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(54) **AUTOMATIC POPUP DEVICE**

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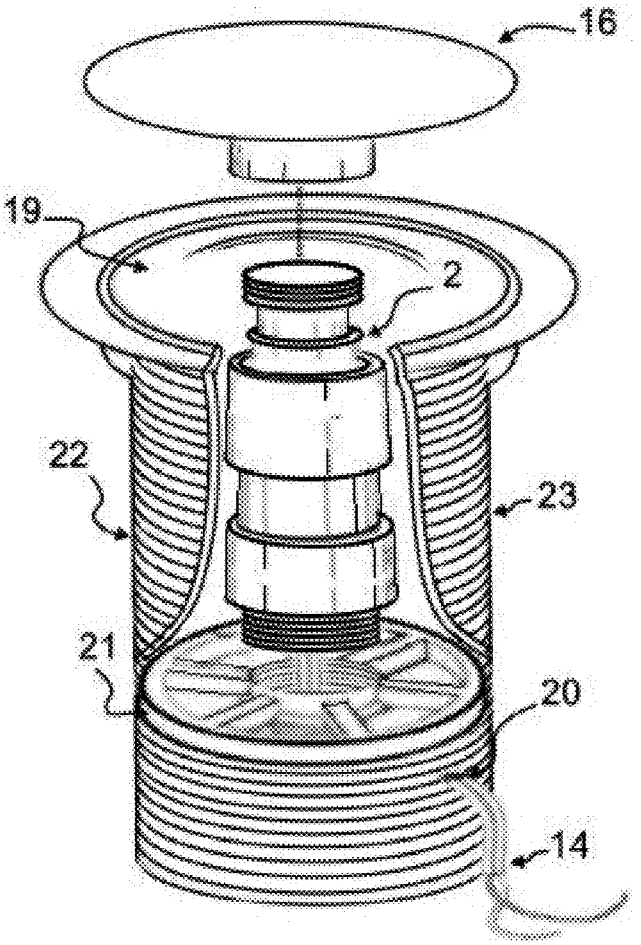
(57) **ABSTRACT**

An automatic popup device assembly that electromechanically opens and closes a sink drain stopper plug. The device operates from within a waterproof capsulated cartridge that seamlessly attaches to a standard water drain pipe assembly. The device is powered by either a linear type solenoid or a low voltage linear dc gear motor to provide the force to raise and lower the stopper plug. The triggering mechanizing to actuate the stopper plug is a motion sensor. More commonly know as (IR), or (PIR) Infrared, Passive infrared motion control activating method. A secondary triggering mechanizing is the touch controller method whereby touching the stopper plug or external object such as the faucet or wall switch to raise or lower the stopper plug assembly automatically preventing the escape of water. A third triggering method to raise or lower the stopper plug is by a hand held remote controller through a (RF) radio signal frequency instructing to the popup device to engage. A forth triggering method making the invention compatible with smart homes is its ability to integrate with a WiFi internet connections. This allows the user to control or actuate the automatic popup device from any location in the world. The invention is constructed with the ability to upgrade and automate conventional water faucets and conform with motion sensing faucets in the commercial and residential sectors worldwide.



