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ADAPTER FOR ACCESS UNITS OF UNDERFLOOR DUCTS

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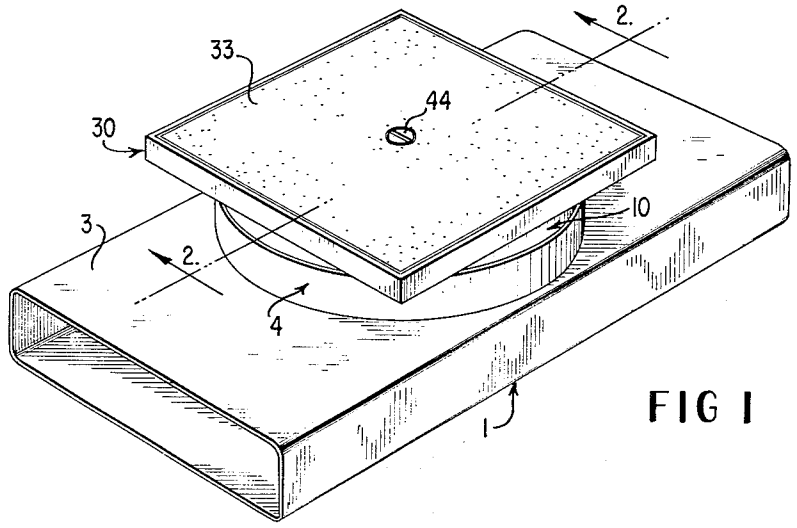
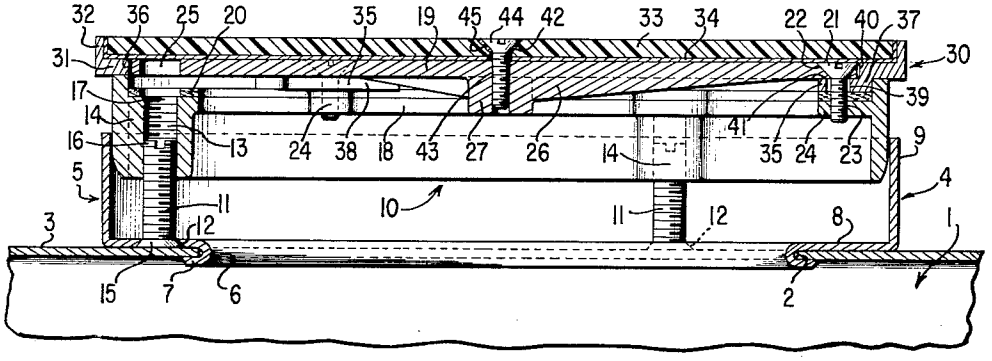


FIG 1

FIG 2



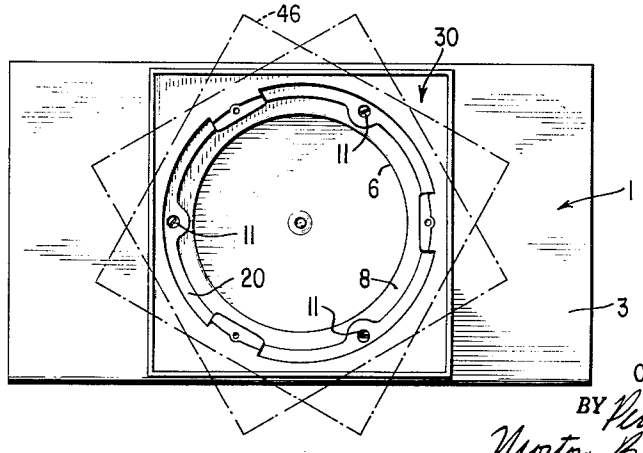


FIG 3

INVENTOR.
CHARLES T. FLACHBARTH
BY Pennie, Edmonds, Morton, Barrows and Taylor
ATTORNEY

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ADAPTER FOR ACCESS UNITS OF UNDERFLOOR DUCTS

Charles T. Flachbarth, Springfield Township, Delaware County, Pa., assignor to Walker Brothers, a corporation of Pennsylvania

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This invention relates to an adapter for access units of underfloor ducts, whereby a circular access unit may be adapted for use with square floor tile.

