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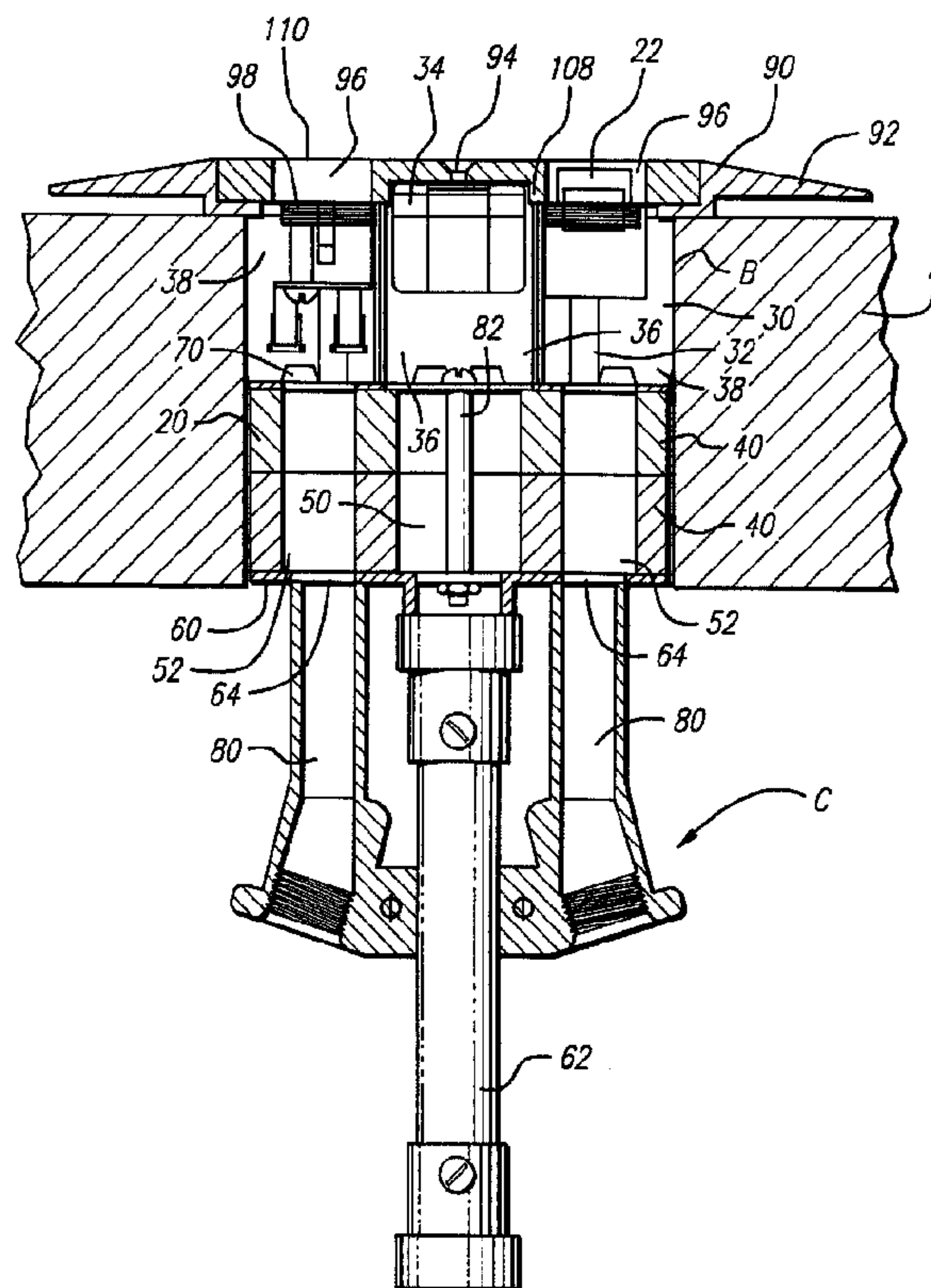
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(54) Titre : PRISE DE PLANCHER RESISTANT AU FEU