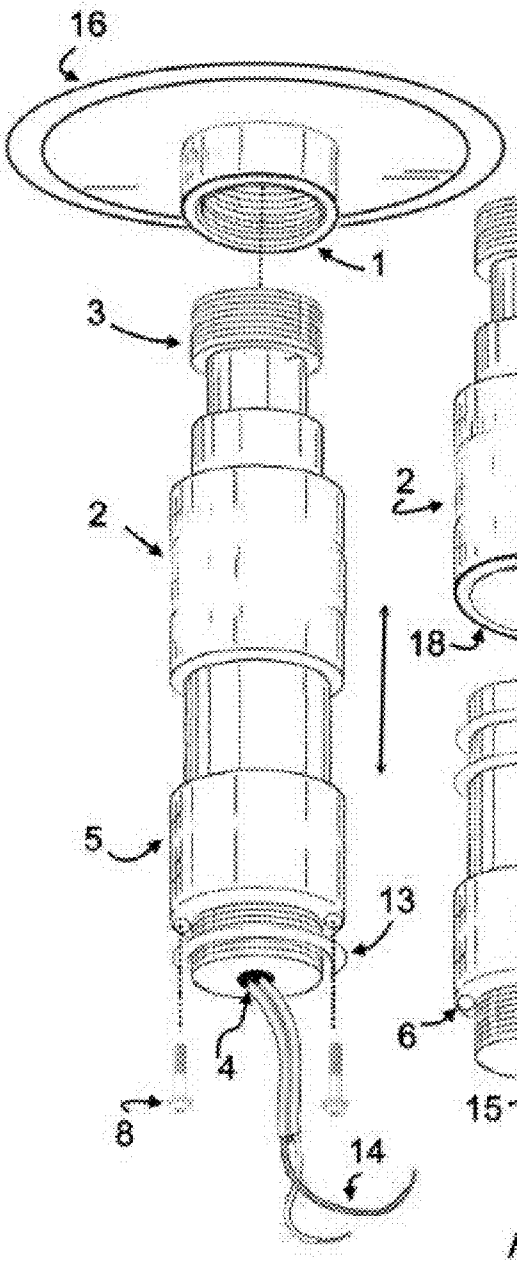


FIG. 1

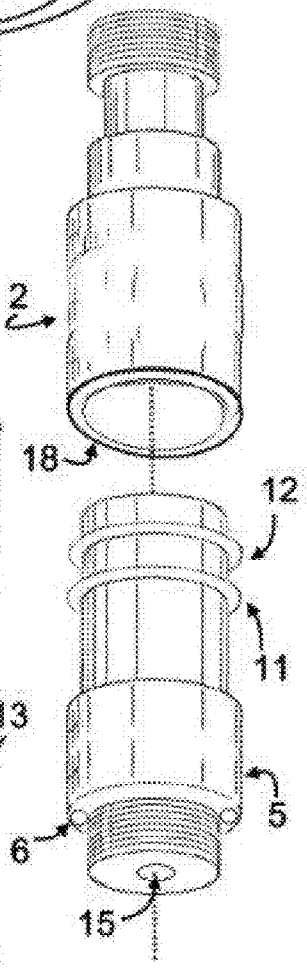


FIG. 2

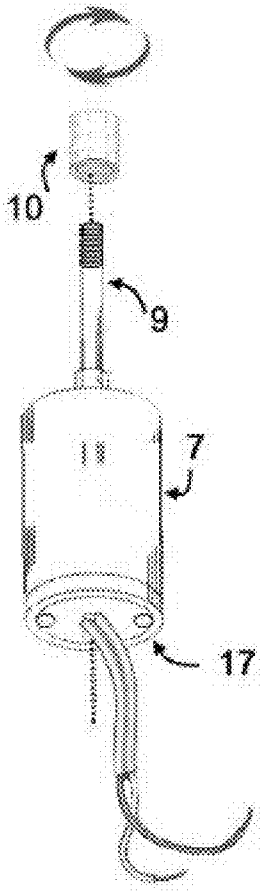


FIG. 3

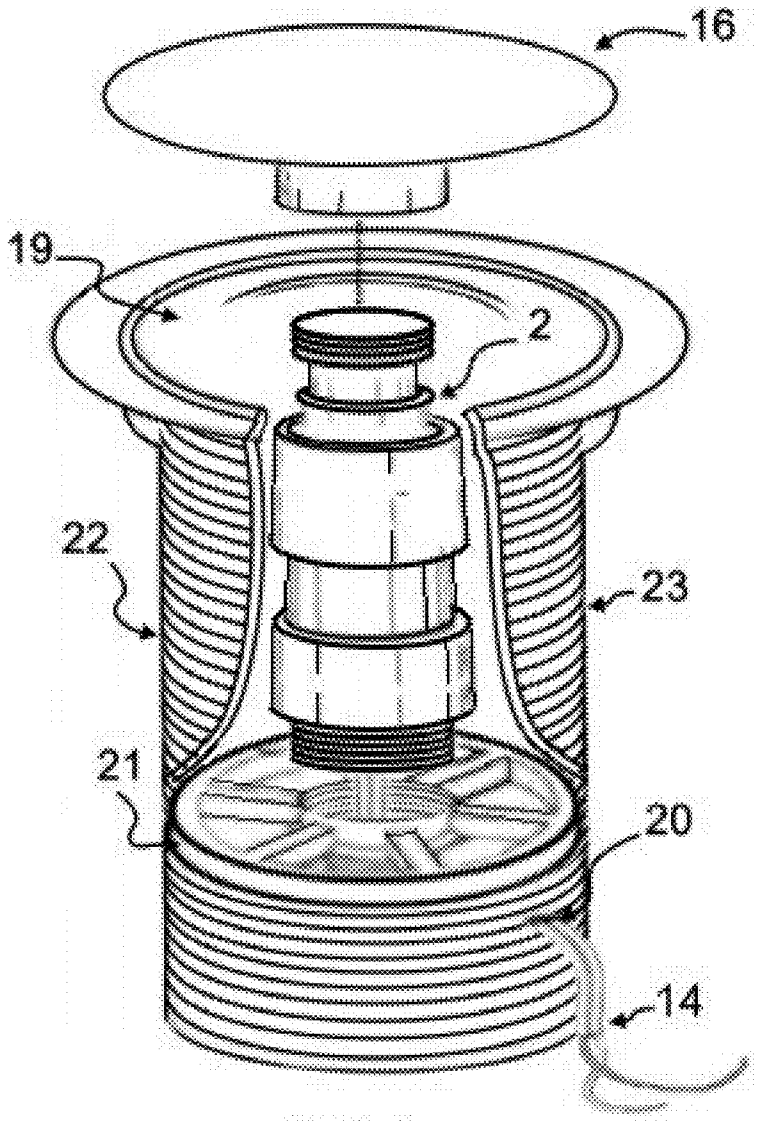


FIG. 4

