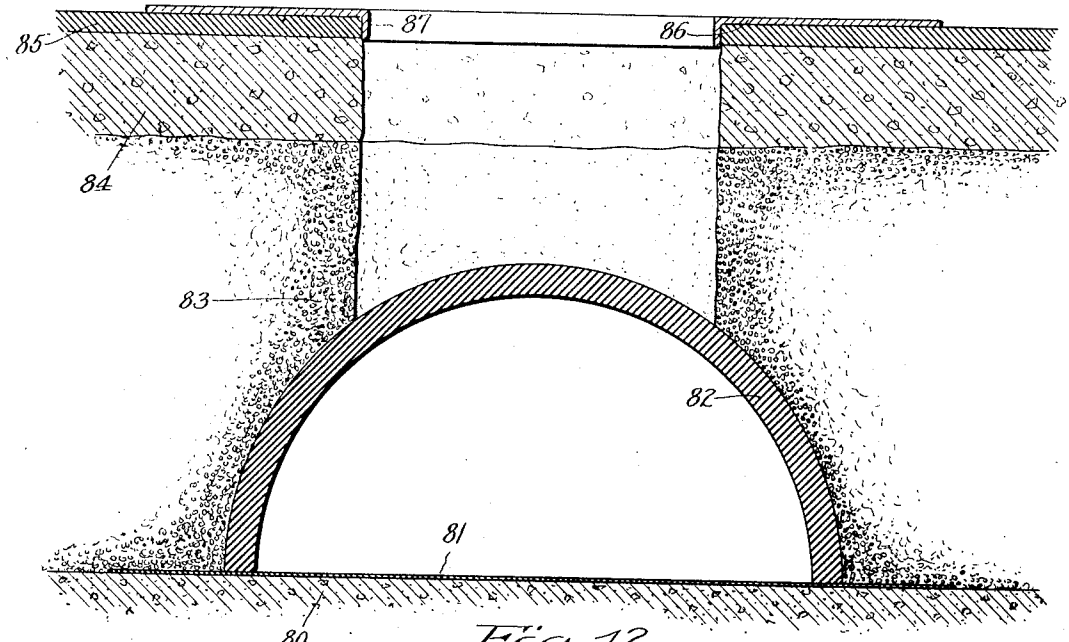
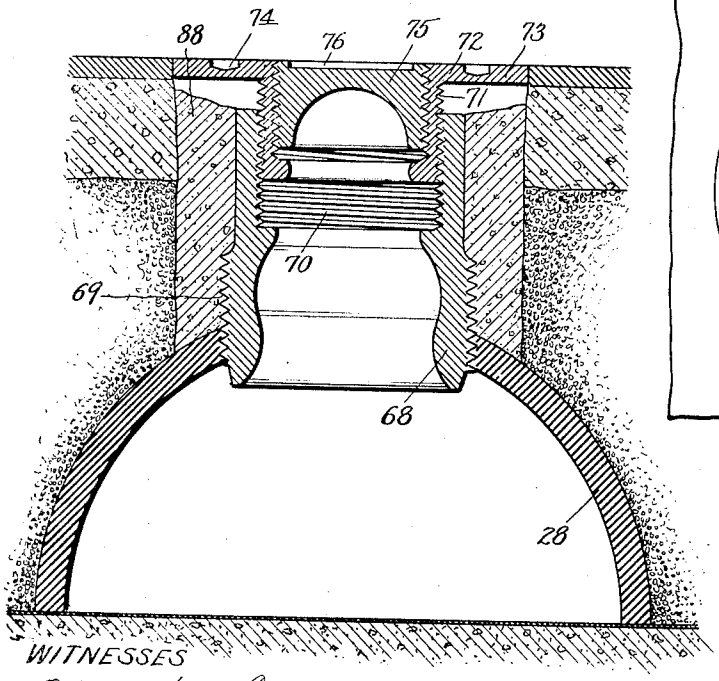


Fig. 12.

Fig. 13.



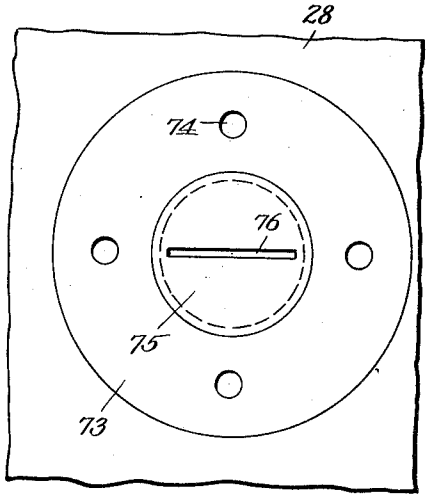


Fig. 14.