Ducts normally are buried in the floor of large buildings and house the various utility lines servicing the tenants of the building. These ducts generically may be termed underfloor ducts. At spaced points along the ducts, there are outlets or access openings to provide access to the utility lines running through the duct. The outlet from each duct normally is circular, and is surrounded by a collar or neck element which extends upwardly to the level of the floor surface. The upper end of the collar is closed by a circular cover plate. When the floor is covered with tile or the like, a circular opening as large as the cover plate is cut in the tile overlying the access unit, so that access may be had to the cover plate through the floor covering. In order to make the opening as inconspicous as possible, the cover plate is covered with a matching circular piece of the tile. Nevertheless, when the floor is covered with square tile, a circular piece of tile in a sea of square tile is quite noticeable, and aesthetically objectionable. For this reason, square cover plates are desired by some architects. However, to supply square cover plates requires a complete alteration or redesigning of the access unit, and even if this is done, the angular direction of the square cover plate in the floor likely would not coincide with the tile pattern, thus giving rise to a similar aesthetic objection.

The present invention relates to a square adapter for use with the circular access units for underfloor ducts. The adapter is mounted on the access unit and is angularly adjustable to align with a square tile pattern of the floor covering and thereby blend in with the pattern of the floor covering, so that it is relatively inconspicuous.

The adapter comprises a square pan, larger than the cover plate, and may be as large as conventional floor tile. The bottom of the pan has a circular opening for receiving the cover plate. The pan has brackets protruding inwardly from its inner edge which define the circular opening, for receiving and supporting the cover plate of the access unit. The brackets are provided with openings through which the screws, that normally attach the cover plate to the access unit, may pass, to secure both the cover plate and the adapter to the access unit. Since the adapter is angularly adjustable on the access unit, it may be secured to the access unit in any of various angular positions, to coincide with the direction of the tile pattern of the floor covering, and thereby blend in with the pattern of square tile so that it is relatively inconspicuous.

The invention will be further described in connection with the accompanying drawings, in which:

FIG. 1 is a perspective view of a portion of an underfloor duct including an access unit, with the adapter carrying a piece of floor tile installed thereon;

FIG. 2 is an enlarged cross-sectional view taken along lines 2—2 in FIG. 1, with the lower portion of the duct broken away; and

FIG. 3 is an enlarged plan view of an acess unit and adapter, with a part broken away and with the cover plate and the piece of tile removed, the broken lines indicating the various alternative angular positions of the adapter on the access unit.

The underfloor duct 1, for housing the various utility

lines, has a circular opening 2 formed in its top wall 3 in which is secured an access unit 4. The access unit comprises an upstanding body member comprising a cylindrical collar or neck element 5 having a section 6 lying within the access opening 2 in the top of the duct. When the access unit is installed, the section 6 of the collar used is longer than the thickness of the duct wall and the end of the section projecting into the duct is forced outwardly to provide a flange 7 engaging the inner surface of the duct around the opening, securely binding the collar 5 to the duct. While welding or other means of securing the collar to the duct may be used, ordinarily the binding of the collar to the duct by the flange 7 is sufficient to securely hold the collar to the duct, and is preferred.

Adjacent the section 7 of the collar in the opening in the top wall of the duct, the collar has a section 8 extending radially from the opening and lying in contact with the upper surface of the duct, and a cylindrical section 9 extending upwardly from the outer edge of the radial section. When the collar is mounted as described, it provides a smooth surface within the access opening.