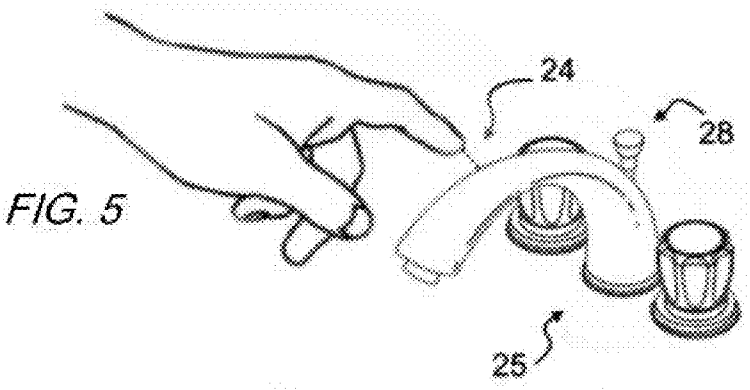


FIG. 5

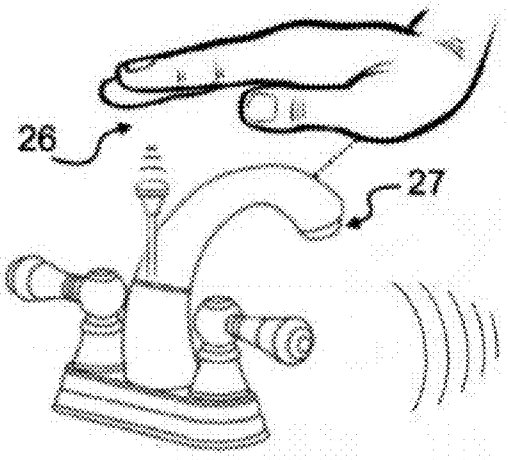


FIG. 6

FIG. 7

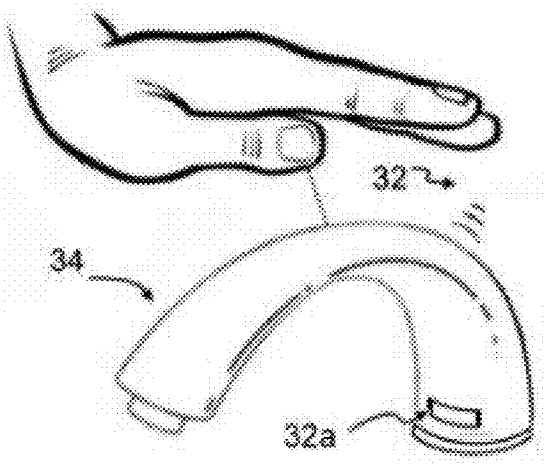


FIG. 8

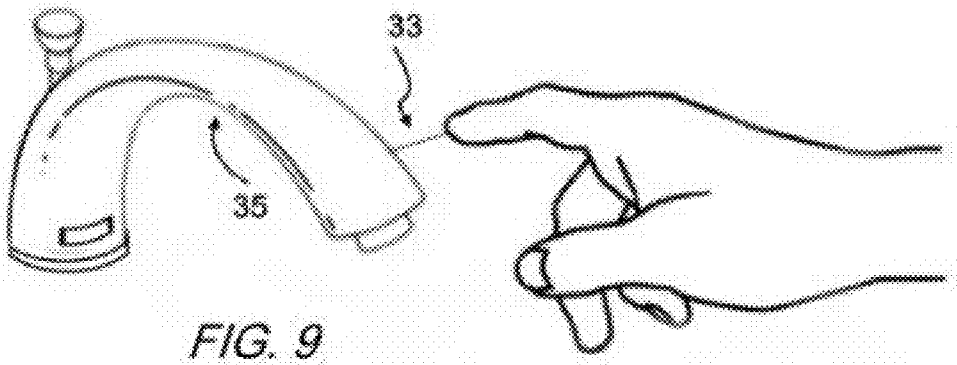


FIG. 9

