

APPLICATION FOR PATENT

Title: PLUMBING FITTINGS BOX AND LEAK DETECTION SYSTEM

RELATED APPLICATION/S

This application claims the benefit of priority under 35 USC §119(e) of U.S. Provisional Patent Application No. 63/283,228 filed 25 Nov. 2021, the contents of which are incorporated herein by reference in their entirety.

FIELD AND BACKGROUND OF THE INVENTION

The present invention, in some embodiments thereof, relates to the field of plumbing fittings installation and maintenance as well as water leaks detection from such fittings and plumbing accessories and, more particularly, but not exclusively, the pipes and connections leading to and from them.

In the world of plumbing fixtures and systems, leakage is an often occurring, highly damaging and hard to fix problem. Damages resulting from untreated or hard to reach and stop leaks can grow to rather substantial sums for a private homeowner, not to mention industries and municipal water systems. Leaks can cause extensive structural damage and lead to high costs of maintenance and repair.

Many solutions are in existence on the market, solving these problems to some extent or degree. However, difficult to install or replace plumbing fixtures and fittings are a common problem, as well as leaks that are slow and hard to detect, additionally, accessing water leaks and spillages can be problematic.

When a leak is detected, the water has often collected and moved downwards away from the leaking pipe. The water may be detected at some point in the structure where water has collected, but it may not be obvious from where the water came or from which pipe. To fix the leak a plumber may have to tear apart large sections of wall and/or floor until the source of the leak is found. Then, the plumber may either root out the pipe all way along the wall or floor, replace the pipe and fix the wall and/or floor, or alternatively, cut and patch the broken section

of pipe, risking a future leak occurring in the already weakened old pipe. Additionally, often the wet area is dried out before repair work, often leaving people without water for an extended period of time.

Some embodiments of the current invention may alleviate some of these and other problems. For example, some embodiments offer new and innovative solutions to some of the main problems in the field in ways that may be more efficient, easier to maintain, easier to operate, and/or easier to detect leaks than some popular existing products on the market.

SUMMARY OF THE INVENTION

According to an aspect of some embodiments of the invention, there is provided a plumbing system including: a first connection boxes, including a plurality of tubing adapters, a junction interconnecting interior spaces of the plurality of tubing adapters, a sealed casing surrounding the plurality of tubing adapters and a plurality of ports in the sealed casing; a leading tube connected at a first end thereof to a first port of the plurality of ports of the first connection box such that the port leads to an interior of the leading tube; a first water conducting tube connected at a first end thereof to a tubing connector of the first box; the water conducting tube passing through the first port and the leading tube.

According to some embodiments of the invention, the water conducting tube includes a second end that is connected to a plumbing end unit.

According to some embodiments of the invention, the end unit is a plumbing fitting selected from a plumbing connection box, a casing, a bathroom fixture, a bathroom fitting, a kitchen fixture, a kitchen fitting, a tap, a cooling system, a heating system, a fire control system, a garden water supply system, a drainage system, or a main water supply network.

According to some embodiments of the invention, the system further includes: a second plumbing connection box, including a second tubing connector, a second sealed casing surrounding the tubing connector; and a second plurality of ports in the second sealed casing, each ports of the second plurality of ports include a lead connector; wherein the leading tube includes a second end connected to a respective lead connector of a respective port of the second plurality of ports and the water conducting tube is also passed through the respective port and the leading tube, wherein the water conducting tube includes a second end connected to the tubing connector of the second connection box.

According to some embodiments of the invention, the connections to the end units are water tight.

According to some embodiments of the invention, the leading tube is built into a wall, floor, or ceiling of a structure, or a combination thereof.

According to an aspect of some embodiments of the invention, there is provided a plumbing connection box including: a plurality of tubing adaptors configured for connecting to a water conducting tube; a junction interconnecting interior spaces of the plurality of tubing adapters; a sealed casing surrounding the tubing adapters; a plurality of ports in the sealed casing; a plurality of connectors, each connector attached to one of the ports and configured for passing the water conducting tube therethrough and configured for attachment to a leading tube such the ports interconnecting the interior the box to the interior of the attached leading tube such that the water conducting tube passes through the port between the interior of the leading tube and the interior of the sealed casing.

According to some embodiments of the invention, the plumbing connection box further includes: a valve configured for opening and closing a connection through the junction between at least two of the plurality of tubing adapters.

According to an aspect of some embodiments of the invention, there is provided a plumbing connection box including: a casing with a removable cover, wherein the casing includes: a plurality of ports; each port of the plurality of ports connected to a respective leading tube; a plurality of water conducting tubes, each of the plurality of water conducting tubes passing through a respective port of the plurality of ports and the respective leading tube, a junction inside the casing connecting between the plurality of water conducting tubes.

According to some embodiments of the invention, each water conducting tube is connected at its proximal end to the junction and to an end unit at its distal end.

According to some embodiments of the invention, the plumbing connection box further includes: a junction switch connected to the adaptor, and an inlet tube with a cutoff switch.

According to some embodiments of the invention, the plumbing connection box further includes a drainage port with a drainage tube.

According to some embodiments of the invention, the plumbing connection box further includes a sensor.

According to some embodiments of the invention, sensor is selected from a moisture sensor, a water sensor, a motion sensor, a pressure sensor, a temperature sensor, or any combination thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

Some embodiments of the invention are herein described, by way of example only, with reference to the accompanying drawings. With specific reference now to the drawings in detail, it is stressed that the particulars shown are by way of example and for purposes of illustrative discussion of embodiments of the invention. In this regard, the description taken with the drawings makes apparent to those skilled in the art how embodiments of the invention may be practice.

In the drawings:

Figure 1: Side view of a schematic illustration of a main plumbing connection box in accordance with some embodiments of the invention.

Figure 2: Perspective view of a schematic illustration of a main plumbing connection box in accordance with some embodiments of the invention.

Figure 3: Cross sectional view of a schematic illustration of a main plumbing connection box cut on plane A-A' of FIGs. 1 and 2 in accordance with some embodiments of the invention.

Figure 4: Cross sectional view of a plumbing fixture in accordance with some embodiments of the invention.

Figure 5: Perspective view of a plumbing fixture in accordance with some embodiments of the invention.

Figure 6: Perspective view of plumbing fixture in accordance with some embodiments of the invention.

Figure 7A: A schematic illustration of plumbing system in accordance with some embodiments of the invention.

Figure 7B: A schematic illustration of plumbing system in accordance with some embodiments of the invention.

Figure 8: Perspective view of a schematic illustration of plumbing fittings in accordance with some embodiments of the invention.