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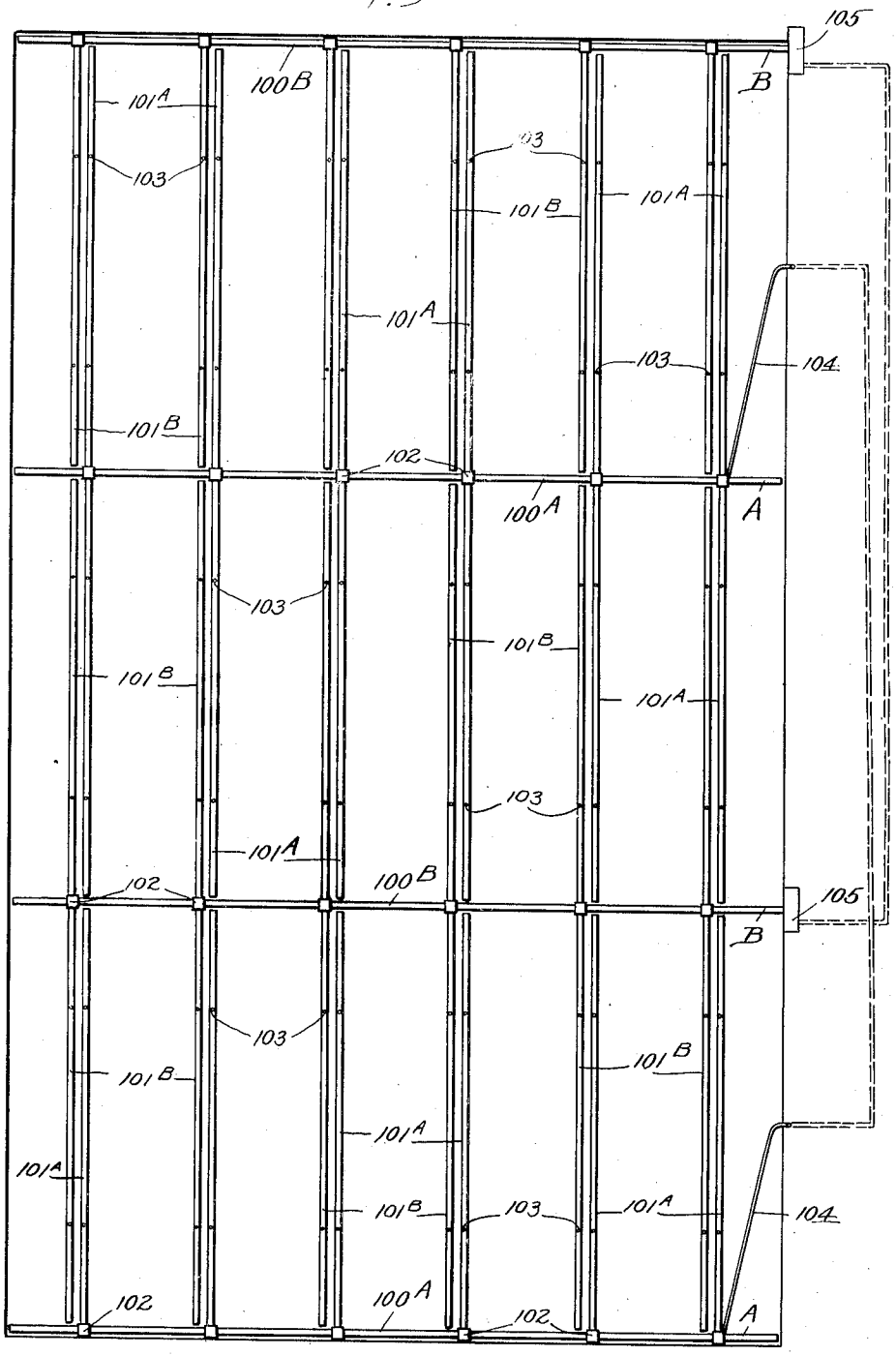
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H. F. RICHARDSON ET AL

SYSTEM OF WIRING CONDUITS FOR BUILDING CONSTRUCTION

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Fig. 15.



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March 17, 1925. 1,530,200

H. F. RICHARDSON ET AL

SYSTEM OF WIRING CONDUITS FOR BUILDING CONSTRUCTION

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Fig. 16.

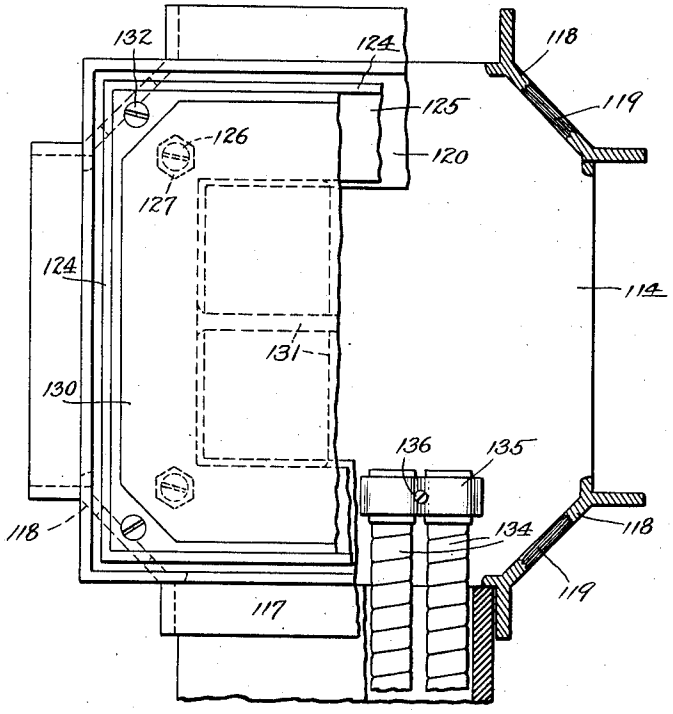
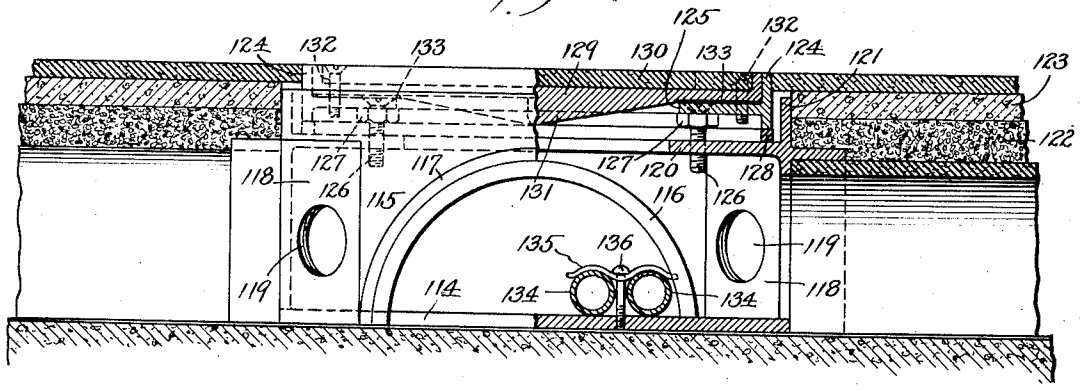