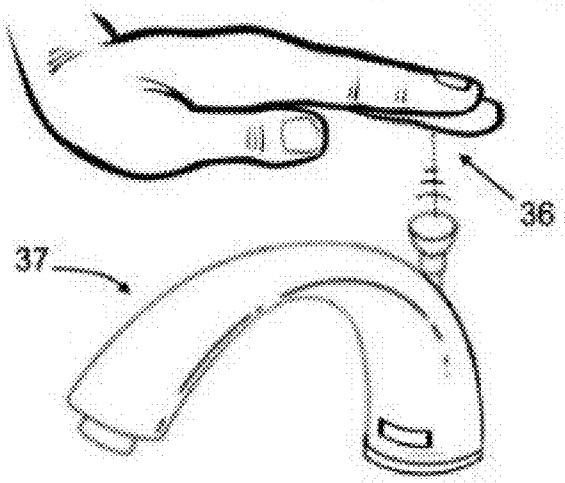


FIG. 10

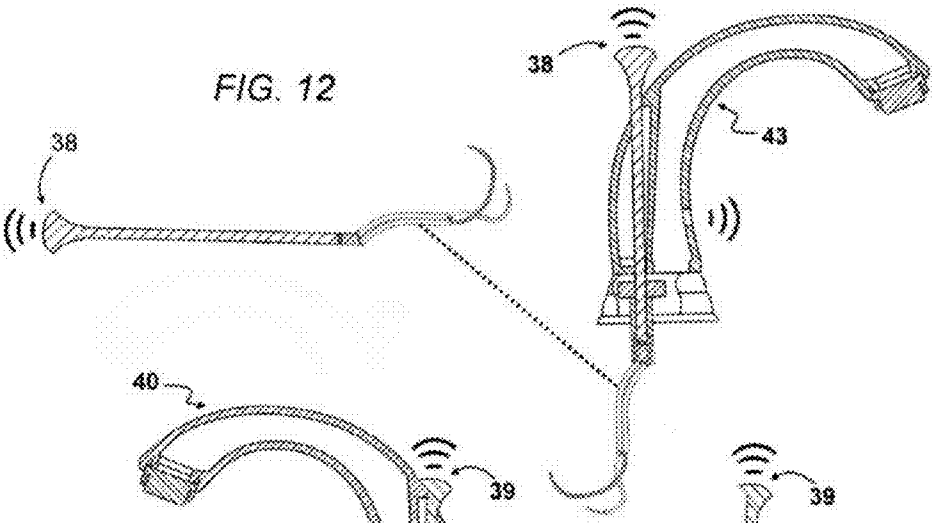


FIG. 12

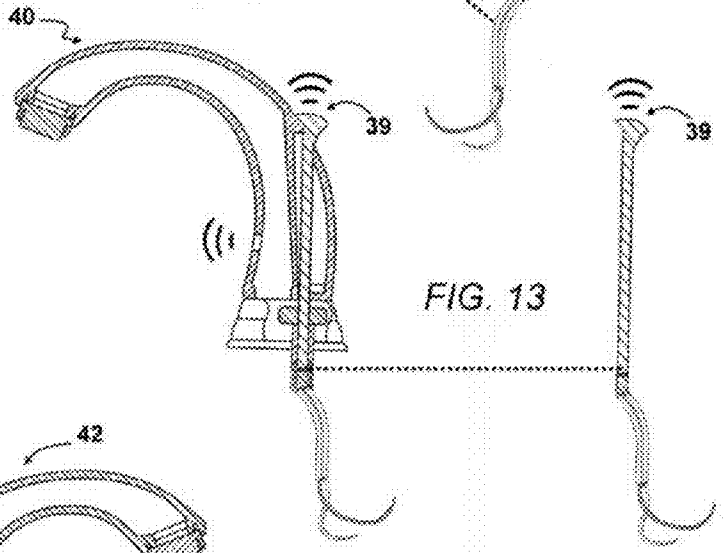


FIG. 13

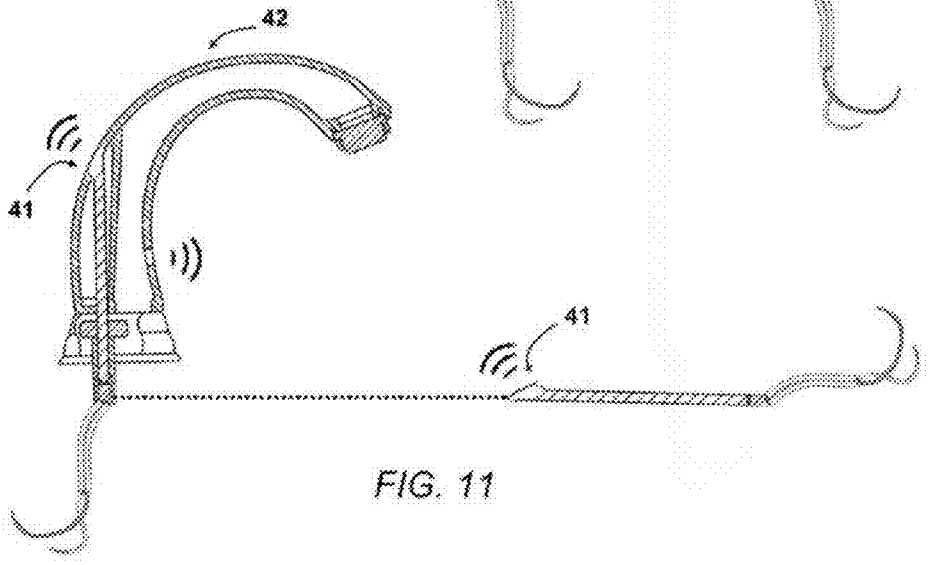


FIG. 11