Figure 9: Perspective view of a schematic illustration of plumbing fittings in accordance with some embodiments of the invention.

Figure 10: Cut away view of a schematic illustration of plumbing fittings in accordance with some embodiments of the invention.

Figure 11: Perspective view of a schematic illustration of plumbing fittings in accordance with some embodiments of the invention.

Figure 12: Perspective view of a schematic illustration of plumbing fittings in accordance with some embodiments of the invention.

Figure 13: Perspective view of a schematic illustration of plumbing fittings in accordance with some embodiments of the invention.

Figure 14: A block diagram of a plumbing connection box in accordance with some embodiments of the invention.

Figure 15 is a block diagram of a plumbing connection box in accordance with some embodiments of the invention.

Figure 16: A flow chart of a method of installing in accordance with some embodiments of the invention.

Figure 17: A flow chart of a method of detecting leaks in accordance with some embodiments of the invention.

Figure 18: A flow chart of a method of installing in accordance with some embodiments of the invention.

DESCRIPTION OF THE INVENTION

The present invention, in some embodiments thereof, relates to plumbing fitting installation and maintenance, as well as a water leak detection in such fittings and, more particularly, but not exclusively, the tubes connected and leading to and from them.

OVERVIEW

An aspect of some embodiments of the current invention relates to plumbing fittings installation and maintenance and/or a water leak detection system. For example, leaks from tubes and/or fittings may be detected and/or localized. Optionally, a system which may detect water leaks from tubes connected and leading to and/or from plumbing fittings. In some embodiments, a simple method for the replacement of faulty tubes is disclosed. Optionally, the system is built into the walls, floor or ceiling of a structure.

Some aspect of the invention may comprise of two main parts or segments, both which may work together to solve or minimize some or all of the aforesaid problems, occurring regularly in the plumbing world.

According to some embodiments, the first part or segment of the invention may be a specially designed plumbing connection box. Such connection boxes may serve various functions. For example, a connection box may be configured as and/or serve as a hot cold mixer valve (for example for a shower, a bathtub and/or a sink). Alternatively or additionally, a connection box may be configured as and/or served as a shut off valve for a single water source (e.g., either hot or cold). Alternatively or additionally, a connection box may be configured as and/or served as main plumbing connection box distributing water to other connection boxes.

In some embodiments, a connection box may optionally be installed into a wall, floor, ceiling, porcelain or tiles, configured so that its cover may be flush or level with the surrounding wall, floor, ceiling, porcelain or tile. Optionally, this casing may be designed in such a way so as to allow easy access to the fittings installed in it if needed. Optionally, the cover of the casing may be designed in such a way so as to blend with its visible surrounding, for example as part of the tiles, a surface around it, as a stand-alone shower fixture, etc. Optionally, the connection box may be designed in such a way as to allow easy and quick installment of fittings and tubes inside it.

According to some embodiments of the invention, the connection box e.g., the casing thereof may have specially cast shapes and tunnels so as to "accept" fittings and/or tubes easily and conveniently, for example, by simply clicking the required tubes and/or fittings into specifically designed grooves and/or depression inside said casing. Alternatively, and/or additionally, the casing may have specially designed ports, adaptors, channels and/or tunnels, which may facilitate the secure and watertight connection of "leading" tubes. Alternatively or additionally, various sorts of conventional tubing and/or connections may be used.

According to some embodiments of the invention, "leading" tubes (optionally a tube may include a pipe and/or a hose) may be hollow channels. Optionally, a water conducting tube may be passed through the leading tube. Optionally, this may facilitate its easy and/or accurate installment. Optionally, some and/or all tubes in a structure, including, for example, an inlet tube from the main water network and/or a drainage tube/s to the main drainage system may comprise a water conducting tube passing through a leading tube.

According to some embodiments of the invention, the secure and water-tight connection of these "leading" tubes may enable any leaking water (e.g., from the fittings inside said casing, from any point higher than the casing, etc.), to be conducted safely away from the leak without leaking into the walls and/or floor and/or ceiling. Optionally, the leaking water may be collected and detected by a second part of the invention.

According to some embodiments of the invention, a sensor, may be installed plumbing box casing of the house or structure (e.g., on the floor of the main), to detect any leaking water. Optionally, the sensor may be located in the plumbing housing and/or the leading tubes. Optionally, the plumbing box casing may sit in the lowest part of the house or structure possible. Optionally, this sensor may send an alert to the proprietor, maintenance worker, etc. of the premises as soon as it detects water. Optionally, the alert may provide information on in which leading tube the water is leaking, and/or to know from which water conducting tube the water is leaking. Optionally, the alerted person may be made aware of the leak rapidly, this is of course highly preferable to noticing the leak only when a water stain appears on the wall, floor, or ceiling, or when flooding occurs.

Optionally, a draining port and/or drainage system, may be connected to the house or structure's main drainage system. Optionally, when a leak occurs, the water from the leak, wherever it occurs, may flow to the main connection box casing and may drain from there into the drain

opening and/or to the main drainage system. Optionally, this may prevent the water from overflowing and flooding the floor of the house or structure, and/or may prevent the appearance of water stains on the wall, floor, or ceiling. In some embodiments, a wetness detector may be located at a drainage port and/or drainage tube.

SPECIFIC EMBODIMENTS

Before explaining at least one embodiment of the invention in detail, it is to be understood that the invention is not necessarily limited in its application to the details of construction and the arrangement of the components and/or methods set forth in the following description and/or illustrated in the drawings and/or the Examples. The invention is capable of other embodiments or of being practiced or carried out in various ways.

According to some embodiments of the invention, the current invention may comprise of two parts of the invention.

According to some embodiments of the invention, the first part may consist of a specially designed plumbing connection box, which may be embedded inside a wall, floor, or ceiling and may have several distinctive and innovative features.

The plumbing connection box may, in some embodiments of the invention, have a specially cast or designed interior. Optionally, the housing may be designed in such a way that standard plumbing fittings may be fitted into the housing in a secure and easy to reach form. Optionally, the inside design of the housing may "accept" such fittings and their connecting tubes and/or may secure them into place. Optionally, this may reduce the risk of leakage inside the housing as a result of movement and vibrations caused by water flowing through said tubes and/or fittings.

