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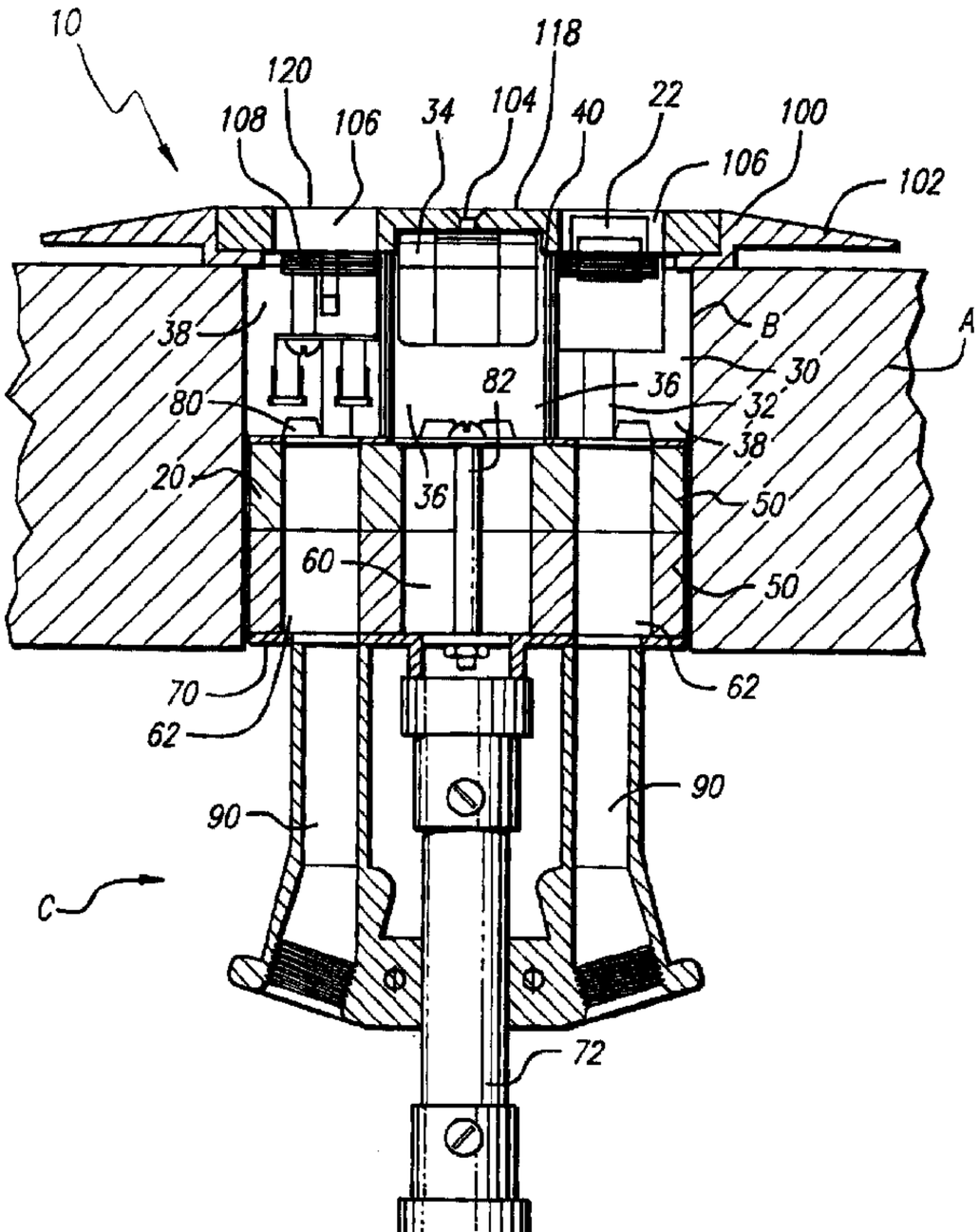
(54) Title: SIGNAL-SHIELDING POKE-THROUGH SERVICE FITTING




(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 further enables transfer of data signals through jack connections. It includes a barrier for surrounding such jacks at the points of potential wiring shielding breakdown, to prevent electromagnetic and radio frequency interference with signal services. The fitting also enables grounding thereof to drain electronic interference. The barrier further radiates heat to reduce plenum temperatures and retard transmission of heat and flame from a fire.