The body member also includes an adjustable member comprising a cylindrical ring 10 supported adjustably within the cylindrical section 9 of the collar element. For this purpose, three screws 11 are mounted to extend through key hole slots 12 in the radially-extending section 8 of the collar element and enter internally threaded openings 13 through equally spaced internal bosses 14 of the ring. Each screw has a flared head 15 at its lower end, which lies in contact with the top wall 3 of the duct. Thus, the screws have a fixed axial position and are captive in that their flared heads are retained by the radial section 8 through which the screws extend for free, non-threaded rotation. Preferably, two of the three keyhole slots 12 extend in one direction around section 8 of the collar, while the other slot extends in the opposite direction. This arrangement permits the screws to be individually correctly positioned and threaded into the openings 13 of the ring, yet prevents rotation of the ring once it is secured by screws 13, since the side of one of the keyhole slots prevents rotation of the screws and ring in one direction, while the side of the two keyhole slots prevents rotation of the screws and ring in the opposite direction. The upper end 16 of the screws 11 is slotted to receive a screw driver inserted through the upper end 17 of the openings 13 receiving the screws. By rotating the screws 11 with a screw driver, the position of the screws within the bosses 14 may be varied, to thereby raise or lower the ring 10 within the collar 5 as desired to adjust the height of the access unit 4 to the level of the floor.

Near its top, the ring 10 is provided with an internal flange 18 which, when the adapter is not used, forms a support for a cover plate 19, which rests on a gasket 20 on the flange 18 and is held in place by three screws 21 passed through equally spaced conical openings 22 in the cover plate and threaded into equally spaced threaded openings 23 in inwardly-extending internal bosses 24 on the flange 18. Conical openings 22 in the cover plate provide a recess for receiving the heads of the screws 21. Three other openings 25 in the cover plate adjacent its circumference are equally spaced between the conical openings and, when the cover plate is secured to the ring 10, overlie and provide access to the slotted upper ends 16 of the screws 11, so that the height of the access unit may be adjusted as previously described without removing the cover plate. The cover plate has three equally spaced radially-extending reinforcing ribs 26 formed on its lower surface. The outer ends of the ribs terminate adjacent to the conical openings 22 in the cover plate, and the inner ends of the ribs terminate at a centrally located boss 27 formed on the lower or under surface of the cover plate.

The adapter 30, or adapter element, of the invention comprises a square pan, having a base 31 and an upstanding peripheral flange 32 of a height sufficient to just receive in the pan a piece of tile 33 in a holder 34, so that the upper edge of the flange 32 is even with the outer surface of the tile in the adapter pan, providing a smooth surface. Tile 33 commonly is made of a nonmagnetic material. The holder 34 preferably is formed of magnetic stainless steel, so that it and the piece of non-magnetic tile 33 therein easily may be placed in and lifted from the pan of the adapter 30 with a magnet, the poles of the magnet being placed on the outer surface of the tile so that its magnetic force will hold the tile and its holder to the magnet by attraction of the magnetic stainless steel holder.

The base 31 of the adapter pan has a circular opening only slightly larger than the cover plate 19 for receiving the cover plate therein. Three equally spaced L-shaped brackets 35 are formed on, or otherwise attached to, the inner edge 36 of the adapter pan that defines the circular opening. The vertical leg 37 of each L-shaped bracket 35 extends downwardly, or axially inwardly, with respect to the access unit, and the horizontal leg 38 extends radially inwardly substantially parallel to the plane of the pan to form a support for the cover plate 19. Centrally located in each of the horizontal legs 38 of the L-shaped brackets is an opening 39, with which the conical openings 22 in the cover plate are adapted to align, and which is slightly larger than the diameter of the screw 21 removably securing the cover plate to the flange 18 of the ring so that the screw may pass freely therethrough and secure both the cover plate and the adapter to the access unit 4. Since the openings in the three L-shaped brackets are equally spaced, as are the openings 23 in the inwardly-extending internal bosses 24 on the flange 18, the adapter may be secured to the access unit in any one of three different angular positions, indicated by broken lines 46 in FIG. 3. The cover plate 19 is circumferentially notched as at 40, adjacent each of the conical openings 22, to receive the vertical leg 37 of the L-shaped brackets 35. The top or upper surface 41 of the horizontal leg 38 of each L-shaped bracket lies in a plane a distance beneath the top or upper surface of the base of the adapter pan equal to the thickness of the cover plate so that, when the cover plate is positioned in the circular opening of the pan, its upper surface lies flush with the upper surface of the base of the pan and provides a smooth, continuous surface for receiving a piece of tile 33 in a holder thereon. Since it is preferred that the thickness of the adapter pan be equal to the thickness of the cover plate, the top or upper surface of the horizontal leg 38 of the L-shaped bracket will lie in the plane of the inner or undersurface of the pan.