A housing may, in some embodiments of the invention, have ports on its perimeters. Optionally, a connector may fit on or into the port. Optionally, the port connector may be designed so as to have leading tubes attach to them in a secure and/or water-tight manner. Optionally, leading tubes include tubes that are embedded and/or built into the walls, floor, and/or ceiling of a structure. Optionally, leading tubes may serve as conduits through which the water conducting tubes may pass. Optionally, this feature may enable any leaking water (e.g., in the connection box itself, in any of the water conducting tubes, at any point above it,

etc.) to be conducted by the leading tube to a connection box, thus preventing them from leaking into the walls, ceiling, or floor.

The housing may, in some embodiments of the invention, have a removable cover or lid that may be designed to be part of the natural environment of shower and bath fixtures and fittings, for example, in aesthetic design, in manufacturing materials, or both. Optionally, this feature may enable the cover or lid to be installed on the outside surface of the bathroom wall, ceiling, floor, porcelain or tiles, allowing easy access as well as easy diagnosis of leaks when they occur. Optionally, the cover or lid may be removed completely or may be opened at a hinge, etc.

According to some embodiments of the invention, more than one connection box may be installed in a house or structure. Optionally, a "main" connection box may be located at the lowest possible part of the house or structure. Optionally, "secondary" connection box may be installed at various locations throughout the structure, for example, in each bathroom, in the kitchen, in the garden, on each floor, ceiling, etc. Optionally, a secondary plumbing connection box may comprise some or all the features of the main plumbing connection box. Optionally, a secondary plumbing connection box may be smaller and/or may comprise fewer connections and/or ports than the main plumbing connection box. Optionally, secondary plumbing connection box may serve as a junction, a shut off valve and/or mixing valve. Optionally, on each plumbing connection box there may be a map of the connectors, ports and/or leading tubes and to which fittings they go.

According to some embodiments of the invention, a second part, which may be facilitated by the first part of the invention, may be that of a drainage and leak detection system, located inside a plumbing connection box (e.g., main plumbing connection box, secondary plumbing connection box, or both). Optionally the second part itself may comprise two segments:

Optionally, all leaking water may eventually flow into the main plumbing connection box and/or the water may be detected by a liquid detector. For example, the liquid detector may be positioned at the bottom end of said connection box. Optionally, such a detector, in some embodiments of the invention, may alert a user to a leak when a liquid is detected. Optionally, the sensor may be connected wirelessly to a personal computing device. Optionally, the personal computing device may include a smartphone, smartwatch, laptop, desktop computer,

VR, etc. Optionally, the sensor may alert a user to the existence of the leak, other methods of alerting may be by sound and/or light and/or any other method deemed efficient.

Optionally, leaking water may accumulate in the main plumbing connection box. The connection box may be connected to a drainage tube. Optionally, the drainage tube leads to the main drainage system of the house or structure (e.g., from the bottom of said main plumbing connection box). Optionally, this may ensure that all leaks may be diverted to the main sewage system and/or may prevent said leaks from flooding the floor of the structure, thus preventing serious damages and costs.

Reference is now made to the exemplary figures.

Figure 1 is a side view of a schematic illustration of a plumbing connection box in accordance with some embodiments of the invention. For example, the plumbing connection box 100 may be a main plumbing connection box. Optionally, the connection box may include a casing 110 containing a several adaptors 102 each connected to a water conducting tube 104 that passes through a leading tube 106 connected through ports to the connection box. Optionally, the leading tubes 106 may be installed within the walls, floor or ceiling of a structure. Optionally, a water conducting tube 104 may be passed through a leading tube 106 and connected at the distal end to one or more plumbing fittings, e.g., tap, toilet, shower, bath, sink, fridge, boiler, garden watering system, fountain, heating and/or cooling system, fire control system, drainage system, main water supply network, etc. Optionally, a water conducting tube 104 may be connected at the proximal end to an adaptor 102 on a plumbing connection box. Optionally, the plumbing connection box may include a drainage port 108. Optionally, the drainage port 108 may be connected to the main drainage system and/or sewage system of the structure.

Figure 2 is a perspective view of a schematic illustration of plumbing fittings in accordance with some embodiments of the invention. For example, a main plumbing connection box 200 may include a casing 214 containing one or more adaptors 202, each connected to the proximal end of a water conducting tube 204 passing through a leading tube 206 and connected to an end unit at the distal end, e.g., toilet, shower, bath, sink, fridge, boiler, garden watering system, fountain, heating and/or cooling system, etc. Optionally, each adaptor 202 may include a shut off valve 210. Optionally, the plumbing connection box 200 may include a sensor 212 which may detect the presence of a liquid in the plumbing connection box and/or passing through the plumbing connection box to a drainage port 208 and to the main drainage system of the

structure. Optionally, the sensor 212 may be a moisture sensor, a water sensor, a motion sensor, a pressure sensor, a temperature sensor, or any combination thereof.

Figure 3 is a side view of a schematic illustration of plumbing fittings in accordance with some embodiments of the invention. For example, a plumbing connection box 300 may include an adaptor 302, each connected to the proximal end of a water conducting tube 304 passing through a leading tube 306 and connected to a plumbing fitting at the distal end, e.g., tap, toilet, shower, bath, sink, fridge, boiler, garden watering system, fountain, heating and/or cooling system, fire control system, drainage system, main water supply network, etc. Optionally, each adaptor 302 may include a shut off valve 310. Optionally, the water supply may be shut off to the entire system, to the plumbing connection box to which the faulty water conducting tube is connected, to several water conducting tubes or to only the faulty water conducting tube. Optionally, the plumbing connection box 300 may include a sensor 312 which may detect the presence of a liquid in the plumbing connection box and/or passing through the plumbing connection box to a drainage port 308 and then by an outlet tube to the main drainage system of the structure. Optionally, a removable cover 314 may be installed on or flush or level with the outside surface of the bathroom wall, ceiling, floor, porcelain or tiles.

Optionally, a water conducting tube may be made of an elastic, flexible, semi-flexible or rigid material. Preferably, the material may be non-toxic and shatter resistant. Optionally, a water conducting tube may be made from a flexible plastic, rubberized plastic, natural rubbers, styrene-butadiene block copolymers, polyisoprene, polybutadiene, ethylene propylene rubber, ethylene propylene diene rubber, silicone elastomers, fluoroelastomers, polyurethane elastomers, nitrile rubbers, acrylic (polymethacrylate), butyrate (cellulose acetate butyrate), polyvinyl chloride, polycarbonate, polyethylene terephthalate, glycol modified polyethylene terephthalate, polytetrafluoroethylene, polystyrene, polypropylene, polyamide, polyethylene, a metal (e.g., lead, copper, aluminum, etc.) or combination thereof.