Fig. 17.



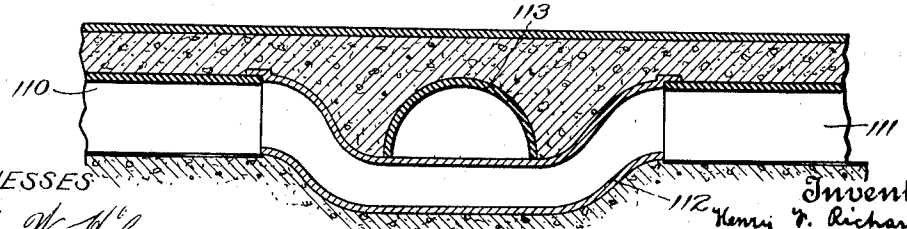


Fig. 18.

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Patented Mar. 17, 1925. 1,530,200

UNITED STATES PATENT OFFICE.

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SYSTEM OF WIRING CONDUITS FOR BUILDING CONSTRUCTION.

Application filed November 4, 1921. Serial No. 512,825.

To all whom it may concern:

Be it known that we, HENRY F. RICHARDSON and ALLAN COGGESHALL, citizens of the United States, and residents, respectively, of Brooklyn, county of Kings, city and State of New York, and Pleasantville, county of Westchester, State of New York, have invented certain new and useful Improvements in Systems of Wiring Conduits for Building Construction, of which the following is a specification.

Our invention relates in general to systems of electric wiring and more particularly to a wiring conduit or duct system for use in building construction.

Present day methods of building construction, as embodied for example in the case of factories and large office buildings, have reached a highly specialized condition. Steel and reinforced concrete are practically required to reduce fire risk and to obtain strength and durability with economy. The use of concrete for forming the floor slab has made the problem of electric wiring a difficult one, on account of the inherent difficulty of subsequent alteration or extension of the usual type of wiring laid within the concrete. On this account, the practice has been to figure in advance the probable need and location of outlets for annunciator, telephone, lighting and other lines, so as to reduce to a minimum the subsequent alterations necessary.

The principle underlying our present invention is just the reverse of the present day practice, and it aims to give the maximum facility of accommodation to subsequent demands, and to avoid the necessity of arranging outlets in advance at predetermined points that may or may not be subsequently used. The principle is equally applicable in many of its features to floor, wall or ceiling construction, but will be herein described with reference to floor construction in particular.

The general principle involved in our invention is based on the idea of so arranging the wiring ducts or conduits beneath the surface of the floor or the like that access to them, after the floor has been completed, can be readily gained by cutting through the floor and into the ducts and installing an outlet fitting where the need has occurred. In carrying out this principle, the conduits are themselves, so disposed as to be available for being placed in service substantially wherever the subsequent need may arise. That is to say, a long, narrow space, within the length of which there may subsequently be required one or more outlet connections as for machines, desks or other articles or furniture, might be adequately provided for by a single, continuous conduit or duct. In the case of floor space of greater width so that there may be some uncertainty as to both longitudinal and lateral disposition of the articles or furniture to which connections may have to be brought, the system may comprise a plurality of continuous conduits or ducts, either branched or unbranched, so arranged beneath the surface of the floor that, no matter where the desk or the like may subsequently be placed on the floor, a duct or conduit, or some branch thereof, will be found to be available immediately beneath the desk or substantially so. The invention further comprises a novel arrangement for distributing such a system of ducts or conduits beneath the surface of the floor to carry conductors of two different kinds, which require separate passages as for example electric light wires and annunciator wires. Two such systems may, according to our invention, be distributed throughout the floor space without the necessity of the conduits of one system passing over or under those of the other, all of which will be more fully explained hereinafter.

In reducing the principles of our invention to practical commercial form, it is, of course, evident that economy and efficiency must be considered. For example, according to our invention, the floor or the like might contain a considerably greater number of running feet of duct than would be employed in the ordinary present day practice of placing duct only where there was an actual expectation of its need and equipping the same originally with outlets. This condition makes it highly desirable to employ a very cheap form of duct or conduit. Another factor of equal, or possibly greater, importance for commercial considerations, is the ability to readily cut into or otherwise gain entrance to the duct through the

surface of the floor and to apply the outlet fixture when the occasion demands. In systems, which have already been installed under our invention, we have found the use of a duct constructed of wood or paper fibre composition to satisfy the above requirements of economy and facility of operations. A third feature of importance is the economy of space, especially in vertical direction, and to avoid or minimize the weakening of the concrete floor structure itself by the provision of the ducts or conduits beneath its surface. We have adopted, in practice, for this reason, a fibre conduit of substantially half-round section with its curved surface uppermost, thus offering relatively great capacity for wires while avoiding excessive height. At the same time, this low, but relatively wide, shape of the conduit is much easier to strike in cutting through the concrete above it and gives a greater area laterally or transversely within which the outlet fixture may be applied. In addition to these general features of the invention, we also provide improved forms of fixtures to be employed in conjunction therewith, examples of which will be hereinafter referred to.