## ABSTRACT OF THE DISCLOSURE

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 further enables transfer of data signals through jack connections. It includes a barrier for surrounding such jacks at the points of potential wiring shielding breakdown, to prevent electromagnetic and radio frequency interference with signal services. The fitting also enables grounding thereof to drain electronic interference. The barrier further radiates heat to reduce plenum temperatures and retard transmission of heat and flame from a fire.

## BACKGROUND OF THE INVENTION

This invention relates generally to in-floor fittings for enabling activation of power, communication and/or data services at the fitting locations. It relates specifically to a signal-shielding poke-through service fitting.

## Description of the Related Art

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

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.

Such fittings previously have been subject to substantial interference with the signals transferred therein, resulting from electro-magnetic interference and radio frequency interference therein.

Such fittings further have not been provided with substantial protection against such interference.

Such fittings also have been subject to breakdown of the shielding on service cables, resulting in loss of protection from interference at points of entry and of securing thereof to signal connector receiving elements in such fittings.

Such fittings also have not included substantial ground access for draining electronic interference.

Such fittings further have not included radiator elements for radiating heat to reduce plenum temperatures and retard the transmission of heat and flame from a fire.

## SUMMARY OF THE INVENTION

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

Accordingly, the present invention provides a poke-through service fitting for enabling service cables including signal service connectors and power service cables to be connected thereto and activated by source service cables including signal service cables and power service cables connectable thereto, adapted to be installed in an opening which may be formed at a selected location in a floor, which fitting is further adapted to separate the power service cables from the signal service cables so as to shield the signal services cables from interference from the power service cables, comprising: (a) an insert, adapted to be installed in the floor opening and activated by the source service cables including signal service cables and power services cables connectable thereto; and (b) means for separating the power service cables from the signal service cables so as to shield the signal service cables from interference from the power service cables, adapted to be mounted in the insert; and (c) means for enabling mounting of the separating means in the insert.

The present invention enables activation of power, communication, and/or data signal services at the fitting location, for transferring voice or data signals through jack connections, and for preventing electromagnetic and radio frequency interference with such signal services.

Such service fitting includes a barrier for surrounding the jacks at the points of potential breakdown of wiring shielding, where wiring enters and is secured to the jacks, to prevent such interference.

The barrier is further adapted to be grounded so as to drain interference which may be generated in the fitting.

Such barrier further radiates heat, conducting plenum temperatures to a fitting flange so as to establish a thermal path. It reduces plenum temperatures, retarding the transmission of heat and flame from a fire.

## DESCRIPTION OF THE DRAWINGS

FIGURE 1 is an elevational partly-sectional view of the signal-shielding 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 EMBODIMENT

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, capable of transferring signals consisting of communication or data signals. It is further adapted to separate the power service cables from the signal service cables so as to shield data services from interference with the signal thereof.

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.

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 signal transferring connectors to be connected thereto.

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 further includes internal side spaces 38 for receiving jacks 22, to which source signal cables (not shown) positioned below floor A may be connected for activation of signal 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. Internal central space 36 is adapted to accommodate most standard 15 and 20 amp receptacles, including

isolated ground, surge suppressor, ground fault, and receptacles including external pods for securing the receptacle face to a bottom cup. Internal side spaces 38 are adapted to accommodate data connectors such as RJ-45 category 5 connectors.

Insert 20 also includes barrier 40 mounted therein, for separating power service cables from signal service cables, so as to shield the signal service cables from interference from the power service cables. Barrier 40 may include an electromagnetic interference (EMI) barrier and a radio frequency interference (RFI) barrier. Barrier 40 is positionable in insert 20 so as to extend about the position at which signal services enter and are secured to jack 22, the location at which shielding of the services may break down.