(54) Title: FIRE-RETARDANT POKE-THROUGH SERVICE FITTING



(57) Abrégé/Abstract:

The service fitting may be installed in the floor of a structure. It enables activation of power, communication, and/or data services at the fitting location. The fitting includes fire retardant material for retarding the transmission of heat and flame from a fire, which enables the fire rating of the floor to be substantially the same with or without a floor opening and the fitting therein. The material is also adapted to be molded in the desired shape, and encapsulated in a composition for sealing all side edges, to retard the aging and degrading process, and further includes substantial interior space to enable full expansion during exposure to increasing heat and flame from a fire.

ABSTRACT

The service fitting may be installed in the floor of a structure. It enables activation of power, communication, and/or data services at the fitting location. The fitting includes fire retardant material for retarding the transmission of heat and flame from a fire, which enables the fire rating of the floor to be substantially the same with or without a floor opening and the fitting therein. The material is also adapted to be molded in the desired shape, and encapsulated in a composition for sealing all side edges, to retard the aging and degrading process, and further includes substantial interior space to enable full expansion during exposure to increasing heat and flame from a fire.

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates generally to in-floor service fittings. It relates specifically to a fire-retardant poke-through service fitting.

Description of the Related Art

Poke-through service fittings may be installed in a floor such as a concrete slab or steel deck, in a structure such as an office building. They enable activation of power, communication, and/or data services at the fitting location.

Service cables loosely positioned in the plenum between the ceiling of the floor below and the floor above may be pulled from the plenum and associated with the service fitting, for activation of services.

Power service cables may be connected to the service fitting, to provide in-floor outlets for power plugs for electrical and electronic equipment.

Communication and/or data service cables may be passed through passages in the service fitting, for connection to communication and/or data equipment.

Fire retarding material may be positioned in such fittings, for retarding the transmission of heat and flame from a fire. Such material may comprise intumescent material which may be activated by occurrence of fire below the floor, upon exposure to heat and flame from the fire rising through the floor opening. Upon activation, the material may absorb

heat and expand under pressure to form a flexible foam which fills open spaces and hardens into a refractory char with increasing temperature.

The activated material functions to enable the fire rating of the floor to be substantially the same with or without the floor opening and fitting therein.

Such fire-retardant material previously has been formed into the desired shape by cutting flat sheets of intumescent material sandwiched between top and bottom layers of protective material.

However, the side cut edges of such fire-retardant material are exposed since they are not covered by the protective layers. Such exposure accelerates the aging process and consequently the rate of degradation of such material. Such materials previously have not retarded such aging and degradation.

Further, such exposure subjects such material to damage in high humidity locations, and in new construction as in a curing concrete slab floor where it is subjected to extensive evaporation.

Also, such material previously provided only a limited interior space for expansion, preventing full expansion during exposure to increasing heat and flame from a fire, thereby limiting the effectiveness of such material.

SUMMARY OF THE INVENTION

The service fitting of the invention overcomes the above problems and others associated with prior service fittings.

The present invention comprises a poke-through service fitting for activating power, communication, and/or data services at the fitting location.

Accordingly, the present invention provides a poke-through service fitting for enabling external service cables to be connected thereto and activated by source service cables connectable thereto, and for retarding the transmission of heat and flame from a fire to a floor which is fire-rated and in which an opening may be formed and the fitting may be installed, such that the fire rating of the floor may be substantially the same with or without the floor opening and fitting therein, comprising: (a) an insert, adapted to be installed in the floor opening and activated by the source service cables and to enable external service cables to be connected thereto; (b) fire retarding material for retarding the transmission of heat and flame from a fire to the fire-rated floor in which the opening may be formed and the fitting may be installed, adapted to be positioned in the insert, such that the fire rating of the floor may be substantially the same with or without the floor opening and fitting therein; and (c) an encapsulating member that encapsulates the fire retarding material in order to retard aging and degradation of the fire retarding material.