To clearly illustrate the principles of the invention, we have shown, by way of example in the accompanying drawings, certain embodiments thereof, which will now be described.

Referring to said drawings:—

Figures 1 and 2 represent in diagrammatic plan view and transverse vertical section a floor construction, in which a single duct or conduit is installed under the principles of our invention.

Figures 3 and 4 are similar views representing the same construction after an outlet fitting has been applied.

Figures 5 and 6 are longitudinal vertical sections of the same form of the invention, Figure 5 indicating the conduit in place within the completed floor prior to the application of an outlet fitting thereto, and Figure 6 representing the same floor and conduit with one outlet already applied and operations for the introduction of a second outlet begun.

Figures 7, 8 and 9 are detail transverse sections of three different forms of conduit which may be employed in the system.

Figures 10 and 11 are vertical, transverse sections through two forms of outlet fittings applied to the conduit.

Figure 12 is a transverse section through a floor containing a half-round conduit, showing one way of cutting through the floor to reach the conduit.

Figure 13 is a similar view with a special form of outlet fixture introduced.

Figure 14 is a top plan view of the outlet fixture shown in Figure 13.

Figure 15 is a diagrammatic plan view of a system embodying separate branched conduits for two different kinds of wiring.

Figure 16 is a top plan view with parts in horizontal section showing a particular form of junction box, which we may employ.

Figure 17 is a vertical section therethrough with parts shown in elevation.

Figure 18 is a detail vertical section, taken longitudinally, of a special form of cross-under fitting, which may be employed in the system under certain conditions.

Referring to Figures 1 to 6 inclusive, 25 indicates an I-beam, 26 the main body of concrete, known in the trade as the arch or slab and 27 a loose fill of, for example, cinder, within which is embedded the duct or conduit 28. 29 may indicate the thin surface layer of concrete or cement and 30 the linoleum or other floor covering laid thereon. It will be understood that the particular structural or load-supporting elements of the floor construction are not, in themselves, special features of our present invention, and the design illustrated in Figures 1 to 6 is merely intended to be diagrammatic of any approved type. The term "floor slab" as used herein includes the floor and ceiling constructions common in the steel and reinforced concrete art referred to in the statement of invention, some specific forms of which are disclosed herein and when this element includes the wire duct forming a part of our invention is distinguished in its various forms by the fact that there exists between said wire duct and a surface of the slab a layer of concrete-like material forming an essential portion of the slab and penetrable to form an outlet from the wire duct. Assuming the construction herein shown, the duct or conduit 28 is laid on the more or less smooth surface of the concrete body 26 in the course of the construction or laying of the floor, and before the bed of cinder or the like 27 has been laid. We have indicated, by heavy line 31, in Figures 2 and 4, a levelling or sealing layer, against which or on which the base of the conduit may be laid. This layer may, for example, be a coat of asphalt paint, or a thin slab of cement, or other levelling material, to facilitate the laying of the conduit. After the conduit has been placed thereon, it may be preliminarily held down by applying cement, mortar or similar material along the outer edge of its base, as indicated at 32, which, at the same time, may constitute a seal for the base of the conduit where the open bottom form of duct is employed. The conduit 28 is, for example, laid from a floor box, such as diagrammatically shown at 33, which may be arranged at one end of the floor space and extend up to the level of the floor surface, all of which will be more

clearly understood from a description of certain examples of floor or junction boxes which will be hereinafter given. The opposite end of the conduit 28 may be sealed or closed by a flanged cap, as shown at 34 in Figures 1, 3, 5 and 6.

After the conduit has been laid in its place, the cinder or other fill 27 may be laid and the floor surface finished off with cement or concrete 29 and, if desired, covered with linoleum or other covering 30. The construction, as shown in Figures 1, 2 and 5, indicates one embodiment of the invention ready to be placed in service by being supplied with conductors and outlet fittings when needed. In Figure 3, we have indicated by dot and dash lines 35, the location of a desk or other piece of furniture to which it may be desired to bring a connection from the floor. The outlet fitting is represented at 36 in this figure and also in Figures 4 and 6, and is indicated in these figures as having been installed. By referring to Figure 6, the method of placing the conduit in service will be clearly understood. Here the surface of the floor is indicated as having been chiselled or cut through at 37 to expose the top of conduit 28 and, in this exposed condition, the perforation for the reception of an outlet fixture can be readily made through the top of the conduit as by chiselling, drilling or by means of an ordinary wood auger, in the case of fibre conduits such as above referred to. After the outlet fixture has been inserted, the space around the same may be filled with grout or cement to seal the joint and otherwise complete the work. Suitable forms of outlet fittings and more detailed description of the manner of finishing the installation of same will be given with reference to figures of the drawings to be subsequently described.

