Jan. 27, 1942. W. C. ROBINSON ET AL 2,271,465

UNDERFLOOR DUCT

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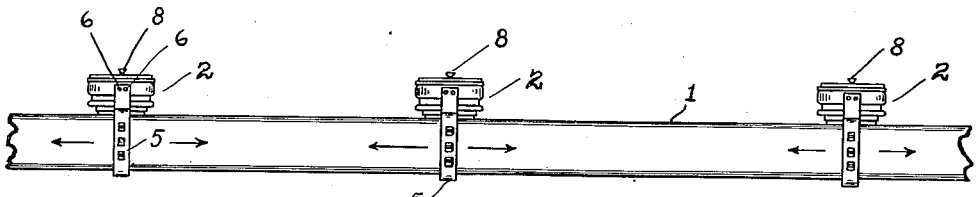


Fig. I.

arrows indicate adjustability of applied access elements.

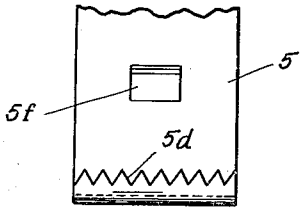


Fig. II.

Fig. III.

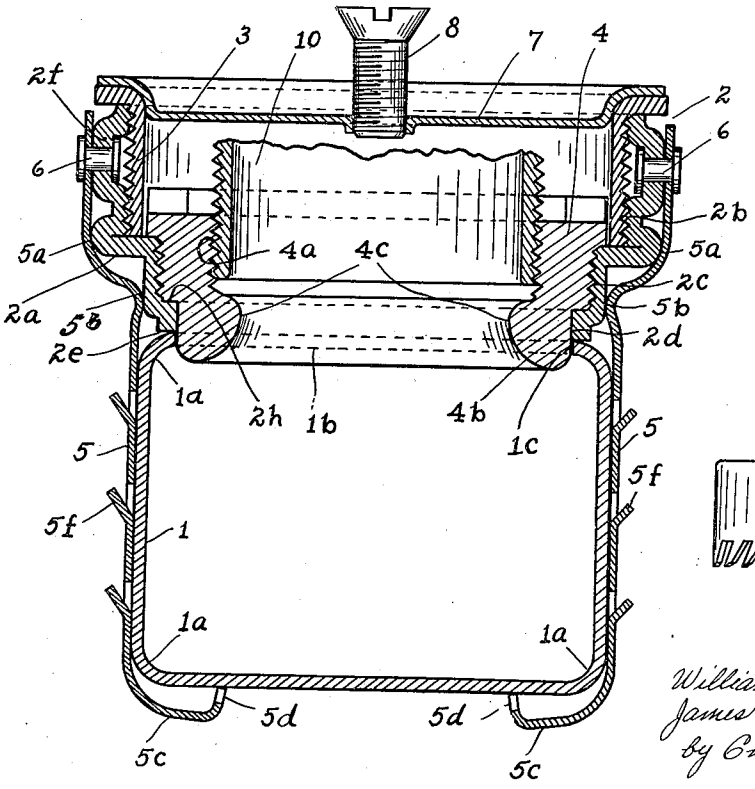
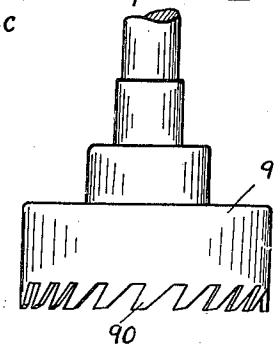


Fig. IV.



INVENTORS

William C. Robinson, and
James M. G. Fullman
by Christy and Wharton
attorneys

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UNDERFLOOR DUCT

William C. Robinson and James M. G. Fullman, Sewickley, Pa., assignors to National Electric Products Corporation, a corporation of Delaware

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3 Claims. (Cl. 285—108)

Our invention relates to underfloor duct systems, systems of conduits or ducts which are embedded in concrete floors to provide raceways and housings for electrical service wires.

In systems of this sort, branch connections are made through the floor to the embedded conduits, and, in order to facilitate the making of such branch connections, access elements are provided on the conduits. The usual access element consists in a cup or tube of metal that is seated and secured upon the upper face of the conduit before the concrete is laid or cast. When the floor structure has been completed, the cup or tube provides a vertical bore or pocket between the face of the floor and the top wall of the conduit. If it becomes necessary to make a branch connection through the floor at this point, access to the conduit is readily obtained, by breaking through the floor at the mouth of the access element, and then drilling, or otherwise providing, a passage in the top wall of the buried conduit.