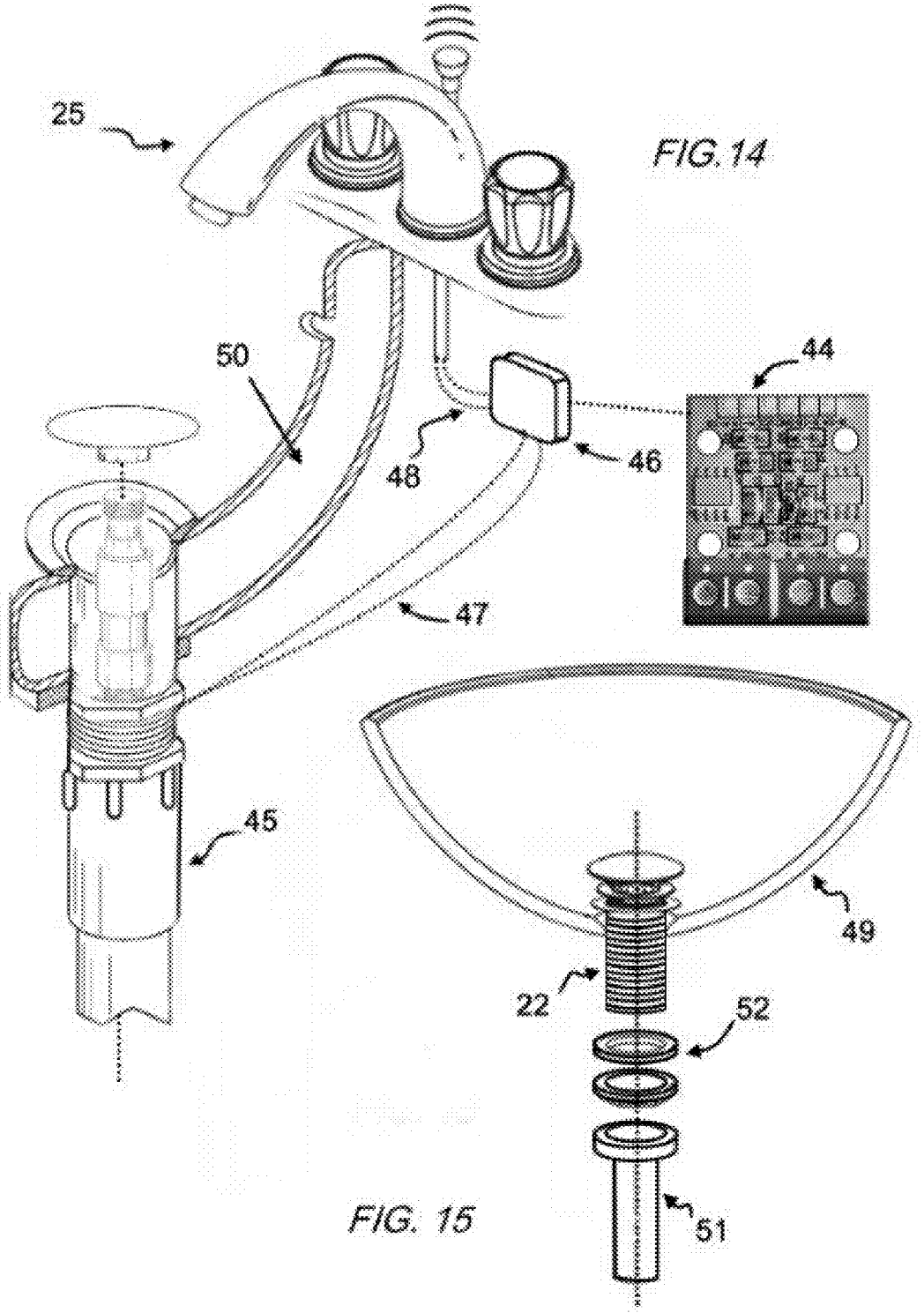


FIG. 14

FIG. 15

AUTOMATIC POPUP DEVICE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] Not Applicable.

FEDERALLY SPONSORED RESEARCH

[0002] Not Applicable.