We have already suggested the importance, on a commercial or economic standpoint, of a special form and construction of duct or conduit element. In Figures 7, 8 and 9, we have illustrated three shapes of conduit which we may assume to be constructed of paper or wood fibre composition. The round fibre conduit is already known and extensively used, but we have designed, as a part of the present invention, a non-circular shape of conduit, of which three examples are given in Figures 7, 8 and 9. Figure 7 shows a half-round conduit 39, open at the bottom, which may, for example, be made by splitting longitudinally into two halves the well known circular fibre duct or conduit. Figure 8 represents a D-shaped section of a conduit 40, which may be molded in one piece or constructed of two parts cemented or otherwise joined together. Figure 9 represents a similar shape of conduit produced by fitting the open bottom conduit 41, such as shown at 39, in Figure 7, with a flanged bottom portion 42, which may be of any desired material, for example, fibre, galvanized iron or the like. It will be noted in the examples illustrated that relatively large interior capacity is gained per unit of height, and at the same time, the width is such as to make it easier to locate the conduit beneath the surface of the floor and apply the fitting to the top thereof.

Two forms of outlet fixture are shown by way of example in Figures 10 and 11. It will be understood that the outlet fixtures are to be of sufficient size and dimensions to permit the "fishing" of the conductors through the same. Its junction with the conduit should be effectively sealed and, for this reason, we prefer in most instances to screw or thread the fitting into the duct. This latter operation can be readily accomplished by inserting the fixture into a perforation in a fibre conduit such as we have described, without the necessity of first tapping or threading the hole which has been bored or cut through the conduit. The outlet fixture is preferably so arranged as to be flush at the top of the surface of the floor or floor covering and this result is readily obtained by screwing the fixture in or out, at least within the range of its screw threading. The physical character of the fibre conduit is such as to accommodate the slight straightening movement which may be necessary to bring the fixture into correct vertical alinement. The depth of the conduit beneath the floor surface may be relatively slight in some cases and greater in others and, for this reason, we provide outlet fixtures of varying degrees of adjustability as to height. Figure 10, for example, shows an outlet fitting provided with a tubular body portion 50, which is flared at 51 to avoid the necessity of a sharp bend in the wires, which are brought through the outlet. The body portion 50 is also enlarged or flanged at the bottom in this example and is threaded at 52 so as to be screwed into the opening formed in the top of the conduit 28. An adjustable extension 53 is threaded on to the upper portion of the body 50 and flanged at the top 54 so as to give the effect of a floor plate, which is to be carefully adjusted to the level of the floor or floor covering. The extension 53, having been adjusted to the proper elevation, may be locked in this position by means of the lock nut 55, which is threaded on to the body portion 50 prior to the application of the extension 53 thereto. An inner flange 56 is formed on the interior of the extension 53 to constitute a seat for a seal or gasket 57 of compressible material such as fibre, rubber, lead or the like. This seal is pressed by a plug 58, which is threaded into the interior of the extension

53, and may be screwed in or out, for example, by means of a screw driver applied to the screw head slot 59, so that a neat and smooth top surface is provided for the outlet when not in use. When the outlet is placed in use, the flange 56 and gasket 57 serve as a shoulder or stop against which the extension element may abut and thus the joint be made water-tight.

The form of outlet connection shown in Figure 11 is adjustable in the sense that it may be screwed further in or out with respect to the conduit 28; but this form of the outlet fitting lacks the special adjustment collar or sleeve illustrated in Figure 10. It is for use where, perhaps, less extent of adjustability is required. As illustrated, it comprises a body portion 60, flared at 61 and threaded at 62, by which threading it may be screwed into the perforation formed in the fibre conduit 28. The upper portion of the fitting is formed with a rim flange 63 to be flush with the floor surface and in the interior of the fitting may be screwed a plug 64, which may seat against an elastic or yielding gasket 65 supported on an interior shoulder 66 of the outlet body 60. A screw slot 67, or other similar means, may be provided in the upper face of the plug 64 to permit the plug to be turned by a screw driver or other suitable tool.

A third example of an adjustable outlet fitting is illustrated in Figures 13 and 14. In this construction, the conduit 28, which has been perforated as before described, has threaded into it the main body portion 68, which is flared at the bottom, as before described, and threaded at 69 to enable it to be screwed into the perforated conduit. This body portion 68 terminates below the floor level, when adjusted, and has in its upper portion an internal threading 70, to receive the external threading 71 of the adjustment neck 72, which latter is flanged, as shown at 73, to be adjusted flush with the surface of the floor or floor covering and at the same time entirely fill the hole cut in the surface covering so as to present a continuity of floor surface without the necessity of intermediate patches of the floor covering. The neck 72 is screwed up or down within the outlet body 68 to properly adjust this level and to facilitate this operation, it may have recesses 74 in its upper face suitable for the reception of an operating tool. An interior plug 75 may be screwed into the threaded neck 72 to close the aperture thereof, a screw head slot 76 or similar construction being provided for operation of the plug by means of a screw driver or the like.