It has been customary to provide the access elements in such profusion in the duct systems that, no matter where a connection might in the future be desired, the need can be met. The means for positioning and securing the access elements in the system have usually consisted in screws, or other devices, provided in the factory on the conduit in longitudinally spaced-apart relation. This factory standardization of the spacing at which the access elements may be applied to the conduit has more or less curtailed the adaption of the equipment to the various particular conditions met in the field, and the result has been that in particular installations more access elements have been installed than have been actually needed. Indeed, over a period of years experience has shown that in some cases only one out of every twenty of the installed access elements has come into use. Furthermore, it has been found that in this wasteful practice many access elements are provided at points where it is practically certain that no branch connection will ever be required, such as in the floors of corridors, public reception rooms, and the like.

The object of our invention is to correct this wasteful practice, and the invention consists in new and useful improvements to such end. More particularly, the invention consists in certain refinements and elaborations in the structure of access elements, by virtue of which:

(1) It becomes more feasible to provide access elements at the points of probable service, and only at such points, irrespective of the space intervals between any two or more elements that have been applied on a given reach of conduit;

(2) It becomes more practical to apply the access elements to the conduits in the field, without the aid of special tools, and it becomes more feasible to apply the elements at any desired points on conduits, particularly metal conduits, that have in no way been structurally modified or elaborated to receive the elements;

(3) It becomes easier to provide a clean and well-defined opening in the upper wall of a conduit, particularly a metal conduit, to gain the desired access at precisely the desired point;

(4) It becomes possible, during the installation of the conduit, to adjust and vary the positions of the applied access elements at will, preferably without removing the elements from the conduit and without loss of the desired rigidity and security of assembly against unintended or accidental movement.

In the accompanying drawing Fig. I is a fragmentary view, showing in side elevation a metal conduit of typical form, with three access elements embodying our invention applied thereto; Fig. II is a view of the conduit and an applied access element in cross section and to larger scale; Fig. III is a fragmentary view, showing in elevation and to the scale of Fig. II the end of one of the clamping members included in the structure of our invention; and Fig. IV is a view in side elevation, to smaller scale than Fig. II, of a special tool that is used in cooperation with the access element structure in forming an access opening in the wall of the conduit.

Referring to the drawing, the reference numeral 1 is applied to a length of conduit, typical of the conduits that in known way are assembled and embedded in the concrete floor of a building, to provide an underfloor duct system for electrical service wires. The conduit 1 consists in a heavy-walled metal tube of rectangular cross-section, with the corners rounded, as indicated at 1*a* in Fig. II; and it is to be understood that the access element of our invention has been designed particularly for use with conduits of this sort. In Fig. I three access elements, 2, are shown assembled upon the conduit, and as presently will appear these elements are adapted to be installed in the field, at any desired point or points upon the conduit, either before or after the conduit has been laid and assembled, preparatory to the casting of the concrete. And it will be further noted that the access elements may be readily adjusted longitudinally of the conduit, thus permitting adjustment after application, and a more

selective locating of the elements in the assembled system.

The access element consists in a metal cup or tube which is so particularly fashioned that its wall 2*a* includes three concentric cylindrical portions 2*b*, 2*c*, and 2*d* that are of successively decreased diameter, as shown. The portions 2*b* and 2*c* are internally threaded, severally to receive and secure in threaded engagement a collar 3 and fixture-supporting ring 4, while the inner cylindrical surface of portion 2*d*, contiguous with the lower rim or lip 2*e* of the access element, is accurately and smoothly finished for cooperation with a specialized drill, as will presently appear.