The fire retarding material also is adapted to be molded in the desired shape, and encapsulated in a composition for

sealing all side edges, to retard the aging and degrading process. It further is adapted to protect against damage from high humidity and evaporation.

Such material further includes substantial interior space to enable full expansion during exposure to increasing heat and flame from a fire.

DESCRIPTION OF THE DRAWINGS

FIGURE 1 is an elevational partly-sectional view of the fire-retardant poke-through service fitting of the invention, installed in a floor opening; and

FIGURE 2 is a top plan view of the fitting;

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The invention comprises a poke-through service fitting 10 as shown in Figures 1 and 2, for enabling signal transferring connectors and/or power cables (not shown) to be connected thereto, and to be activated by source service cables including signal and power service cables (not shown) connectable thereto. Fitting 10 may be installed in a fire-rated floor A of a building such as a commercial office building. The signal connectors and cables are capable of transferring signals consisting of communication (voice) or data signals.

Fitting 10 may be installed in an opening B formed in floor A to activate a desired location therein, and is adapted to be activated by the source service cables and to enable power plugs and signal transferring connectors to be connected thereto.

Fitting 10 is further adapted to retard the transmission of heat and flame from a fire through plenum C below floor A, and through floor opening B and fitting 10, to floor A. It is operable such that the fire rating of floor A is substantially the same with or without floor opening B and fitting 10 therein. It is further adapted to retard the aging and degrading process of the fire retarding material.

Fitting 10 comprises an insert 20, adapted to be installed in floor opening B and activated by source service cables, and for retarding the transmission of heat and flame from a fire. It further includes jacks 22, adapted to be activated by signal service cables and to enable for signal transferring connectors to be connected thereto. Each jack 22 includes elements for terminating the signal service cable extendable thereto. The terminating elements may be adapted to be rated gas and moisture proof.

Insert 20 includes an upper chamber 30, including a top plate 32 for enclosing a power receptacle 34, forming an internal central space 36 for receiving power receptacle 34, to which source power cables (not shown) positioned below floor A may be connected for activation of power services.

Upper chamber 30 may have a nominal diameter of 4 inches, substantially larger than the internal space therefor in prior fittings which have a nominal diameter of up to 3 inches, for enabling any one of a plurality of types of receptacles and jacks to be mounted therein.

Insert 20 further includes fire retarding elements 40, comprised of fire retarding material, which may comprise intumescent material such as hydrated sodium silicate. The

intumescent material may comprise coated rubber intumescent material, such as a proprietary material sold under the mark FB-525 by Alva-Tech, Inc., Asbury Park, New Jersey, of the type described in U.S. Patent No. 4,588,523. The FB-525 material absorbs heat and begins to expand upon exposure to heat and flame. Expansion is substantial at a relatively low temperature of 250°F. It expands to about 1.5 times its initial volume or density at 250°F, to about 2.8 times at 350°F, and to about 4 times at 500°F. The resultant flexible foam rapidly seals any existing openings. The intumescent material may be cast in the desired shape, and encapsulated in a composition such as polyvinyl chloride.

The intumescent material may alternatively comprise graphite intumescent material in a urethane matrix, cast in a generally tubular shape, and encapsulated in a composition such as polypropylene, to seal each element 40 and render it substantially degradation-free, and to insure expansion of each element 50 to substantially the maximum required to seal opening B. The graphite intumescent material in a urethane matrix may comprise a non-halogen proprietary material sold under the mark FB65NH by Alva-Tech, Inc. Asbury Park, New Jersey. It also absorbs heat and begins to expand upon exposure to heat and flame. Expansion starts at about 400°F, with significant expansion after about 500°F, and continuing until about 1000°F. It expands to about 8 to 20 times its

initial volume or density. It forms a dense insulative char when activated. The graphite material compacts. It can be custom molded in the desired shape.