FIELD OF INVENTION

[0003] The invention herein refers to an actuated popup drain plug that falls within, but not limited to, the plumbing industries governing sinks, sink drain and vertical electronic actuated devises, conventional and electronic motion sensing faucet applications, automated devises. Apparatus that facilities and promotes hygiene in commercial and residential settings. More specifically, the invention allows sinks drain plug stoppers to be controlled automatically via an electronic faucet or other remote signal delivery system. Such as WiFi smart home connections

BACKGROUND OF INVENTION

[0004] The following indicates background information as it pertains to the aforementioned invention.

[0005] Categorically, an automated popup sink drain for commercial and residential lavatories applications. Comparatively, most of us are more familiar with its commonly known cousin the manual "PopUp Sink Drain" operated by manually pulling or pushing a metal rod perched upon the backside of the sink faucet.

[0006] Historically, as to the date of this invention 99.9% of all residential and commercial lavatories in the United States, China the Middle East, and around the world still operate their sink drain plug stopper manually. Ironically, we have electronic faucets that activate water flow by hand motion but none so modern in which they automate the manual process of opening or closing the sink drain plug. This invention seeks to introduce a new automated solution for an old, antiquated and out dated manual operation. A low cost public benefit is a time saving modem convenience—energy efficient. The added benefits in health care saving by preventing the spread of infections through use of automation.

[0007] While there has been some prior art in the field of automated drain valves, for instants, U.S. Pat. Nos. 6,308,351; 4,945,579; 7,530,123 and others, they all contain various short comings, different in manner and/or nonspecific by structure to the present invention. For example, (1) they are overly complicated in their design and thus expensive to manufacture and maintain. With more moving parts the greater the chance of break down. (2) The method of actuation differs from the present invention, internal vs. external actuation methods, and (3) The installation of the devise shown in the prior art is overly cumbersome. Nearing requiring someone with a technical engineering degree to install.

[0008] The present invention is user friendly, low cost, compact universal device that can be installed in less than 15 minutes without the added cost of a professional installer. Advantages of improvements, would include, but not limited to, consumer cost saving through lower production cost, low maintenance, longer life.

[0009] None of the prior art devises appear to provide much in the way of teaching about actuated popup drain assemblies.

BRIEF SUMMARY OF THE INTENTION

[0010] The brevity of this summary disclosure is not intended to include every element or feature within the scope of the invention, nor intended to be exhaustive or comprehensive by its nature or description.

[0011] By in large part, the invention an automatic popup drain assemble powered by a linear encapsulated actuator designed to open & close off the flow of liquid from a basin sink of standard sizes and configurations.

[0012] The automatic drain assemble is mounted in the position of a standard conventional non-automatic sink drain. The encapsulated part that houses the actuator is made up of primarily to separate pieces which interact together to form a single waterproof encapsulated component housing. The two pieces interact with one another on a linear axes while the force needed to telescope the sliding interaction between to two component parts is powered by the internal actuator.

[0013] Two O-rings that provide the water proof seal of the individual capsules are situated on the upper side of the lower end capsule. The positioning of the O-ring ensures that the internal actuator is waterproofed. Two O-rings provide a double layer of moisture protection from water flow or back flow.

[0014] The upper end of the capsule is threaded so as to attach to the drain stopper to prevent the flow of water through the drain. The drain stopper can easily be removed without the removal of the capsule housing the actuator. This allows the user to more easily remove any debris that may accumulate inside of the drain.

[0015] A secondary feature of the removable stopper is the ability to manually fixate the stopper over the drain whole preventing water flow. The lower end of the capsule housing the actuator is also threaded for fast and easy installation. This function allows for the maintenance removal of the capsule without the removal of the sink drain itself.

[0016] The drain housing insert is female threaded to primarily receive and support the encapsulated actuator. The drain housing insert is a wagon wheel shape support so as to catch any debris or objects that may accidental fall down the drain passage way. The lower housing of the capsule that contains the actuator feeds a low dc voltage wire through a small hole at the end of capsule. The opening in the capsule that feeds the wire is sealed and waterproofed around the extended wire. The extended wire from the encapsulated housing feeds through a hole on the side of the drain housing. That hole is sealed by a rubber wire grommet to prevent water leakage. For installation purposes, the encapsulated housing is first attached to the drain housing insert. Once attached the wire is then feed through the drain housing hole for connection to the power source and controller that drives the actuator. The intricacies of the presents invention will become more apparent by the following description. A further description of the invention is made by reference to the drawings which illustrate the preferred embodiments of the invention. Generally, the embodiments do not represent the full breath or scope of the invention.

BRIEF DESCRIPTION OF DRAWINGS

[0017] The drawing described herein are for illustrative purposes only of selected embodiments and not showing all possible implementation, and are generally not intended to limit the scope of the present disclosure.