The piece of tile 33 received in the holder has a conical opening 42 centrally located therein, coaxial with the axis of the boss 27 of the cover plate 19. The holder 34 also has an opening therethrough in alignment with the conical opening 42 in the piece of tile. The cover plate has a threaded opening 43 passing through the boss thereof in axial alignment with the openings in the tile and tile holder. A screw 44 is passed through the openings in the tile and tile holder and is threaded into the threaded opening 43 of the boss, the head of the screw being positioned in the conical opening 42 of the tile so that the screw holds the tile and its holder securely to the cover plate. A metallic ferrule 45 lies between the head of the screw 44 and the conical opening 42 of the tile, to provide a solid bearing surface for the head of the screw on the tile. While the tile laid on the floor, the adapter, and the piece of tile in the adapter all are described as being square, it is to be understood that the tile may be hexagonal, triangular, or any of various other polygonal shapes, in which case the adapter and piece of tile therein would take the same polygonal shape.

Typically, the underfloor ducts 1, access units and

adapters will be installed in the building before the concrete floor structure is poured. In doing this, it is conventional to lay the ducts 1, which have been previously assembled in a predetermined pattern with the access units already installed, in the desired configuration. However, the access units may be installed as previously described after the underfloor duct has been laid in the desired configuration. Before the concrete floor is poured, a plate is secured to each access unit in place of the adapter 30 and cover plate 19, to prevent cement from flowing into the duct through the access unit, to provide a smooth top surface on the access unit that is flush with the floor surface, and to form a recess in the finished floor for receiving the adapter. This plate is of a size and shape corresponding to that of the adapter, and of a thickness equal to the thickness of the base of the pan. The plate has six openings therethrough spaced in correspondence with the spacing of the six openings through the cover plate. Screws passing through three of these openings are threaded into the openings in the three inwardly-extending internal bosses on the flange and secure the plate to the access unit in the correct angular position as determined by the direction of the tile pattern to be laid on the floor. After the underfloor ducts, with access units to which these plates have been attached, have been installed in the building, the height of the access units is adjusted, by inserting the blade of a screw driver through the openings in the plate overlying the screws and into the slotted upper ends of the screws and the screws rotated, as previously described, to position the upper surface of the plate flush with the desired level of the top surface of the finished concrete floor. Thus, when the concrete floor is poured, the fluid concrete will flow about the ducts and access units and up under and about the portion of the plate protruding beyond the access unit, the outer surface of the plate indicating the correct level of the finished floor. The top surface of the fluid concrete is screeded down to a level flush with the upper surface of the plates on the access units. After the concrete floor has set, the plates are removed from the access units, leaving a depression in the floor of a size and shape to receive the adapter. The adapter is then positioned in the depression and when the tile subsequently is laid on the floor its upper surface will lie flush with the upper edge of the adapter. Finally, the cover plate is set on the adapter and the assembly is secured by screws passing through the conical openings in the cover plate and the openings in the L-shaped brackets of the adapter and into the flange of the ring, and a piece of matching tile in a holder is laid in the pan of the adapter and screwed to the cover plate, to provide a finished tile floor. Since the angular direction of the adapter on the floor coincides with the tile pattern on the floor, and since the adapter and piece of tile in it are both square, with the outer shape of the adapter corresponding to the shape of a piece of tile on the floor, the tile in the adapter blends with the pattern of the floor covering, so that it is relatively inconspicuous.