Such intumescent material may be formed between top and bottom protective layers of material such as neoprene, with the side edges exposed. The aging retarding elements may comprise molded and encapsulated fire retardant material for sealing all side edges.

The molded fire retardant material includes internal spaces formed thereby, which enables substantially complete expansion of the fire retardant material to take place. The internal space formed in the molded fire retardant material is substantially larger than the internal space formed in prior fire retardant material.

Such material forms an insulating barrier to control temperature increases and retard the spread of flames. It further protects against heat and flame by forming a refractory char as the temperature continues to rise.

Fire retarding elements 40 each include a hollow portion forming a raceway 50 through which power cables are extendable, and hollow portions forming raceways 52 through which signal cables are extendable.

Insert 20 further includes a bottom plate 60, for supporting fire retarding element 40 thereon. Bottom plate 60 may comprise a casting, for enabling connection of an electrical metalized tubing (EMT) connector 62 for securing a conduit system thereto for improving grounding capability. Connector 62 may further be connected to a junction box (not shown). The junction box may include a terminal (not shown) for connection of service cables thereto.

Receptacle 34 may be pre-wired, with wires (not shown) connected between terminals in receptacle 34 and a terminal in the junction box and extending through raceway 50 and connector 62. Bottom plate 60 may further include tapped openings 64 for enabling conduit fittings (not shown) to be connected thereto.

Insert 20 also includes a retainer 70, for retaining fitting 10 in floor opening B, and an insert rivet 72, for securing fire retarding elements 40 between retainer 70 and bottom plate 60.

Insert 20 also includes tubes 80 for passing signal service cables therethrough. Tubes 60 are comprised of a dielectric material, which may comprise polyethylene. Fire retarding elements 40 are comprises of an intumescent

dielectric material. The dielectric of the material of tubes 80 and the dielectric of the material of fire retarding elements 40 are substantially the same as the dielectric of fitting 10 for electrical safety.

Fitting 10 further includes a top assembly 90 comprising a service head including a flange plate 92, connectable to insert 20 by screw 94. Top assembly 90 further includes signal jack openings 96, and a data connector mounting plate 98. It also includes sliders 100, slots 102 and 104 in sliders 100 alignable with corresponding slots in receptacle 34, and elements for enabling sliders 100 to be slidably movable between positions covering and uncovering the receptacle slots. It still further includes sliders 106, and elements for enabling sliders 106 to be slidably movable between positions covering and uncovering insert signal jack openings 96.

Top assembly 90 further includes a top face 108, jack 22 includes a top face 110, and jack top face 110 is adapted to extend substantially flush with top assembly top face 108.

Top assembly 90 may also be adapted to extend above floor A such that top assembly top face 108 extends substantially flush with the top of a carpet (not shown) adapted to be installed on floor A.

To install fitting 10 in floor A, at a desired location for service activation, floor A may be drilled at the desired location, as by core drilling, to form floor opening B, for access to the power, communication and/or data services.

The power and/or signal service cables may be pulled for connection to fitting 10. The power cables may be pulled to connect to terminals and wires in a junction box, to activate power services. The signal cables may be pulled through tapped openings and tubes 80 in insert 20 for connection to jacks as 22, for activation of communication or data services.

Insert 20 and the junction box connected thereto may then be oriented relative to floor opening B, to be pushed thereinto until top assembly 90 rests on floor A such that top face 108 of top assembly 90 is substantially flush with the top of a carpet. Retainer 70 grips floor opening B, to resist pulling of fitting 10 from floor opening B.

In operation, fire retarding elements 40 are activated by a fire below floor A, upon exposure to heat and flame from the fire rising through floor opening B.

Fire retarding elements 40 are preferably comprised of intumescent material which absorbs heat. They are activated

to expand into floor opening B, about insert 20, and about power and signal cables extending through raceways 50 and 52, under pressure. They form flexible foam seals, sealing openings, and forming very strong refractory chars. They seal openings to form efficient heat and smoke barriers, retarding transmission of heat and flame from the fire.