Optionally, the leading tube may be made from high quality transparent, partially transparent, translucent and/or opaque material. Preferably, the material may be non-toxic and shatter resistant. For example, the leading tube may be made from flexible plastic, rubberized plastic, natural rubbers, styrene-butadiene block copolymers, polyisoprene, polybutadiene, ethylene propylene rubber, ethylene propylene diene rubber, silicone elastomers, fluoroelastomers, polyurethane elastomers, nitrile rubbers, acrylic (polymethacrylate), butyrate (cellulose acetate butyrate), polyvinyl chloride, polycarbonate, polyethylene

terephthalate, glycol modified polyethylene terephthalate, polytetrafluoroethylene, polystyrene, polypropylene, polyamide, polyethylene, a metal (e.g., stainless steel, copper, aluminum, etc.) or combination thereof.

Figure 4 is a cut away perspective view of a schematic illustration of a plumbing fitting (e.g., a shut off valve) in accordance with some embodiments of the invention. For example, a plumbing connection box 400 may include a removable cover 402. Optionally, a water-tight leading tube connection 406 such that water leaking from the water conducting tube into the leading tube does not leak out of the system (e.g., into the walls of the building through which the tubes pass) and/or may be transported back to the main water connection box and/or to a sensor and/or to a drain. Optionally, the water conducting tube may be connected to junction 408 contained within the casing 410 of the connection box, and then to a fitting 404, e.g., a tap, toilet, shower, bath, sink, fridge, boiler, garden watering system, fountain, heating and/or cooling system, fire control system, drainage system, main water supply network, etc.

Figure 5 is a front perspective view of a schematic illustration of a plumbing fitting in accordance with some embodiments of the invention. For example, a plumbing connection box 500 may include a removable cover 502. Optionally, a removable cover 502 may be installed on or flush or level with the outside surface of the bathroom wall, ceiling, floor, porcelain or tiles. Optionally, a water-tight leading tube connection 506 and a connection to a fitting 504 (e.g., a tap, toilet, shower, bath, sink, fridge, boiler, garden watering system, fountain, heating and/or cooling system, fire control system, drainage system, main water supply network, etc.), may lead onto the casing 508 of the connection box 500.

Figure 6 is a rear perspective view of a schematic illustration of a plumbing fitting in accordance with some embodiments of the invention. For example, a plumbing connection box 600 may include a removable cover 602. Optionally, a removable cover 602 may be installed on or flush or level with the outside surface of the bathroom wall, ceiling, floor, porcelain or tiles. Optionally, a water-tight leading tube connection 606 and a connection to a fitting 604 (e.g., a tap, toilet, shower, bath, sink, fridge, boiler, garden watering system, fountain, heating and/or cooling system, fire control system, drainage system, main water supply network, etc.), may lead onto the casing 608 of the connection box 600.

Figure 7A is a schematic illustration of a plumbing system in accordance with some embodiments of the invention. For example, a plumbing system 700a comprising a main

plumbing connection box, for example plumbing connection box 100 as illustrated in FIG. 1. Optionally a leading tube 714 encloses the water conducting tube 704. Optionally, the leading tube 714 inhibits any leaking water from the water conducting tube 704 from leaking out of the system (e.g., into the wall of the building). The tubes (e.g., the leading tube 714 and the water conducting tube 704) optionally connect between the main plumbing connection box 100 and a peripheral connection box 401a-401c' (for example connection box 400 with a stop valve and/or a connection box 800 with a hot/cold mixing valve).

In some embodiments, the water conducting tube 704 conducts water between a water source (e.g., at the main connection box 100) to a junction (e.g., junction 408 of FIG. 4) in a peripheral connection box (e.g., cut off valve connection boxes 401a, 401b, 401c). Leading tube is optionally sealed to the casing (e.g., casing 410 e.g., a leading tube connection 406 of the casing 410) of the connection box 401a-401c' (e.g., leading leaking water into the sealed connection box 400 and/or just sealing to the outer side of the peripheral connection box). For example, water leaking from water conducting tube 704 may be transported down the leading tube 714 back to the main water connection box and/or to a sensor and/or to a drain.

In some embodiments, water in the water conducting tube 704 connects through a junction in the peripheral plumbing connection box 401a-401c', and/or 800 to an end unit and/or a device. For example, the plumbing fitting may include a toilet 702a, a sink 702b, a shower 702c, a bath, an irrigation system, a garden hose, a fountain, fire control system, drainage system, main water supply network, etc. For example, a device may include a refrigerator and/or a water heater and/or heating system and/or a cooling system. For example, the connection between the peripheral connection box 401a-401c', 800 to the device and/or end unit may include a conventional water conducting tube 705 and/or may pass in an open space where leaks will be detected.

In some embodiments, the water conducting tubes 704, 705 may be connected through ports on the casing of the box 401a-401c', 500 through which a water conducting tube 704, 705 may extend into a sealed connection box. Inside the connection box a junction may connect between various water connecting tubes. For example, the junction may interconnect between an incoming water supply water conducting tube 704 (e.g., from the main box 100) and one or outgoing water conducting tubes (e.g., tube 705) for example connecting to a fixture and/or device. Optionally, water in the leading tube 714 is inhibited from exiting the system at the peripheral connection box 401a-401c', 800. For example, a leading port connection (e.g.,

connection 406) may be sealed such that water is inhibited from exiting the leading tube at the end connected to the peripheral connection box. Alternatively or additionally, a leading tube connection (e.g., connector on port 812) may lead to a sealed casing. In some embodiments, a port through which a conventional water conducting tube 705 incoming water supply water conducting tube 705 (e.g., not including a leading tube) passes is sealed so that water in the connection box (e.g., box 500) does not leak around the tube 705. In some embodiments, an incoming water supply tube 704 is enclosed in a leading tube 714. Optionally the incoming water supply water conducting tube 704 passes through a port into the box. Optionally, leading tube 714 are attached by connectors with a water tight seal to the casing of the box 401a-401c', 800.