Barrier 40 is comprised of a material having a dielectric sufficient to isolate the power service cables from the signal service cables, which material may comprise a polycarbonate polymer. Barrier 40 may be grounded, to drain interference which may be generated in insert 20.

Insert 20 further includes fire retarding elements 50, comprised of fire retarding material, which may comprise an intumescent material. The intumescent material may comprise a 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 50 and render it substantially degradation-free, and to insure expansion of each element 50 to substantially the maximum required to seal opening B.

Fire retarding elements 50 each include a hollow portion forming a raceway 60 through which power cables are extendable, and hollow portions forming raceways 62 through which signal cables are extendable.

Insert 20 further includes a bottom plate 70, for supporting fire retarding elements 50 thereon. Bottom plate 70 may comprise a casting, for enabling connection of an electrical metalized tubing (EMT) connector 72 for securing a conduit system thereto for improving grounding capability. Connector 72 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 60 and connector 72. Bottom plate 70 may further include tapped openings 74 for enabling conduit fittings (not shown) to be connected thereto.

Insert 20 also includes a retainer 80, for retaining fitting 10 in floor opening B, and an insert rivet 82, for securing fire retarding elements 50 between retainer 80 and bottom plate 70.

Insert 20 also includes tubes 90 for passing signal service cables therethrough. Tubes 90 are comprised of a dielectric material, which may comprise polyethylene. Fire retarding elements 50 are comprised of an intumescent dielectric material. The dielectric of the material of tubes 90 and the dielectric of the material of fire retarding elements 50 are substantially the same as the dielectric of fitting 10 for electrical safety.

Fitting 10 further includes a top assembly 100 comprising a service head including a flange plate 102, connectable to insert 20 by screw 104. Top assembly 100 further includes signal jack openings 106, and a data connector mounting plate 108. It also includes sliders 110, slots 112 and 114 in sliders 110 alignable with corresponding slots in receptacle 34, and elements for enabling sliders 110 to be slidably movable between positions covering and uncovering the receptacle slots. It still further includes sliders 116, and elements for enabling sliders 116 to be slidably movable between positions covering and uncovering insert signal jack openings 106.

Top assembly 100 further includes a top face 118, jack 22 includes a top face 120, and jack top face 120 is adapted to extend substantially flush with top assembly top face 118.

Top assembly 100 may also be adapted to extend above floor A such that top assembly top face 118 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 90 in insert 20 for connection to jacks as 22, for activation of communication or data services. A signal connector, such as an RJ-45 Category 5 connector, may be connected to jacks 22, to activate signal-operable equipment.

Insert 20 and the junction box connected thereto may then be oriented relative to floor opening B, to be pushed thereinto

until top assembly 100 rests on floor A such that top face 118 of top assembly 100 is substantially flush with the top of a carpet. Retainer 80 grips floor opening B, to resist pulling of fitting 10 from floor opening B.

In operation, fire retarding elements 50 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 50 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 60 and 62, 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 50 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 110 in top assembly 100 may be moved so that outlet slots 112 and 114 in sliders 110 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 116 in top assembly 100 may be moved so that a jack openings 106 in top assembly 100 and a 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.

Barrier 40 shields signal service cables from interference with the signal thereof, as from electromagnetic and/or radio frequency interference. It shields such cables at points of potential breakdown where such cables enter insert 20 and are secured to jack 22. It also may be grounded to drain interference which may be generated in insert 20. It further conducts heat temperatures from a fire to flange 102 of top assembly 100, such that flange 102 radiates heat.

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 116 of jack 22 is substantially flush with top face 118 of top assembly 100. Jack 22 includes terminals (not shown), accepting service cables from the source in plenum C through fitting 10 thereto. Sliders 116 are adapted to close jack openings 104.