[0018] FIG. **1** is a perspective view of the encapsulated housing, as embodiment of the present invention.

[0019] FIG. **2** is a perspective view of the encapsulated housing separated into two halves as the two halves would join together.

[0020] FIG. **3** is a perspective view of the actuating device which propels the encapsulated housing in a vertical direction.

[0021] FIG. **4** is an enlarge catch view of the encapsulated housing as it attaches to the drain.

[0022] FIG. **5** is a representational view of a perceived delivery system on a conventional faucet that triggers the power to the actuator that raises and lowers the drain plug, by touch actuation.

[0023] FIG. **6** is a representational view of a perceived secondary delivery system on a conventional faucet that triggers the power to the actuator that raises and lowers the drain plug, by Infrared (IR) (PIR) motion sensors.

[0024] FIG. **7** is a representational view of a third perceived delivery system that triggers the power to the actuator that raises and lowers the sink or bath drain plug by an RF, Radio frequency signal emitted by remote control or a wall mounted touch switch.

[0025] FIG. **8** is a representational view of a perceived delivery system on an electronic faucet which activates the flow of water by motion sensor. A motion sensor mounted on the back side of the faucet that would trigger the sink drain plug to open or close by the present invention.

[0026] FIG. **9** is a representational view of a perceived delivery system on an electronic faucet which activates the flow of water by motion sensor. A touch of the same faucet would effective open or close the same sink drain plug.

[0027] FIG. **10** is a representational view of a perceived delivery system on an electronic faucet which activates the flow of water by motion sensor. The attachment of a push-pull rod with Infrared (IR) (PIR) motion sensors mounted at the top of the push-pull rod would trigger the actuator which opens and closes the sink drain plug.

[0028] FIG. **11** is a cross sectional representational view of a perceived faucet demonstrating the location of the signal delivery device by type and placement that would trigger the actuator to open or close the popup sink drain plug.

[0029] FIG. **12** is a cross sectional representational view of a perceived faucet demonstrating the location of the signal delivery device by type and placement that would trigger the actuator to open or close the sink drain plug.

[0030] FIG. **13** is a cross sectional representational view of a perceived faucet demonstrating the location of the signal delivery device by type and placement that would trigger the actuator to open or close the sink drain.

[0031] FIG. **14** is a cross hatch sectional view of the automatic drain plug assembly as it would attach to any standard sink configuration with or without water over flow.

[0032] FIG. **15** is a cross sectional view of the automatic drain plug assembly as it would attach to any standard vessel sink bowl configuration.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

[0033] The following describes embodiments of the invention and are provided to more fully convey the scope of the same to those who are skilled or otherwise unskilled in the art. Numerous specific details are set forth such examples of specific components, devises and methods, to provide a more thorough understanding of the embodiments of the present invention. It will be apparent to those skilled in the art that specific details need not be illustrated. That the exampled embodiments may be embodied in many different forms and that neither should be construed to limit the scope of the disclosure. In some example embodiments, well-known processes, well-known device structures and well-known technologies are not described in detail.

[0034] In reference to FIG. **1** an illustration is shown of the mechanical encapsulated devise of the present invention. The lower body of the capsule **5** is of smaller diameter than the upper body part **2** of the capsule. This allows **2** to slide in a fluid motion over the body of **5**. The interaction between **2** and **5** prevents the centrifugal force of water from entering the capsule. The upper body of the capsule **2** is threaded at **3** to allow the connection between the stopper **16** at the intersection of **1**, the threaded body of the drain stopper. The lower body of the capsule at **5** is threaded to allow the attachment of the body to the drain pipe. This position secures the capsule in a upright linear position to the drain pipe. The bottom side of the capsule contains three holes. FIGS. **2**, **6** and **15**. Two hole secure the solenoid to the lower boy of the capsule while the larger center hole of the capsule feeds a low voltage wire **14** from the solenoid through the capsule at **15**. The largest of the three holes. The solenoid is secured to the lower body of the capsule by two screws **8** to prevent the ingress of moisture into the screw holes, FIG. **2** at **6** the holes are sealed off by the O-ring **13**. The O-ring sits between the lower body of the capsule and the horizontal wagon wheel support, FIG. **4** at **21** which together seal off the screw holes via the O-ring.

[0035] The larger whole at the bottom of the lower capsule from which the wire is feed is sealed off by industrial grade silicone **4** to prevent water intrusion. FIG. **2** depicts the capsule in its two main parts. The lower and upper portion **2**. The cavity of the upper body of the capsule at **18** receives the lower body of the capsule at **5**. Two O-rings at **11** and **12** double seal the capsule to prevent the intrusion of water into the capsule which houses the solenoid FIG. **3** at **7**. The solenoid fits inside the lower body of the capsule secured by the holes located at the bottom of the solenoid FIG. **3** at **17**. A spinner **10** connects to the shaft **9** of the solenoid. A key element of the spinner is its connection to the upper body of the capsule. This support allows the upper body of the capsule to move in the linear direction reverse or forward to manipulate the position of stopper plug from open to closed. The spinner support allows for two different configurations as it relates to the reverse or forward motion of the upper body of the capsule. A spinning motion of the solenoid or an upward thrusting of a solenoid or dc motor achieves the same results.