In some embodiments, the housing casing of a connection box 100 (and/or a peripheral connection box 401a-401c', 800) is connected by a drainage tube 744 to the main drainage system 742 of the structure. The connection box 100, 401a-401c', 800 may also contain sensor 716. Optionally, the sensor may be located in the casing close to a drainage port or outlet drainage tube 744. Optionally, the drainage port or outlet drainage tube 744 may be located near the lowest part of the casing. Optionally, a sensor may be located near the lowest point in the casing and/or close to the proximal end of each leading tube. Optionally, a sensor may identify a water leak by detecting water in a leading tube 704 and/or a casing and/or drainage tube 744 and/or drainage port. In some embodiments, a sensor detects when what has entered casing but does not indicate from where it came. Optionally, a user will open the casing to see from which port the water is coming, thereby localizing the leak to an associated leading tube 704, water carrying tube 714 and/or a connection thereto. Alternatively or additionally, a sensor 716 may identify from which water leading tube the water is coming. For example, water from a leaking from water conducting tube 714 may be transmitted down its associated leading tube 704 to the casing and/or accumulate in the casing and/or be drained away to the main drainage system 742 of the structure. Optionally, the faulty water conducting tube 714 may be easily replaced by disconnecting at the distal and proximal ends from end units 702 and/or a junction 707 and/or water a supply, pulling the faulty water conducting tube 714 out of its leading tube 704 and then snaking in a new water conducting tube through the leading tube 704 and/or connected at its distal and proximal ends to an end unit 702, a water supply and/or a junction respectively.

In some embodiments, connection boxes may be used between various conventional units of a plumbing system 700a. For example, a device 703 (e.g., a water heater) may have a water input 707a and a water output 707b. The output may optionally be connected by a conventional tube 705 to a connection box 401c'. Optionally connection box 401c directs hot water from output 707b through a water conveying tube 704 inside a leading tube 714 to a further connection box 401b' which directs the hot water to a conventional mixing valve of end unit (e.g., sink 702b). Alternatively or additionally, connection box 401c directs hot water from output 707b through a water conveying tube 704 inside a leading tube 714 to a further connection box 800 includes a mixing valve and mixed hot/cold water is sent from connection box 800 via a conventional tube 705 to an end unit (e.g., shower 702c).

Figure 7B is a schematic illustration of a plumbing system in accordance with some embodiments of the invention. For example, a plumbing system 700b comprising a plumbing connection box 706. Box 706 may be directly connected to an end unit 702f, which may include various fittings such as a tap, toilet, shower, bath, sink, fridge, boiler, garden watering system, fountain, heating and/or cooling system, fire control system, drainage system, main water supply network, etc. that include a port for water conveying tube 714 and a connector for leading tube 704. Alternatively or additionally, box 706 may be connected to an additional plumbing connection box 800 including a mixing valve and/or a wall mounted shut off valve connection box 401d to a standard plumbing tube 705 and/or an end unit 702e (e.g., the cold water supply of a conventional mixing valve of a bathtub). Optionally, the leading tube 704 will connect hermitically around the connection between the wall mounted shut off valve connection box 401d, 401d'. For example, a connection may include a by leading tube 704 enclosing water conducting tubes 714. Optionally, multiple plumbing connection boxes 706 may be interconnected and/or connected to additional end units.

In some embodiments, a mixing valve connection box 800 receives cold water input directly from another connection box 706 and/or hot water input from water heater device 703 through a shut off valve connection box 401d'.

In some embodiments, a connection box may include a shut off valve and/or a sensor 716 for wetness in the leading tubes. In some embodiments the connection box may receive incoming water from a water conducting tube 717 inside a leading tube 718.

In some embodiments, a drainage port of the connection box 100, 400, 401a-c', 800 is also connected by a drainage tube 744 to the main drainage system of the structure. The connection box may also contain a sensor 716. Optionally, the sensor 716 may be located in the box 100, 400, 401a-c', 800 close to the drainage port or outlet drainage tube 744. Optionally, the drainage port or outlet drainage tube 744 may be located at the lowest part of the box 100, 400, 401a-c', 800. Optionally, a sensor 716 may be located in or close to the proximal end of each leading tube 704. Optionally, a sensor 716 may identify a water leak by detecting water in a leading tube 704 and/or a box 100, 400, 401a-c', 800 and/or drainage tube 744 and/or drainage port. Water from a leaking water conducting tube 714 may be pass through a leading tube 704 and/or may accumulate in the box 100, 400, 401a-c', 800 and/or be drained away by a drainage tube 744 to the main drainage system 742 of the structure. Optionally, the faulty water conducting tube 714 may be removed by disconnecting at the opposite ends from end units 702, connection box pulling it out of its leading tube and then snaking in a new water conducting tube which is connected at its distal and proximal ends to a first and second end unit, respectively.

Figure 8 is a perspective view of a schematic illustration of a plumbing fitting in accordance with some embodiments of the invention. For example, a plumbing connection box 800 may include a removable cover 802. For example, the cover 802 may seal to the casing 808 sealing the enclosure. Optionally, valve controls may be accessible from outside of the enclosure. For example, junction switch 804 may include a hot/cold mixing valve between one or more of the outgoing water conducting tubes and/or an incoming water connection 814 818 which may connect to the water mains and/or to a source of hot water. For example, junction switch 804 may protrude from cover 802. Optionally, a cut off release valve 806 on the outlet water conducting tube (e.g., tube 1117 of FIGs. 11 and 12) may be accessible from outside the removable cover 802.

In some embodiments, the casing 808 may include one or more mounting aids 810. For example, mounting aid 810 may be configured to aid in connecting the casing within and/or to a wall, floor and/or ceiling (e.g., via hooks, loops, screw holes, rings, etc.).

In some embodiments, the casing may include one or more ports 812. Optionally, a port 812 may include a connector (for example protruding from the casing 808). For example, the connector may facilitate making a water tight connection between an end of a leading tube 816, 818 to the port 812. Optionally a water conducting tube 814 may pass through the lead tube

816 and/or extend into the connection box 800 and/or connect to a junction. The water conducting tube 814 may be passed through a leading tube 816 and connected to an end unit at its far end.

According to some embodiments of the invention, water conducting tubes are installed, rather than installing the water conducting tube directly into the wall, a conduit (“leading tube”) is installed in the wall. Then a water conducting tube (for example a flexible tube) is run through the conduit. The water conducting tubes are interconnected inside of plumbing casings e.g., via a junction. The plumbing connection box may have a set of plumbing adaptors and/or junctions (and optionally valves) inside a sealed outer casing, with an optional drainage tube. Optionally, the leading tube may be connected with a water proof seal to the outer casing of the connection box.