Bottom plate 70 of insert 20 may comprise a casting, for enabling connection of electrical metalized tubing connector 72 thereto for grounding capability, and for enabling tapped openings to be formed therein for accepting standard conduit fittings.

Tubes 90 in insert 20 for passing signal service cables therethrough are comprised of a dielectric material, such as polyethylene. Fire retarding elements 50 are also comprised of a dielectric material, such as an intumescent material. The dielectric of the signal tubes 90 and of fire retarding elements 50 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 service cables including signal service connectors and power service cables to be connected thereto and activated by source service cables including signal service cables and power service cables connectable thereto, adapted to be installed in an opening which may be formed at a selected location in a floor, which fitting is further adapted to separate the power service cables from the signal service cables so as to shield the signal services cables from interference from the power service cables, comprising:

(a) an insert, adapted to be installed in the floor opening and activated by the source service cables including signal service cables and power services cables connectable thereto; and

(b) means for separating the power service cables from the signal service cables so as to shield the signal service cables from interference from the power service cables, adapted to be mounted in the insert; and

(c) means for enabling mounting of the separating means in the insert.

2. A fitting as in claim 1, further comprising means for positioning the separating means in the insert at a location at which shielding of the service cables may break down.

3. A fitting as in claim 1, in which the separating means are comprised of a material having a dielectric

sufficient to isolate the power service cables from the signal service cables.

4. A fitting as in claim 1, further comprising a service head which includes a flange plate, in which the separating means are further adapted to conduct heat temperatures from a fire to the flange plate, for enabling the flange plate to radiate heat.

5. A fitting as in claim 1, in which the signal interference comprises electromagnetic interference.

6. A fitting as in claim 1, in which the signal interference comprises radio frequency interference.

7. A fitting as in claim 1, in which the fitting further comprises at least one fire retarding element adapted to retard the transmission of heat and flame from which the fitting may be installed, which floor may be fire-rated, such that the fire-rating of the floor may be substantially the same with or without the floor opening and fitting therein.

8. A fitting as in claim 1, in which the signal service cables include service cables capable of transferring signals consisting of communication or data signals, and the fitting includes signal connection enabling means comprising signal jacks, and the mounting means are adapted to mount the separating means so as to extend about locations at which shielding of the signal service cables may break down.

9. A fitting as in claim 1, in which the separating means are comprised of a polycarbonate polymer.

10. A fitting as in claim 1, further comprising means for grounding the separating means to drain interference which may be generated in the insert.

11. A fitting as in claim 7, in which the fire transmission retarding means include an element comprised of fire retarding material.

12. A fitting as in claim 8, in which the potential shielding breakdown location comprises points at which the signal services enter and are secured to the signal jack.

13. A fitting as in claim 8, in which the separating means are further adapted to surround the signal jack at the potential shielding breakdown locations.

14. A fitting as in claim 11, in which the fire retarding material comprises intumescent material.

15. A poke-through service fitting for enabling service cables including signal service connectors and power service cables to be connected thereto and activated by source service cables including signal service cables and power service cables connectable thereto, adapted to be installed in an opening which may be formed at a selected location in a floor, which fitting is further adapted to separate the power service cables from the signal service cables so as to shield the signal services cables from interference from the power service cables, comprising:

(a) an insert, adapted to be installed in the floor opening and activated by the source service cables including

signal service cables and power service cables connectable thereto;

(b) means for separating the power service cables from the signal service cables so as to shield the signal service cables from interference from the power service cables, adapted to be mounted in the insert; and

(c) means for positioning the separating means in the insert at a location at which shielding of the service cables may break down.

16. A fitting as in claim 15, in which the signal service cables include service cables capable of transferring signals consisting of communication or data signals and the fitting includes signal connection enabling means comprising signal jacks, and the means for positioning the separating means is adapted to mount the separating means to extend about the location at which shielding of the signal service cables may break down.

17. A fitting as in claim 15, in which the separating means are comprised of a polycarbonate polymer.

18. A fitting as in claim 16, in which the location at which shielding of the signal service cable may break down comprises a point at which the signal service cables enter and are secured to the signal jacks.