Fire retarding elements 40 are thereby activated upon exposure to heat and flame from a fire to prevent heat and flame from the fire from being transmitted therethrough. This enables the fire rating of floor A to be substantially the same with or without floor opening B and fitting 10 therein.

In use, sliders 100 in top assembly 90 may be moved so that outlet slots 102 and 104 in sliders 100 align with corresponding outlets in receptacle 34. Plugs (not shown) from electrical and/or electronic devices may be plugged into the receptacle outlets for activation of power services.

Sliders 100 in top assembly 90 may be moved so that jack openings 96 in top assembly 90 and jacks 22 are exposed. Signal connectors, such as an RJ-45 Category 5 connector, may be connected to jacks 22, for activation of signal services.

Internal chamber 30 in insert 20 is substantially larger than the internal chamber therefor in prior fittings, and is

adapted to accommodate any one of a plurality of types of receptacles 34.

Internal side spaces 36 for jacks 22 are adapted to accommodate any one of a plurality of types of jacks 22. Jacks 22 include terminals (not shown) adapted to be rated gas and moisture proof. Top face 106 of jack 22 is substantially flush with top face 108 of top assembly 90. Jack 22 includes terminals (not shown), accepting service cables from the source in plenum C through fitting 10 thereto. Sliders 100 are adapted to close jack openings 96.

Bottom plate 60 of insert 20 may comprise a casting, for enabling connection of electrical metalized tubing connector 62 thereto for grounding capability, and for enabling tapped openings to be formed therein for accepting standard conduit fittings.

Tubes 80 in insert 20 for passing signal service cables therethrough are comprised of a dielectric material, such as polyethylene. Fire retarding elements 40 are also comprised of a dielectric material, such as an intumescent material. The dielectric of the signal tubes 80 and of fire retarding elements 40 are substantially the same as the dielectric for electrical safety for fitting 10.

A preferred embodiment of the invention has been set forth above, for the purpose of explaining the invention. However, it is to be understood that variations in such embodiment may be made which are nevertheless within the scope and spirit of the invention as set forth in the claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A poke-through service fitting for enabling external service cables to be connected thereto and activated by source service cables connectable thereto, and for retarding the transmission of heat and flame from a fire to a floor which is fire-rated and in which an opening may be formed and the fitting may be installed, such that the fire rating of the floor may be substantially the same with or without the floor opening and fitting therein, comprising:

(a) an insert, adapted to be installed in the floor opening and activated by the source service cables and to enable external service cables to be connected thereto;

(b) fire retarding material for retarding the transmission of heat and flame from a fire to the fire-rated floor in which the opening may be formed and the fitting may be installed, adapted to be positioned in the insert, such that the fire rating of the floor may be substantially the same with or without the floor opening and fitting therein; and

(c) an encapsulating member that encapsulates the fire retarding material in order to retard aging and degradation of the fire retarding material.

2. A fitting as in claim 1, in which the retarding material comprises at least one of hydrated sodium silicate and graphite intumescent material in a urethane matrix.

3. A fitting as in claim 1 or 2, wherein the encapsulating member is composed of at least one of polyvinyl chloride and polypropylene.

4. A fitting as in claim 3, in which the fire retarding material includes side edges, and the encapsulating member seals the side edges of the fire retarding material.

5. A fitting as in claim 3, in which the encapsulating member conforms to the fire retarding material.

6. A fitting as in claim 5, in which the encapsulating member enables the formation of an internal space for substantially complete expansion of the fire retarding material.

7. A fitting as in claim 1, in which the fire retarding material comprises intumescent material.

8. A fitting as in claim 7, in which the intumescent material comprises coated rubber intumescent material.

9. A material as in claim 7, in which the intumescent material comprises graphite intumescent material in a urethane matrix.