Figure 9 is a perspective view of a schematic illustration of an open plumbing connection box 900 in accordance with some embodiments of the invention. For example, a plumbing connection box 900 may include a removable cover 902. Optionally, a junction switch 904 (for example a hot/cold mixing switch), for example, to control flow between water conducting tubes and/or through a junction in the connection box. For example, the junction switch may be accessible from outside the casing of the plumbing connection box. Optionally, there is a cut off release valve 906 on the outlet tube (e.g., tube 1117 of FIGs. 11 and 12) inside a leading tube 918. For example, the cut off release valve may be accessible from outside the box 900. Optionally, the casing 908 may include one or more mounting aids 910 configured to aid in connecting the casing within or to a wall, floor or ceiling (e.g., hooks, loops, screw holes, rings, etc.). The casing may include one or more ports 912 through which a water conducting tube 914 may extend, and connected to a leading tube 916. The water conducting tube 914 may be passed through a leading tube 916 and connected. for example, to an end unit, a junction and/or a wall mounted connector at its distal end.

Figure 10 is a cut away view of a schematic illustration of a plumbing fitting in accordance with some embodiments of the invention. For example, a plumbing connection box 1000 may include a casing 1008 from which may protrude a junction switch 1006 (e.g., a hot/cold mixing valve) and optionally, a cut off release valve 1004 on the water conducting outlet tube (e.g., tube 1117 of FIGs. 11 and 12) from the water mains network optionally inside a leading tube 1018. Optionally, the casing 1008 may include one or more ports (e.g., through which pass water conveying tubes 1012, 1014) with optional connectors (e.g., protruding from

the casing) through which a water conducting tube 1014 may extend. Optionally a leading tube 1016 may connect to the connector, e.g., to provide a water tight seal around the port. The water conducting tube 1014 may be connected to an adaptor 1020 at its proximal end. The water conducting tube may be passed through a leading tube 1016 and connected to an end unit at its distal end. Optionally, the plumbing fittings connection box 1000 may be installed into a wall, floor, ceiling, porcelain or tiles 1010, configured so that its cover may be level with the surrounding wall, floor, ceiling, porcelain or tile. Optionally, this connection box may be designed in such a way so as to allow easy access to the fittings installed in it if needed. Optionally, the cover of the housing may be designed in such a way so as to blend with its visible surrounding, for example as part of the tiles, a surface around it, as a stand-alone shower fixture, etc. For example, cold water may enter through a tube 1014 of a plurality of input tubes 1014, 1012. For example, hot water may enter through a tube 1012 of a plurality of input tubes 1014, 1012.

Figures 11 and 12 are perspective views of schematic illustrations of a plumbing fitting in accordance with some embodiments of the invention. For example, a plumbing connection box 1100 may include a casing 1106 from which may protrude a junction switch 1104 (e.g., a hot/cold mixing valve) and/or optionally, a cut off release valve 1102 on the outlet water conveying tube 1117. Optionally outlet conveying tube 1117 is inside a leading tube 1118. Optionally, the casing 1106 may include one or more mounting aids 1116 configured to aid in connecting the casing 1106 within or to a wall, floor or ceiling (e.g., hooks, loops, screw holes, rings, etc.). The casing may include one or more ports 1110 connected to a leading tube 1108, through which a water conducting tube 1114 may extend after connection through an adaptor 1112 to a junction switch 1104. The water conducting tube 1114a-1114d, 1117, 1117' may be passed through a leading tube 1108 and connected to an end unit at its distal end.

In some embodiments, a mixing valve connection box may include alternative input ports (e.g., connected to tubes 1114a and/or 1114b) for hot water and/or alternative input ports (e.g., connected to tubes 1114c and/or 1114d) for cold water. For example, the hot and cold inputs 1114b and 1114c may be from one end of the box 1100 and/or the hot and cold input tubes 1114a and 1114d may be from one end of the box 1100 and/or alternative output ports (e.g., connected to tubes 1117 and/or 1117') may be from opposite ends of the box 1100. For example, this may make it convenient to connect the mixing valve to various input and/or output connections of various geometries.

Figure 13 is a Perspective view of a schematic illustration of plumbing fittings in accordance with some embodiments of the invention. For example, a plumbing housing 1200 may include a casing 1206 from which may protrude a junction switch 1204 and optionally, a cut off release valve 1202 on the outlet water conducting tube (e.g., tube 1117 of FIGs. 11 and 12) optionally passing through a leading tube 1218. Optionally, the casing 1206 may include one or more mounting aids 1216 configured to aid in connecting the casing 1206 within or to a wall, floor or ceiling (e.g., hooks, loops, screw holes, rings, etc.). Also protruding from the casing may be one or more ports 1210 connected to a leading tube 1208, through which a water conducting tube 1214 may extend after connection by an adaptor 1212 to a junction switch 1204. The water conducting tube 1214 may be passed through a leading tube 1208 and connected to an end unit at its distal end.

Figure 14 is a block diagram of a plumbing housing in accordance with some embodiments of the invention. For example, the plumbing housing includes an inlet tube 1300 with a cut off valve 1316 which connects the casing 1304 to the water network. The casing 1304, having a removable cover 1302, contains a number of adaptors 1318, each connected to a water conducting tube 1310 passing through a leading tube 1312 connected to the casing 1304 by a port 1324. Optionally, the leading tubes 1312 may be installed within the walls, floor or ceiling of a structure, for example by means of a wall connector 1306. The casing 1304 includes a sensor 1320 which may detect the presence of a liquid in the plumbing housing and/or passing through the plumbing housing to a drainage port 1322 through a drainage tube 1308 to the main drainage system and/or sewage system of the structure. Optionally, the casing 1304 may include a junction switch 1314 which may control the water flow.

Figure 15 is a block diagram of a plumbing connection box in accordance with some embodiments of the invention. For example, an inlet tube 1400 with a cut off valve 1410 connects a casing 1402 to the water network. The casing 1402, having a removable cover 1404, contains a number of adaptors 1412, each connected to a water conducting tube 1414 passing through a leading tube 1416 connected to a port 1418 on the casing 1402. Optionally, the leading tubes 1416 may be installed within the walls, floor or ceiling of a structure, and held in place by a wall mounting aid 1406. The casing 1402 may include a junction switch 1408 which may control the water flow.

Figure 16 is a flow chart of a method of installing a plumbing fitting in accordance with some embodiments of the invention. For example, leading tubes are installed in the walls and/or

floor and/or ceiling of a structure 1502. The leading tubes are connected to a plumbing connection box casing 1504. Water conducting tubes are passed through the leading tubes 1506. The proximal end of a water conducting tube is connected to a junction (e.g., via an adaptor) in the plumbing box casing 1508. The distal end of the water conducting tube is connected to an end unit 1510.