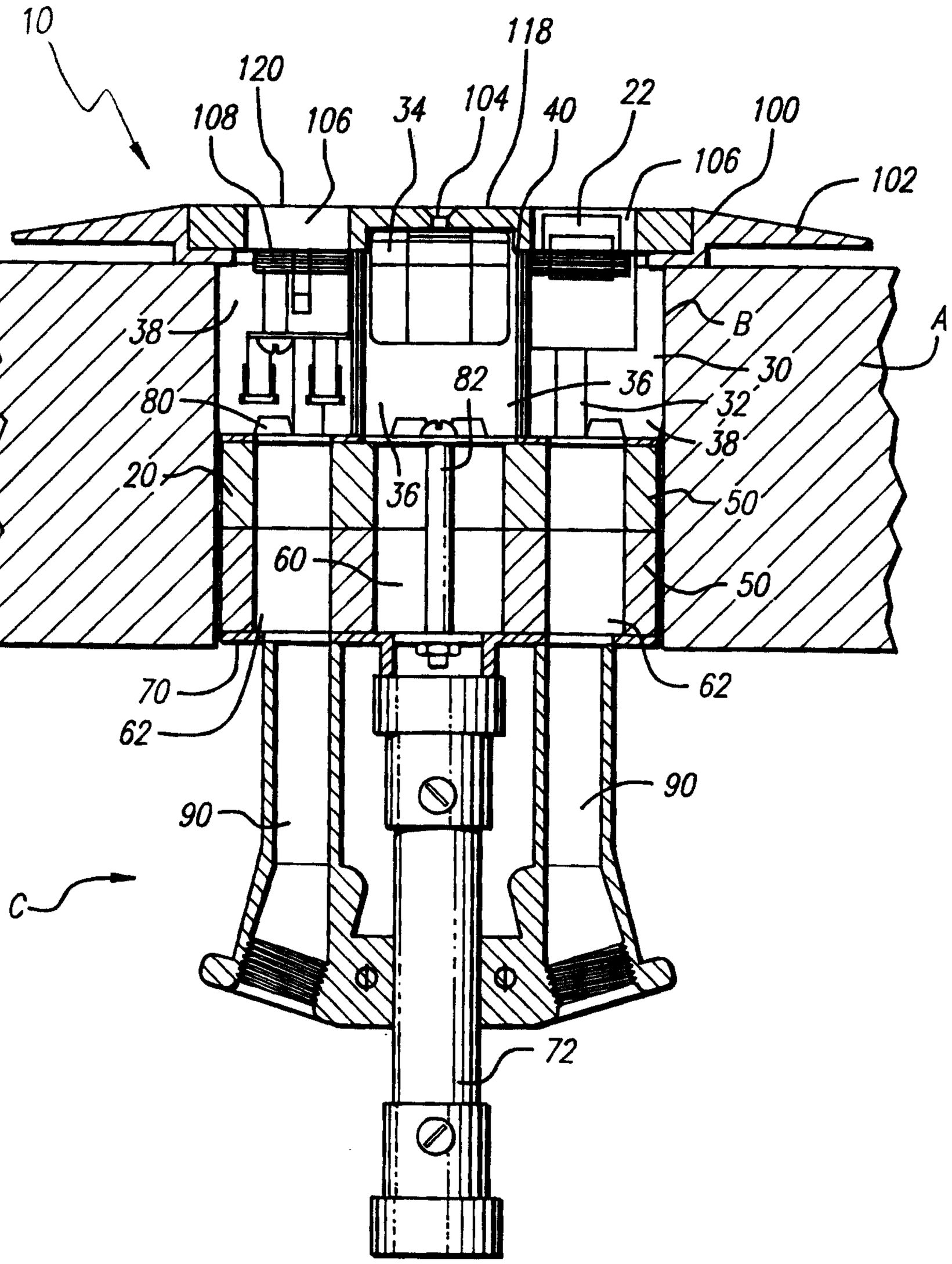

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