10. A material as in claim 8, in which the coated rubber intumescent material is cast in a desired shape.

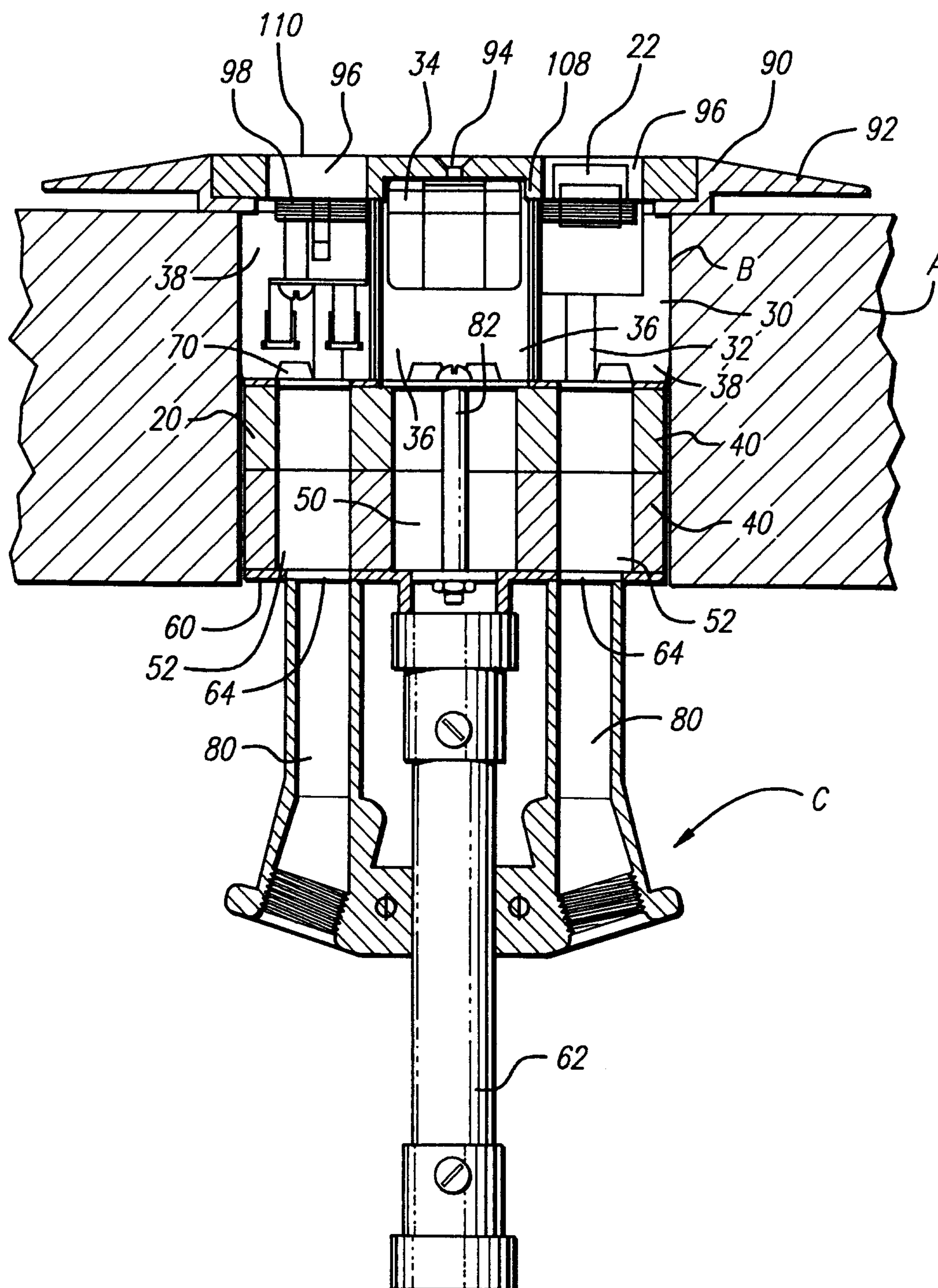


FIG. 1

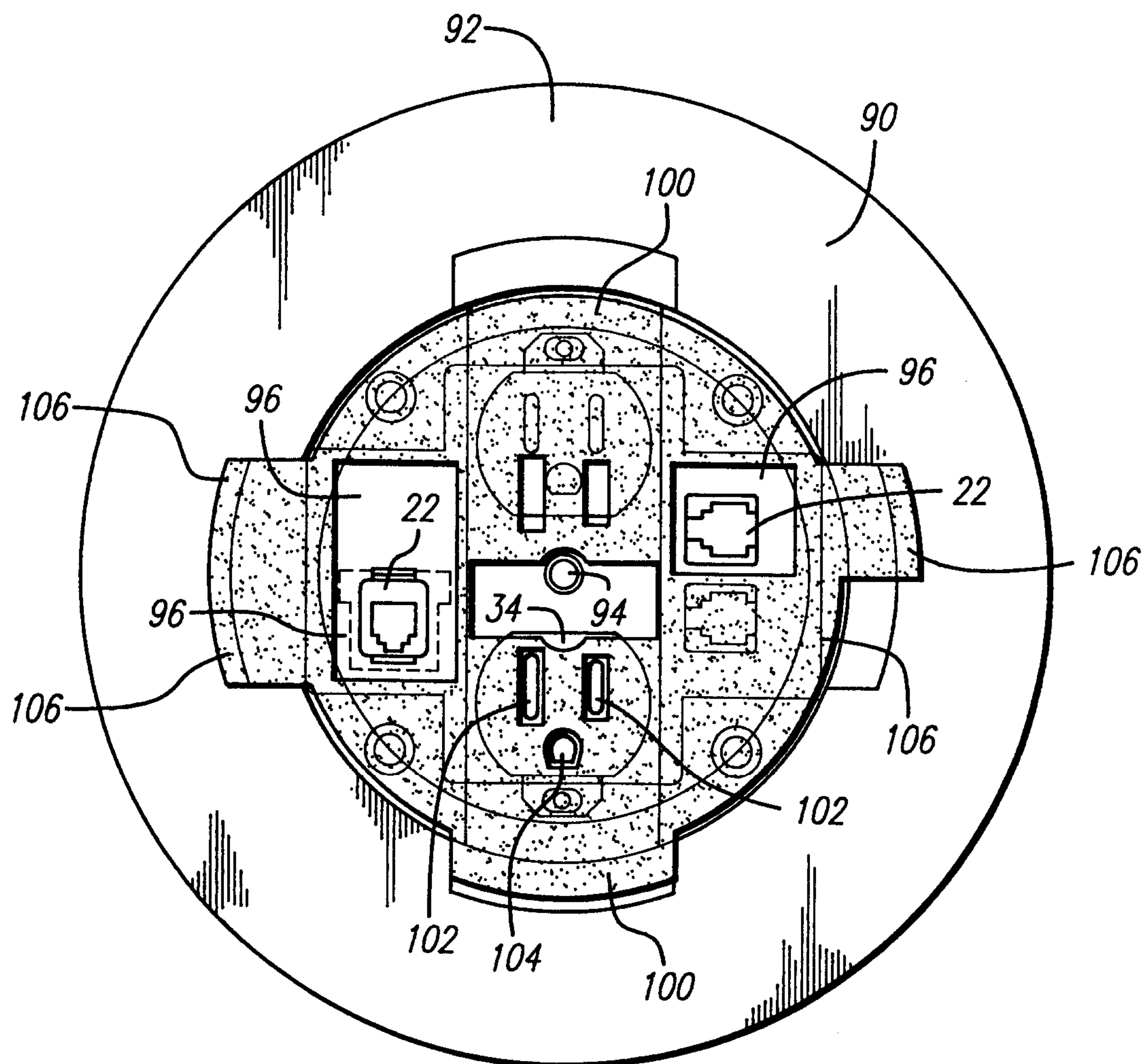


FIG. 2