An important feature of the invention is the manner in which the adapter and cover plate are attached to the access unit to permit angular adjustment of the adapter to align with the pattern of the floor tile. Because of the three equally spaced means for attaching the adapter and cover plate to the access unit, the adapter and cover plate may be attached to the access unit in any one of three angular positions. That is, the structure is designed so that the adapter and cover plate may be attached to the access unit with opposite outer edges of the adapter lying parallel to the sides of the trench duct; or, the adapter and cover plate may be shifted 60° either clockwise or counterclockwise so that one pair of opposite outer edges of the adapter will lie at an angle of 60° to the sides of the duct and the other pair of opposite outer edges of the adapter will lie at an angle of 30° to the sides of the duct. The direction of this angular positioning is dependent upon the direction in which the adapter is shifted. Thus,

the adapter, cover plate and tile section carried thereby may be positioned in any one of three angular positions with respect to the floor, as indicated by broken lines 46 in FIG. 3, to enable the angular positioning of the tile contained in the adapter to coincide with the direction of the tile pattern on the floor. A different angular adjustment of the adapter on the access unit, such as a 45° or any other desired angular adjustment, may be obtained by appropriately selecting and positioning the number of the inwardly-extending internal bosses on the flange, the conical openings in the cover plate, and the L-shaped brackets of the adapter.

Another important feature of the invention is that ready access still may be had to the utility lines in the underfloor duct simply by removing the tile section in the adapter and the circular cover plate, without disturbing the adapter.

It is to be understood that various changes within the skill of the art may be made in the details of the adapter herein described without departing from the invention or sacrificing any of the advantages thereof, the scope of the invention being set forth in the appended claims.

I claim:

1. An access unit for an underfloor duct comprising a body member extending upwardly from the underfloor duct and having an opening therethrough to provide access to the underfloor duct, said body member including a collar mounted on the underfloor duct and a ring adjustably mounted within the collar and adjustable vertically relative thereto, a flange carried by said ring and extending radially inwardly with respect to the body member, a polygonal adapter element extending over and protruding beyond the upper edge portion of the body member and having an opening therein, a cover plate in the opening in the adapter element, means to support the cover plate relative to the adapter element comprising at least one L-shaped bracket having one leg attached to the inner edge of the adapter element defining the opening therein and extending downwardly towards the underfloor duct, and the other leg of the L-shaped bracket extending inwardly from the lower end portion of said one leg, and means for securing the adapter element to said flange in any of a plurality of different angular adjusted portions with respect to the body member.

2. An access unit as set forth in claim 1 in which there

are a plurality of L-shaped brackets attached to and equally spaced about the inner edge of the adapter element defining the opening thereinto, and in which said means for securing the adapter element to said flange includes threaded openings through said flange spaced a distance equal to the spacing of said brackets and underlying the inwardly-extending legs of the L-shaped brackets, each of the inwardly-extending legs of the L-shaped brackets having an opening therein coaxial with the threaded opening through the internal flange, screws received within the openings in the L-shaped brackets and threadably received in the openings in the flange for removably securing the adapter element to said flange, whereby the adapter element may be removably secured by the screws to said flange in any selected position of a plurality of different angularly adjusted positions with respect to said flange.

3. An access unit as set forth in claim 1 in which the adapter element has a peripheral flange extending upwardly from the outer edge of the body portion of said adapter element and with the body portion forming a pan for receiving a section of nonmagnetizable floor covering material, and including a magnetizable member on said pan adapted to underlie a piece of nonmagnetizable floor covering material in said pan, whereby the piece of nonmagnetizable floor covering material received within the adapter pan may be removed from the pan by magnetic force applied through the floor covering material to attract the magnetizable member.

4. An access unit as set forth in claim 3 in which said magnetizable member is a holder snugly received within said pan of the adapter element and adapted to receive a section of nonmagnetizable floor covering material.

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THERON E. CONDON, *Primary Examiner.*