In accordance with the invention, we provide means on the tubular or cup-shaped access element for positively locking the element upon the conduit, with its lower rim 2*e* centered and tightly secured upon the upper or top wall 1*b* of the conduit. Such means consist, advantageously, in a pair of tong-like arms that are formed of relatively narrow (Fig. I) straps 5 of spring steel. The resilient straps are secured at their upper ends to the wall of the access element at diametrically opposite points, and, while integration of the straps with the body of the access element may be effected in numerous ways, riveting is preferred. Specifically, the side wall portion 2*b* of the access element is regionally embossed, as at 2*f*, and the two rivets 6 that secure each strap to the element are arranged with their heads nested within the pockets thus provided in the otherwise continuous threaded surface of the said wall portion 2*b* of the access element. Extending downward from the rivets 6, the resilient straps 5 are so formed that they bear laterally upon the access element at points 5*a* and 5*b*; continuing downward from these points, the straps snugly embrace the side walls of the conduit 1 in surface-to-surface contact; and each strap is inturned at its lower end, providing a portion 5*c* that passes inward beneath the adjacent lower corner 1*a* of the conduit and such inturned portion of the strap terminates in an upwardly directed, serrated edge 5*d* which takes purchase upon the bottom wall of the conduit. The two straps, thus formed and arranged, provide in effect a pair of resilient tongs whose medial portions frictionally embrace the sides of the conduit and whose distal portions positively engage the bottom of the conduit and lock the access element in assembly therewith. It is important to note that mechanical security of assembly is thus obtained without any portion of the tong or clamping members being embedded in or driven into the body of the conduit. No special treatment of the metal conduit is required, to admit of the assembly of the access element thereon, and no tools are required. These are valuable characteristics or features attending the practice of our invention. In making the assembly, the tong arms, while possessing a high degree of resiliency or spring strength, may be readily spread apart and applied over the conduit body, and this operation is facilitated by the provision of tong arms of maximum permissive length, the arms being secured at their upper ends adjacent to the top of the access element 2. And the security, and accuracy of centering, of the access element upon the conduit (which security and accuracy might otherwise be lost through such use of elongate tong arms 5) are preserved by so shaping the arms that they engage the access element at the points 5*a* and 5*b*; that is, the access element is in effect securely engaged throughout its entire vertical extent. Thus, the access element may be readily assembled and secured upon the square or rectangular-sectioned metal conduit, with the lower rim 2*e* of the access element positively held in seated position upon the top wall of the conduit.

If desired, tangs 5*f* may be struck from the bodies of the straps 5, to provide projections that are locked in concrete when the floor is cast and hardened upon the assembly.

It will be understood that, while the tong-like arms 5 positively secure the assembly, the applied access element may be readily adjusted longitudinally of the conduit. That is to say, whereas the engagement of the serrated tips 5*d* with the bottom of the conduit is effective to prevent an accidental or unintended spreading of the arms 5 from the position of service in which they are shown in Fig. II, such tips do not prevent the intentional movement of the applied element lengthwise of the conduit. In consequence, the applied element may be inched along the conduit to any desired ultimate position of assembly.

It will be understood that there is no opening in the top wall of the conduit 1 when the access element is initially applied, and that the supporting ring 4 (sometimes known as the radius ring) is not included in the assembly. On the other hand, the collar 3 is included in the assembly, and in usual way is vertically adjusted to such position in the access element that its upper, flanged rim lies at the desired interval below the finished surface line or plane of the floor under construction. Before the concrete is poured a dished cover 7 of usual form is applied, to close the mouth of the access element, and in known way a screw 8, carried by the cover, is vertically adjusted to such position that the top of its head lies flush with said floor line. The screw provides in the surface of the finished floor a marker which indicates the exact location of the embedded access element.

When it becomes desirable to make a branch connection through the floor to the buried conduit, the concrete surrounding the marker screw 8 in the floor is cracked away, and the lid 7 upon the access element, thus uncovered, is removed.

Next, an opening is made through the wall portion of the conduit exposed at the bottom of the access element, and in the drilling of this opening the portion 2*d* of our access element proves particularly valuable. The drill employed is of the specialized form shown in Fig. IV, which is drawn on smaller scale than Fig. II. The body of the drill consists in a cylindrical shell 9 whose lower edge is formed into, or carries, a circumferential line of cutters 90. The inner cylindrical surface of portion 2*d* of the access element 2 is slightly greater in diameter than the body 9 of the drill, so that the drill, when introduced to the uncovered access element and its cutters brought to cutting engagement with the top wall of the conduit, is snugly engaged by such cylindrical surface, in much the same manner as a journal is engaged by its bearing. This annular surface of portion 2*d* of the access element serves accurately to center the drill, and, during the drilling operation, the drill is supported and guided, whereby the opening 1*c* provided thereby accurately registers with the lower mouth of the access element.