Figure 17 is a flow chart of a method of detecting leaks in accordance with some embodiments of the invention. For example, if one of the water conducting tubes springs a leak 1602, the water will not go into the wall and/or floor and/or ceiling, but will drip into a leading tube 1604, and then be conducted down the leading tube to the next plumbing connection box or main plumbing casing 1606. The water flows out of the plumbing connection box via a drainage port and drainage tube into the drainage system 1608. In the plumbing connection box, there may include a sensor. The water in the plumbing connection box will be detected 1610 (e.g., either by the water sensor and/or it will be seen in when it exits the drainage tube). The sensor alerts 1612 a user, maintenance professional, plumber, proprietor, etc. Optionally, the alert may be a signal. Optionally, the signal may be sent wirelessly e.g., over a network (e.g., radio, satellite, cellular network, etc.) to a user's electronic device (e.g., computer, laptop, tablet, cellular phone, smart watch, cloud, VR, etc.). Optionally, a signal may be visual (e.g., lights may flash) and/or audio (e.g., a siren may sound). Optionally, a professional may come and open the plumbing connection box, and see from which leading tube the water coming, and thereby know that the water conducting tube in that leading conduit is leaking. Optionally, the system may prevent the wall and/or floor and/or ceiling from getting wet.

Figure 18 is a flow chart of a method of repairing a plumbing fitting in accordance with some embodiments of the invention. For example, a leak is sprung in a water conducting tube 1801. An alert is signaled that a leak has been detected 1804. A plumber may identify which water conducting tube is leaking 1806 (e.g., observes water dripping out of the leading tube or a sensor indicates which water conducting tube is compromised). Once it is known which water conduction tube is leaking, the water is turned off 1808 (e.g., at the cut off valve of the plumbing connection box). Optionally, the water may be shut off to the entire system, to the plumbing connection box to which the faulty water conducting tube is connected, to several water conducting tubes, or to only the faulty water conducting tube. The faulty water conducting tube is disconnected at the distal end from a first end fitting (e.g., another plumbing connection box, bathroom fixture or fitting, kitchen fixture or fitting, a tap, a cooling or heating

system, a fire control system, a garden water supply system, drainage system, main water supply network, a wall mounted cut off valve etc.), and from a second end fitting at the proximal end 1810. The faulty water conducting tube is drawn out of the leading tube 1812 (e.g., by pulling it out of the leading tube). A new water conducting tube is snaked into the leading tube 1814. The proximal end of the water conducting tube is connected to a second end unit (e.g., an adaptor in the plumbing casing), and the distal end of the water conducting tube is connected to the first end unit 1816. Water supply is reestablished. The leak is thereby fixed with reduced need to break walls and/or floors and/or ceilings. Water leaking may also be channeled through leading tubes away from the building and/or structural damage caused by the leak may be reduced. The system may reduce waiting for the damp area to dry out before work can begin.

While the system and method are described above for use in a water supply system, the same features and embodiments may be adapted for use in a sewage or waste disposal system.

These embodiments are provided by way of example and are in no means intended to be limiting the scope of the invention.

While the invention has been described in its preferred form or embodiment with some degree of particularity, it is understood that this description has been given only by way of example and that numerous changes in the details of construction, fabrication, and use, including the combination and arrangement of parts, may be made without departing from the spirit and scope of the invention.

GENERAL

It is expected that during the life of a patent maturing from this application many relevant building technologies, artificial intelligence methodologies, computer user interfaces, image capture devices will be developed and the scope of the terms for design elements, analysis routines, user devices is intended to include all such new technologies a priori.

Unless otherwise defined, all technical and/or scientific terms used herein have the same meaning as commonly understood by one of ordinary skill in the art to which the invention pertains. Although methods and materials similar or equivalent to those described herein may be used in the practice or testing of embodiments of the invention, exemplary methods and/or materials are described below. In case of conflict, the patent specification,

including definitions, will control. In addition, the materials, methods, and examples are illustrative only and are not intended to be necessarily limiting.

As used herein the term “about” refers to $\pm 10\%$

The terms "comprises", "comprising", "includes", "including", “having” and their conjugates mean "including but not limited to".

The term “consisting of” means “including and limited to”.

The term "consisting essentially of" means that the composition, method or structure may include additional ingredients, steps and/or parts, but only if the additional ingredients, steps and/or parts do not materially alter the basic and novel characteristics of the claimed composition, method or structure.

As used herein, the singular form "a", "an" and "the" include plural references unless the context clearly dictates otherwise.

Throughout this application, various embodiments of this invention may be presented in a range format. It should be understood that the description in range format is merely for convenience and brevity and should not be construed as an inflexible limitation on the scope of the invention. Accordingly, the description of a range should be considered to have specifically disclosed all the possible subranges as well as individual numerical values within that range. For example, description of a range such as from 1 to 6 should be considered to have specifically disclosed subranges such as from 1 to 3, from 1 to 4, from 1 to 5, from 2 to 4, from 2 to 6, from 3 to 6 etc., as well as individual numbers within that range, for example, 1, 2, 3, 4, 5, and 6. This applies regardless of the breadth of the range.

Whenever a numerical range is indicated herein, it is meant to include any cited numeral (fractional or integral) within the indicated range. The phrases “ranging/ranges between” a first indicate number and a second indicate number and “ranging/ranges from” a first indicate number “to” a second indicate number are used herein interchangeably and are meant to include the first and second indicated numbers and all the fractional and integral numerals therebetween.

It is appreciated that certain features of the invention, which are, for clarity, described in the context of separate embodiments, may also be provided in combination in a single

embodiment. Conversely, various features of the invention, which are, for brevity, described in the context of a single embodiment, may also be provided separately or in any suitable sub-combination or as suitable in any other described embodiment of the invention. Certain features described in the context of various embodiments are not to be considered essential features of those embodiments, unless the embodiment is inoperative without those elements.

Although the invention has been described in conjunction with specific embodiments thereof, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art. Accordingly, it is intended to embrace all such alternatives, modifications and variations that fall within the spirit and broad scope of the appended claims.

All publications, patents and patent applications mentioned in this specification are herein incorporated in their entirety by reference into the specification, to the same extent as if each individual publication, patent or patent application was specifically and individually indicated to be incorporated herein by reference. In addition, citation or identification of any reference in this application shall not be construed as an admission that such reference is available as prior art to the present invention. To the extent that section headings are used, they should not be construed as necessarily limiting.

CLAIMS

What is claimed is:

1. A plumbing system comprising:

a first connection boxes, including

a plurality of tubing adapters,
a junction interconnecting interior spaces of said plurality of tubing adapters,
a sealed casing surrounding said plurality of tubing adapters and
a plurality of ports in said sealed casing;

a leading tube connected at a first end thereof to a first port of said plurality of ports of said first connection box such that said port leads to an interior of said leading tube;

a first water conducting tube connected at a first end thereof to a tubing connector of said first box; said water conducting tube passing through said first port and said leading tube.