Figures 12 and 13 will serve to make clear a method of applying the outlet fitting to the duct lying beneath the surface of the finished floor. 80 may represent the concrete floor structure on which a layer or slab of plastic material 81 is laid for the reception of a half-round fibre conduit 82, which is surrounded by, for example, a loose fill of cinders 83, on which is laid the upper layer of concrete or cement 84, covered by linoleum or the like 85. Having determined the point at which an outlet fitting is to be inserted into the conduit section 82, a sheet metal or otherwise formed guard 86, having a flanged aperture 87 corresponding in diameter with the necessary size of opening to be cut through the floor surface, is employed to protect the floor surface and covering 85 during the work on the job. A circular disk of the floor covering may be removed to permit the reception of the flange of aperture 87 and thereafter the relatively thin layer of concrete or cement 84 is cut away or chiselled out and the hole extended down through the cinder fill 83 until the top of the conduit 82 lies exposed. An ordinary wood auger of suitable size may now be employed to cut through the top of the fibre conduit 82. The size of the aperture formed in the conduit will be so selected as to enable the threaded portion of the outlet fitting to be forced into it by turning so that the result is a screw thread connection between the duct and the fitting without having previously tapped the aperture by a special tool. Having inserted the body portion 68, the space surrounding same will be filled up, to within a short distance of the top, by grout or cement, as indicated at 88. The protecting form or guard 86, 87 may then be removed and the outlet neck 72 inserted, its flange 73 approximately fitting the opening made through the floor covering 85 so that a neat and tidy joint is formed. The plug 75 may be inserted when desired to close the aperture of the outlet. By the use of the method described, installations of outlets can be made after the floor has been finished and without disfiguring the floor covering, which is left in place upon the floor surface during the operations described.

The description thus far has been devoted principally to the features directly bearing upon the installation of the outlet fittings. The invention further comprises certain improved constructions and arrangements for distributing and connecting the conduits or ducts in an especially advantageous manner. In Figure 15, for example, we have shown a composite system in which two entirely separate systems of duct or conduit are arranged to parallel each other throughout the floor space desired to be served. This system may be used where, for example, it is necessary to install one class of wiring separately from another class of wiring, and, at the same time, have ready access to either of

them at any point where a connection may be found necessary. This result may be accomplished without the necessity of running the duct of one system over or under that of another and thus we avoid the doubling of the vertical space occupied by the wiring ducts within the floor. Certain junction boxes and other fittings in addition to the conduit sections themselves are employed in a practical carrying out of this feature of our invention, but we shall first describe the same in diagram and then explain more in detail a construction which we have found satisfactory for the junction boxes and other necessary appurtenances. Referring in detail to Figure 15, it will be observed that the system comprises two separate and distinct systems of conduit which we may represent as systems A and B respectively. We may assume, for the sake of illustration, that system A represents telephone wiring and system B the annunciator or electric light wiring. Our invention does not aim to prescribe what systems shall be kept separate, but rather provides the means of keeping them separate when such condition is required.

Each system comprises one or more conduits 100^A, 100^B, which extend continuously or straight through from one side of the space to the other, from which are laid the transverse or lateral communicating branches or extensions 101^A, 101^B. In laying the systems, the conduits of system A alternate with those of system B and are spaced apart at more or less uniform intervals, as illustrated in Figure 15. The conduits 100^A, 100^B may, for example, be approximately parallel to each other and similarly the extensions 101^A, 101^B may be parallel to each other. Obviously, the formation of rectangular spaces is optional as the same principle may be advantageously applied so as to produce figures of other shapes where the shape of the space to be covered is different. For example, they may be arranged in parallelograms where the shape of the room is that of a parallelogram. The connection of the branches with their straight-through conduits is effected by junction boxes, such as diagrammatically illustrated at 102 in Figure 15. It will be seen that these branches extend from one system toward the next, but terminate just short thereof, so that all the conduit sections may be substantially in one plane and the necessity of permitting one to cross over, above or below another is avoided. In actual practice, the dimensions of the intervals between the two systems and the successive conduits of each system are so selected that no point on the floor space will be more than a certain minimum distance from a conduit or branch of either system. This particular distance may be figured on the basis of the size of furniture so that, for example, assuming a desk of ordinary size, some part of the desk, no matter where placed on the floor space, would be approximately over some part of each system of conduit. In this way, an outlet connection for extending the service to the desk could be made through the floor either underneath the desk or substantially at the edge of the desk, thus avoiding the encumbrance, of what should be free walking space, with wires. We have indicated diagrammatically at 103 the location of outlet fixtures, which may, for example, be originally installed under the principles already described and closed by their floor plates or plugs so as to be available without the necessity of cutting through the floor. These however, might be omitted, and they are only shown in this figure to indicate that outlets may be placed in advance of demand if so desired. The system is still readily available for the installation of additional outlets to meet subsequent requirements. Ordinarily, the conduits are not originally wired but are so constructed that wiring can be readily introduced into them when necessary. We have shown, for example, the supply of wiring to system A by ducts 104 leading from the wall and to system B from wall boxes 105 leading into the end of the conduit itself. These illustrations are merely by way of example. It will be understood that such connections afford communication or distribution of the service from floor to floor, or from room to room on the same floor. The construction and arrangement of the individual lines of conduit may follow, for example, the general construction shown in and described with reference to Figures 1 to 6 of the drawings.

There may be for certain reasons a desirability of departing from the described purpose of arranging all the conduits substantially in the same plane or on the same level. For example, it may be required that certain space beneath the floor surface be left, within which to place piping or other duct system, which must be crossed by a wiring duct such as we have set forth. Figure 18 illustrates an example of a special fitting, which may be employed for this purpose. In this figure, it will be seen that the duct sections 110 and 111 are joined together by a cross-under connection duct 112, which leaves the space above it for piping or duct 113 running transversely thereof. This principle is, of course, only applicable where permitted by the height or construction of the floor proper.

The junction boxes shown diagrammatically at 102 in Figure 15 are intended to be flush with the floor surface and serve to join together the duct sections. They are adapted to be opened at the top when it is desired to gain access to the junction for

the purpose of drawing wires into the adjoining parts of the duct system or for performing some other operation thereon. It should be borne in mind that, ordinarily, the ducts are not supplied with wiring when first laid, but those portions of the duct system which are placed in commission will be wired when the need arises. We have shown in Figures 16 and 17 an embodiment of a satisfactory form of junction box.