Upon removal of the drill, the ring 4 is screwed into place, it being noted that the body of the access element provides, between threaded wall

portion 2c and drill-guiding portion 2d, a shoulder 2h against which the complementary body of the ring is tightly seated. The internal wall of the ring 4 is threaded, as shown at 4a, to receive and secure the lower end of the usual stand-pipe 10, or other fixture, that extends upward from the supporting ring and provides the desired vertical passage through which the electric branch conductors (not shown) are led out in known way. Other than to the extent disclosed herein, our invention is not immediately concerned with the form of the stand-pipe, nor with special details of how the branch connection is made; it suffices that the lower end of a stand-pipe be fragmentarily indicated in Fig. II, with the understanding that normally the ring 4 and stand-pipe are not included in the assembly until after the cover 7 has been removed and an opening 1c has been formed in the top wall of the conduit. There is, however, an important detail in the structure of the ring 4 that merits particular consideration. Specifically, the lower edge of the ring is of funnel shape, including a round or curved surface 4b that protects the electrical conductors (not shown) from engagement with the relatively sharp peripheral edge of the opening 1c in the wall of the conduit. More specifically, the body of the ring 4, from the shoulder 2h downward to the inner surface of the top wall 1b of the conduit, is of cylindrical form, snugly fitting the inner cylindrical surface of portion 2d of the access element and the edge of the said opening 1c. The lower edge of the ring extends downward an interval below the upper wall of the conduit, and, beginning at the edge of opening 1c, the surface of the ring curves downward and inward, then upward and inward to a region 4c that defines the effective internal diameter of the ring, and then upward and outward from such region 4c to the base of the threaded wall portion 4a of the ring. The diameter of the ring in the region 4c is at least equal to, and in this case is less than, the internal diameter of the stand-pipe 10, and thus it is that the electrical conductors which are led upward from the conduit 1 are protected from the sharp edge of the lower end of the stand-pipe. By virtue of such refinement in structure the conductors bear only upon the round surface 4b of the ring, and at no point in the assembly do the conductors come into contact with an edge that might tend to cut or erode the insulation with which they are covered.

It is to be understood that our invention is not to be limited to the exemplary construction described above. The appended claims define the invention, and within the terms and intent thereof various modifications and refinements are held in contemplation, and are covered thereby.

We claim:

1. In an underfloor duct system the combination of a conduit having an opening through a wall thereof, an access element having tong-like conduit-embracing arms for engaging the access element to the conduit, the said access element being positioned on the conduit with a peripheral edge of the access element surrounding the opening in the wall of the conduit and having a portion of its peripheral edge structure formed as a drill-guide for making the said opening, and a fixture-mounting ring engaged with the access element and extended into the said opening, the said ring having its interior surface adjacent the said opening curved upward and inward toward the interior of the access element to provide a funnel-like mouth for drawing wires from the conduit into the access element.

2. An underfloor duct system including a metal duct approximately rectangular in cross section, an access element on the top wall of the said duct, a pair of resilient tong-like arms secured to the said access element and extended therefrom along opposite sides of the duct, terminal portions of the said arms turned toward each other yieldingly to contact the bottom wall of the duct embracingly to engage the access element to the duct, and bent portions in the said arms extended toward each other into contact with the access element adjacent the top wall of the duct providing points of yielding deflection at the lower region of the access element for the portions of the said resilient arms which extend along and beneath the walls of the duct.

3. An underfloor duct system including a metal duct approximately rectangular in cross section, a tubular access element composed of inner and outer members on the top wall of the duct, the inner member of the said access element being adjustable axially of the outer member thereof, a pair of yielding tong-like arms secured to the outer member of the said access element and extended therefrom along opposite sides of the duct, terminal portions of the said arms turned toward each other yieldingly to contact the bottom wall of the duct embracingly to engage the access element to the duct, and bent portions in the said arms extended toward each other into contact with the access element adjacent the top wall of the duct providing points of yielding deflection at the lower region of the access element for the portions of the said resilient arms which extend along and beneath the walls of the duct.

WILLIAM C. ROBINSON.
JAMES M. G. FULLMAN.