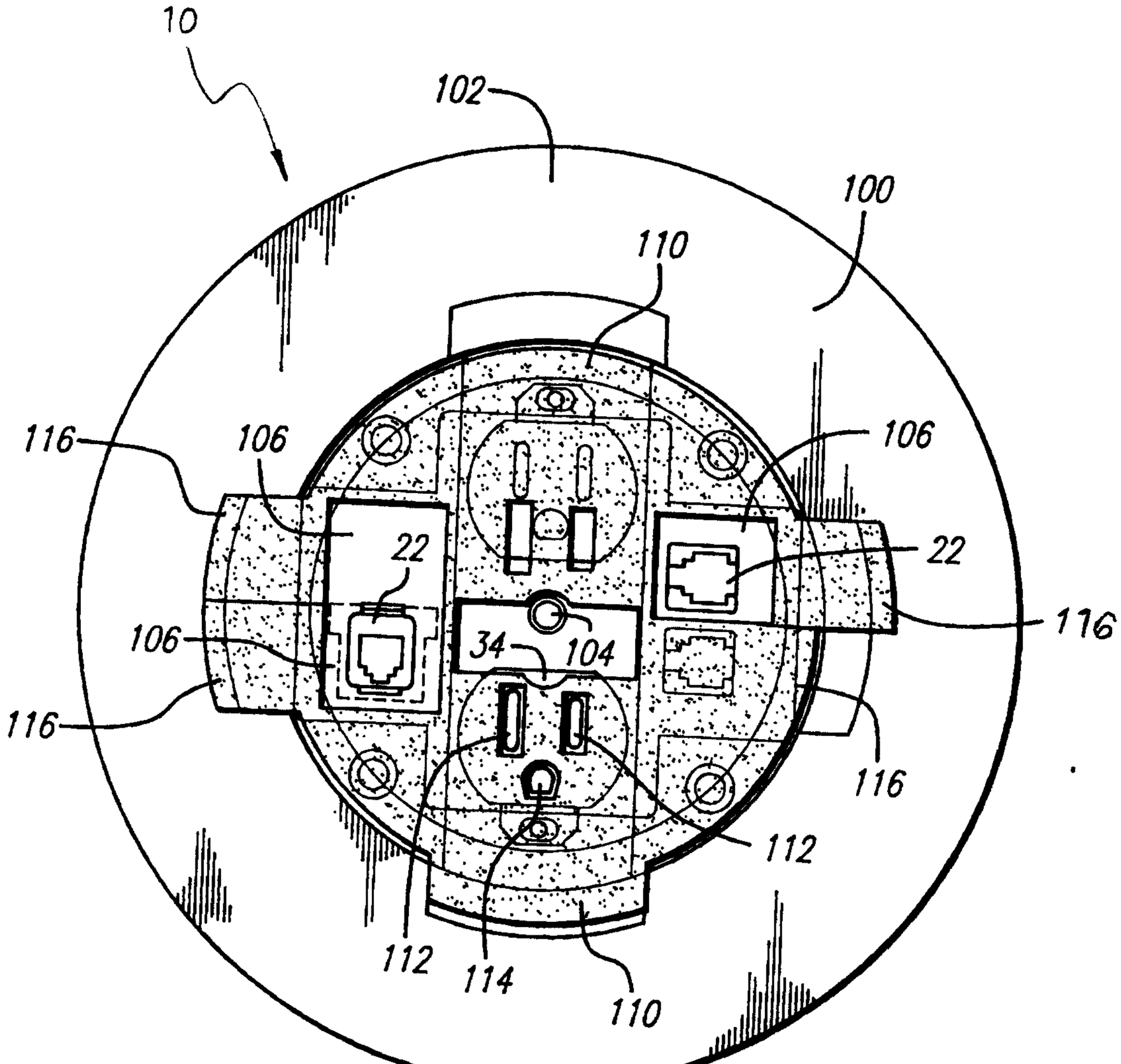
FIG. 1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