Referring to Figures 16 and 17, the junction box here illustrated comprises a body of, for example, cast iron made up of a floor or bottom 114, and side walls 115 which are open on all four sides to receive the duct sections 116 and provided with corresponding flanged sockets 117, into which the ends of the duct sections fit more or less closely. The corners of the body portion of the junction box are, in the present example, arranged at say forty-five degrees to the side walls to form diagonally opposite faces 118, which are perforated and tapped at 119 to receive a threaded iron pipe or conduit when it is desired to lead a forty-five degree connection into or from the junction box. The upper portion of the body is formed with an internal, horizontal ledge or flange 120 which surrounds the central opening of the junction box, through which access is gained to the interior. An upwardly extending rim flange 121 serves to prevent the fill of cinder 122 and surface cement 123 from getting into the interior of the junction box during the process of laying the floor structure around the junction box, and also provides an interior pocket or chamber to receive the junction box cover and its associated parts, which will be explained. The rim flange 121 terminates a slight distance below the level of the floor surface. The cover and floor plate are to be adjusted to lie flush with the floor surface. For this purpose, we provide a rim plate 124, which has an inner flange 125, through which pass a suitable number of screws 126 that are threaded into the inner flange 120 of the body portion of the junction box, to secure the rim plate 124 to the said body. The screws 126 are turned in or out to raise or lower the level of the rim plate 124 so that its upper edge is just flush with the floor surface or floor covering and the lock nuts 127 are then tightened upwardly against the under face of the flange 125 to definitely fix the plate at that elevation. If desired, a collar or gasket 128 of suitable thickness may be disposed beneath the lower edge of the flange plate 124. The floor plate 129 is herein illustrated as countersunk to receive a sheet of linoleum 130 to match the floor covering. This floor plate may be of brass and preferably has strengthening ribs 131 formed integral therewith and extending along its under surface. It fits within the interior of rim plate 124 and may be secured therein by means of countersunk screws 132, which are threaded into the flange 125 of the rim plate, as shown clearly in Figure 17. A gasket 133 of yielding material may be confined between the lower edge of the floor plate 129 and the upper surface of the flange 125 to make the joint water-tight.

We have shown in Figures 16 and 17 a construction by which the grounding of metal armoured cable may be accomplished in the junction boxes, as required by insurance regulation. The two armoured cables are indicated at 134. Their ends are drawn part way into the junction box and clamped beneath a metal yoke 135 by, for example, a screw 136 threaded into the bottom of the cast iron body portion of the junction box.

It is thought that the description above given will be sufficient to enable those skilled in this art to understand and practice the invention. It has already been explained that the principle involved is to distribute the conduit within the body of the floor structure at the time of building the floor and to lay the conduit preferably at regular intervals based upon assumed standards of size of office furniture or the like to which the service may have to be supplied. That is to say, it is the intent, primarily, to provide conduits at such intervals apart within the floor area that connection through floor fixtures may be gained substantially beneath the desk, machine or the like, no matter where the latter is placed upon the floor. The wiring is only introduced where wires are found to be necessary. When the wiring is required, it is readily introduced into the system by the well known practice of so-called "fishing", the junction boxes and outlet fixtures giving access to the conduit for this purpose. The junction boxes are ordinarily installed throughout the system in the beginning, whereas the outlet fixtures are readily introduced where desired when their need becomes apparent. The supply of wiring to the conduits from the wall boxes or shafts may be accomplished by drawing the wires through the adjacent ends of the conduit or through special iron pipe conduits led into the junction boxes on the forty-five degree faces thereof, as already explained. Figure 15, for example, shows both methods of leading the wires to the conduits from the walls. These same principles may be applied, of course, to the communication of the various systems from floor to floor or from room to room on the same floor. The importance of the shape and material of the conduits with regard to certain features of the invention has already been made clear. Obviously, the outlet fixture to be applied and used in the manner described must have sufficient opening to

permit the "fishing" of wires through it and, at the same time, the width of the conduit into which the outlet fixture is to be threaded should be such as to provide ample extent of space horizontally to permit the introduction of the outlet fixture in the manner described. As distinguished from ordinary metallic pipes or ducts, the wood fibre or paper composition duct is especially desirable as lending itself more readily to manipulation by ordinary wood working tools and, furthermore, it is easier to cut into the top of the duct without destroying its natural contour and without leaving ragged burs or edges.

The junction boxes as already described, are constructed of metal, whereas in most cases, the conduit itself will be of non-metallic fibrous material, such as wood, fibre or paper composition. All metallic parts of a conduit system for high tension wiring, such as electric lighting circuits, are commonly grounded, and we conform with the practice by grounding the junction boxes in any approved manner.

We claim:—

1. The steps in a method of building, which comprise constructing a floor slab including a wire duct within and substantially parallel with the floor surface of the slab, cutting through the slab into the duct at a point determined by the location of a device to be supplied with current whereby conductors may be led through said duct to said device.

2. The steps in a method of building, which comprise constructing a floor slab including a wire duct within and substantially parallel with the floor surface of the slab, cutting through the slab into the duct at a point determined by the location of a device to be supplied with current and applying a fitting to the duct through which the conductors may be drawn.

3. The steps in a method of building, which comprise constructing a floor slab including a wire duct within and substantially parallel with the floor surface of the slab, cutting through the slab into the duct at a point determined by the location of a device to be supplied with current, applying a fitting to the duct, and filling the space around the fitting with cementitious material.