2. The system of claim 1, wherein the water conducting tube includes a second end that is connected to a plumbing end unit.

3. The plumbing system according to claim 2, wherein the end unit is a plumbing fitting selected from a plumbing connection box, a casing, a bathroom fixture, a bathroom fitting, a kitchen fixture, a kitchen fitting, a tap, a cooling system, a heating system, a fire control system, a garden water supply system, a drainage system, or a main water supply network.

4. The system of claim 3, further comprising:

a second plumbing connection box, including

a second tubing connector,
a second sealed casing surrounding said tubing connector; and
a second plurality of ports in said second sealed casing, each said ports of said second plurality of ports include a lead connector;

wherein said leading tube includes a second end connected to a respective lead connector of a respective port of said second plurality of ports and said water conducting tube is also passed through said respective port and said leading tube,

wherein said water conducting tube includes a second end connected to said tubing connector of said second connection box.

5. The plumbing system according to claim 2, wherein the connections to the end units are water tight.
6. The plumbing system according to claim 1, wherein the leading tube is built into a wall, floor, or ceiling of a structure, or a combination thereof.
7. A plumbing connection box comprising:
 - a plurality of tubing adaptors configured for connecting to a water conducting tube;
 - a junction interconnecting interior spaces of said plurality of tubing adaptors;
 - a sealed casing surrounding said tubing adaptors;
 - a plurality of ports in said sealed casing;
 - a plurality of connectors, each connector attached to one of said ports and configured for passing said water conducting tube therethrough and configured for attachment to a leading tube such that said ports interconnecting the interior of the box to the interior of the attached leading tube such that said water conducting tube passes through said port between said interior of said leading tube and said interior of said sealed casing.
8. The plumbing connection box of claim 7, further comprising:
 - a valve configured for opening and closing a connection through said junction between at least two of said plurality of tubing adaptors.
9. A plumbing connection box comprising:
 - a casing with a removable cover, wherein the casing includes:
 - a plurality of ports;
 - each port of said plurality of ports connected to a respective leading tube;
 - a plurality of water conducting tubes, each of said plurality of water conducting tubes passing through a respective port of said plurality of ports and said respective leading tube,
 - a junction inside the casing connecting between the plurality of water conducting tubes.
10. The plumbing connection box of claim 8, wherein each said water conducting tube is connected at its proximal end to the junction and to an end unit at its distal end.
11. The plumbing connection box of claim 8, further comprising:
 - a junction switch connected to the adaptor, and
 - an inlet tube with a cutoff switch.

12. The plumbing connection box of claim 9, further comprising a drainage port with a drainage tube.
13. The plumbing connection box of claim 9, further comprising a sensor.
14. The plumbing connection box of claim 13, wherein sensor is selected from a moisture sensor, a water sensor, a motion sensor, a pressure sensor, a temperature sensor, or any combination thereof.
15. The plumbing connection box of claim 9, further comprising a wall connector configured to connect the plumbing connection box within or to a wall, floor or ceiling of a structure.
16. The plumbing connection box of claim 9, wherein the removable cover is configured to be installed on or level with an outside surface of a wall, ceiling, floor, porcelain or tiles.
17. A method for installing a plumbing fitting comprising:
installing a leading tube into a structure;
connecting a proximal end of the leading tube to a port on the outside of a plumbing connection box;
passing a water conducting tube through the leading tube such that a proximal end of the water conducting tube protrudes through said port into plumbing connection box; and
attaching a proximal end of the water conducting tube to a junction inside the plumbing connection box.
18. The method of claim 17, wherein said installing is into at least one of a wall, a ceiling and a floor of the structure.
19. The method of claim 17, further comprising:
attaching a distal end of said water conducting tube to an end unit.
20. The method of claim 19, wherein said end unit is selected from at least one of plumbing connection box, a casing, a bathroom fixture, a bathroom fitting, a kitchen fixture, a kitchen fitting, a tap, a cooling system, a heating system, a fire control system, a garden water supply system, a drainage system, a wall mounted cut off valve and a main water supply network.
21. The method of claim 19, further comprising:
connecting a second said respective leading tube to a second port;
passing a second water conducting tube through said second port and said second leading tube
and

connecting a proximal end of said second water conducting tube to said water conducting tube via said junction.

22. A method of detecting a leak in a plumbing fitting comprising:

collecting water dripping a leaking water conducting tube in a leading tube;

conducting said water down the leading tube into a plumbing connection box; and

sensing the water in at least one of the leading tubes and the plumbing connection box.

23. The method of claim 22, further comprising draining the water out of the plumbing connection box through a drainage port.

24. The method of claim 23, further comprising draining the water through the drainage port into a drainage tube to the main drainage system.

25. The method of claim 22, wherein the sensing is by a sensor selected from a moisture sensor, a water sensor, a motion sensor, a pressure sensor, a temperature sensor, or any combination thereof.

26. The method of claim 22, further comprising alerting a user to a detected leak.

27. The method of claim 26, wherein the alerting is executed by a signal selected from a signal wireless signal, visual signal, audio signal, or a combination thereof.

28. The method of claim 27, wherein the alerting is performed by sending a signal wirelessly to a users' personal computing device.

29. The method of claim 26, further comprising indicating to the user which water conducting tube is leaking.

30. A method for repairing a leaking water conducting tube passing through a leading tube comprising:

turning off water supply to the leaking water conducting tube;

disconnecting the leaking water conducting tube;

drawing the leaking water conducting tube out of the leading tube;

passing a new water conducting tube through the leading tube;

connecting the new water conducting tube; and

turning on water supply to the new water conducting tube.

31. The method of claim 30, wherein a proximal end of said leading tube connected to a port of a plumbing connection box and said disconnecting includes disconnecting a distal end of

said leaking water conducting tube from an end unit and disconnecting a proximal end of said leaking water conducting tube from a junction inside a connection box.

32. The method of claim 31, wherein said drawing includes drawing said distal end of said leaking water conducting tube through said leading tube and out said port into said junction box.
33. The method of claim 32, wherein said passing includes passing a distal end of said new water conducting tube through said from said junction box through said port and said through leading tube.
34. The method of claim 33, wherein said connecting includes connecting said distal end of said new water conducting tube to said end unit and connecting a proximal end of said new water conducting tube to a junction inside said plumbing connection box.