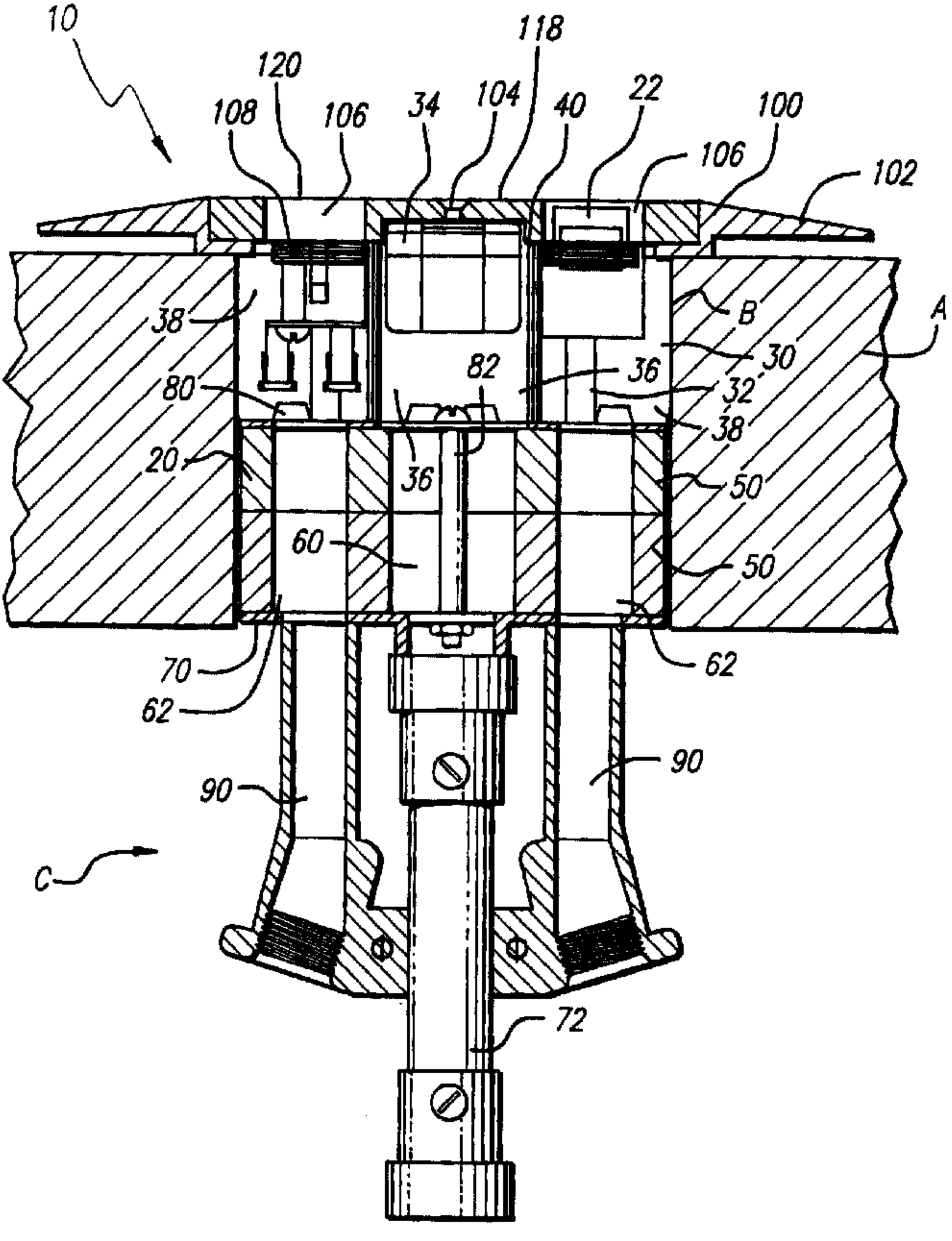
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