4. The steps in a method of building, which comprise supporting a system of conduits substantially parallel with the floor surface, constructing a floor slab to include the conduits, and cutting through the slab into the conduit at a point determined by the location of a device to be supplied with current, whereby conductors may be led to said device.

5. The steps in a method of building, which comprise supporting a system of conduits substantially parallel with the floor surface, constructing a floor slab to include the conduits, cutting through the slab into the conduit at a point determined by the location of a device to be supplied with current, and applying a fitting to the conduit, whereby conductors may be led to said device.

6. The steps in a method of building, which comprise supporting a system of conduits substantially parallel with the floor surface, constructing a floor slab to include the conduits, cutting through the slab into the conduit at a point determined by the location of a device to be supplied with current, applying a fitting to the conduit, and filling the space around the fitting with cementitious material.

7. In combination, a floor slab, a duct within the slab, a fitting having a part narrower than the duct adapted to be fitted into the upper part of the duct and extend through the floor to the surface.

8. In combination, a floor slab, a surface covering thereon, a duct within the floor slab, a fitting applied to the duct to give access to the duct through the floor, the fitting extending to the edges of the floor covering whereby patching of the floor covering is avoided.

9. A concrete floor construction comprising in combination, a course of suitable material constituting a floor slab, a course of suitable material disposed upon a level above the floor slab and constituting a floor surface, a course of suitable filling material disposed intermediate the floor slab and floor surface, and an arched wiring conduit of greater width than height disposed entirely within the intermediate course, for wiring, to which connections are to be subsequently established through the floor surface.

10. A concrete floor construction comprising in combination, a floor slab and an upper floor surface layer, an arched conduit disposed entirely between the floor slab and the floor surface layer, extending to within a prescribed distance of all parts of the floor area, and an outlet fitting anchored in the floor surface and extending downward into said arched conduit.

11. A concrete floor construction comprising a floor slab and an upper floor surface, an arched conduit of greater width than height, having a substantially flat bottom and disposed entirely between the floor slab and the floor surface, reaching within a prescribed distance all parts of the floor area, said conduit being suitable for subsequent entry at any portion of its length to receive an outlet fitting and for installment of wiring therein when required.

12. A concrete floor construction comprising a floor slab, an upper layer of floor surface material, and an arched conduit of fibrous material or the like of greater width than height, disposed entirely beneath the

floor surface, within a prescribed distance of all parts of the floor area to be served, and adapted to be penetrated at any point after completion of the floor to receive an outlet fitting.

13. A concrete floor construction comprising a floor slab, an upper continuous floor surface layer, an intermediate layer of filling material between them, and an arched conduit embedded in said filling material, adapted to be penetrated at desired points after the completion of the floor for installing wiring as required.

14. A wiring arrangement for floor construction comprising two sets of branched conduits, for two independent systems of wiring, the branches of one set intercalating with the branches of the other set so that every point of the floor space to be served will be within a prescribed minimum distance from a conduit of either set, without requiring crossings of the two sets.

15. A concrete floor construction comprising a floor slab, an arched conduit open at the bottom, laid on said floor slab, a fill laid over and covering said conduit, and a layer of floor surface material laid over said fill.

16. A concrete floor construction comprising a floor slab, open-bottomed arched conduits laid on said floor slab, a filling between and over the conduits and a surface floor laid over and covering said filling.

17. A wiring arrangement for floor construction comprising two independent systems of continuous runs of conduit spaced apart at intervals beneath the floor surface substantially in one plane, the runs of one system alternating with those of the other, and each run having a plurality of lateral branches extending along and terminating within the space between the branches of the other system.

18. A method of constructing floors in buildings, which comprises laying a course of suitable material to constitute a supporting slab, laying an arched wiring conduit in the space above the supporting slab, covering said arched conduit with a fill laid upon said supporting slab, and laying a superficial course of suitable material over said fill, to constitute a floor surface.

19. The method of laying and utilizing conduit in the construction of floors which comprises placing the conduit on a lower course of the floor, cementing the edges of the conduit to secure the same, then applying a fill over the conduit and cement, then covering the whole with an integral surface floor and subsequently cutting through the surface floor and into the conduit and applying an outlet fitting.

20. The method of laying and utilizing conduit in floors which comprises placing the conduit on a lower course of the floor, then applying filling material around and over the conduit, then covering the whole with a continuous integral surface floor, and subsequently cutting through the surface floor and into the conduit and applying an outlet fitting, and introducing the wiring.

21. A concrete floor construction comprising a floor slab, a concrete floor surface a wiring passage disposed entirely beneath the surface of the concrete floor and formed by a non-metallic fibrous conduit of half round section open at the bottom, the bottom of said passage being closed by the floor slab on which the conduit is laid.

22. A wiring duct arrangement for floor construction comprising two independent runs of conduit spaced apart beneath the floor surface substantially in one plane, and each having a lateral branch extending toward the other.

23. A wiring arrangement for floor construction comprising two independent systems of continuous runs of conduit spaced apart at intervals beneath the floor surface in one plane, those of one system alternating with those of the other, and each run having a plurality of lateral branches extending substantially across the space intervening between the runs of the two systems.

24. A wiring arrangement for building construction comprising two independent systems of wiring conduits disposed beneath the surface of a building floor in substantially the same plane, each system having main ducts extending across the area of the floor and spaced lateral ducts extending at right angles from the main ducts, the main ducts of one system being parallel to the main ducts of the other system and the lateral ducts of one system being parallel to and intercalating the lateral ducts of the other system.

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