[0036] A more illustrative diagram of how the piece come together is shown in FIG. **4**. The upper and lower body of the capsule is concealed inside of the drain pipe **22** and evenly spaced **19** to allow for the maximum flow of water drainage through a standard threaded pipe **23**. A hole **20** is position below the wagon wheel support **21** to allow the low dc voltage wire **14** to feed through the pipe for connection to the power supply. The pipe hole is sealed by a grommet to prevent water flow.

[0037] By illustrations FIG. **5**, FIG. **6**, FIG. **7** show the triggering mechanism that raise and lower the automatic popup device. The popup device can be actuated by remote control **31**, or by a wall mount touch switch **29**, by simply touching the wall switch at **30**. A third method of actuating the popup device is by (PIR) Passive Infrared sensor **26** or (IR)

Infrared motion sensor. The triggering device would be attached to a conventional type water faucet **27**. The conventional standard push/pull rod would be replaced with a push/pull rod equipped with motion sensors. A forth method of actuating the popup device is by touching **24** a spread handle type faucet **25** equipped with a standard push/pull lift rod **28**.

[0038] The automatic popup device would technological update conventional style water faucets without having to replace the faucet style itself. FIGS. **8**, **9** & **10** illustrate a motion activated water faucet in most common use today. Those are disclosed in two different styles. With or without a conventional push/pull rod to open and close the water stopper plug **37** illustrates a triggering mechanizing by motion sensor at **36**. The motion activated water faucet by type **35** could be easily wired to trigger the automatic popup device **33** by touch in the same fashion as the conventional water faucet. Or the entire motion activated water faucet **34** would be configured by the industrial process molding the motion sensing window to the back of the water faucet **32** so that the window was a surface as smooth as the water activating motion sensor window on the front of the faucet **32***a*.

[0039] As illustrated in FIG. **11**, **12**, **13**, there are three primary style motion sensing triggering mechanizing designed to actuate the automatic popup device. **41** is a molded type. That is the motion sensing trigger is formed into the body of the faucet **42**. A smooth surface is achieved by this style and would be the first fully automatic electronic faucet with automatic water & automatic popup water stopper of its kind. The conventional motion activated water faucet at **40** is not equipped with a sensing device that would trigger the automatic pop device. The implementation of the motion sensor rod **39** would convert a hybrid motion sensing faucet to fully automatic. Hybrid-faucets, operates by motion activated water and manual push/pull rod configuration that raises the drain stopper. **38** is a third style motion sensing design push rod attached to a water faucet **43** that would trigger the automatic popup device. There are literally hundreds of millions of faucets worldwide that could be easily upgrade with this new technological invention.

[0040] A part from the triggering mechanizing that send the signal to the automatic popup device is the drain housing itself shown again in FIG. **15** at **22**. The automatic popup device drain housing is of industry standard thread type and shape. This allows the invention to attach to any standard size vessel sink bowl **49**, any standard size drain assembly at **51**, and **45** or any standard size vessel sink mounting ring at **52**. The invention is further compatible with all standard size basin sinks with or without water over flow **50**. FIG. **14** illustrates the wire assembly **17** of the invention from the automatic popup device to the controller **46**. And from the sensing rod to the controller. While **44** illustrate the small and compact size of the circuit board of the controller.

[0041] The foregoing description of the embodiment has been described for the purposes of illustration and description. Its is not intended to be exhaustive or to limit the invention. Individual elements or features of a particular embodiment are generally not limited to that particular embodiment, but where applicable are interchangeable and can be used in a selected embodiment, even if not specifically shown or described. The same may also be varied in many ways. Such variations are not to be regarded as a departure from the invention, and all such embodiments are intended to be included within the scope of the invention.

[0042] Although the invention has been illustrated and described in detail in the drawings and description, the same is to be considered as illustrative and not restrictive in character, being understood that only preferred embodiments have been shown and described, and that all changes and modification that come within the spirit of the invention are desired to be protected. Undoubtedly, many other variations on the themes set forth herein will occur to one having ordinary skill in the art to which the present invention most nearly pertains, and such variations are intended to be within the scope of the invention as described herein.

What is claimed is:

1. An automatic popup device assemble for lavatory sinks having a drain outlet, the assembly comprising: waterproof encapsulate cartridge; a linear positioned solenoid dc motor so as to provide the force to open and close the drain stopper; a internal cartridge holding configuration within the drain as to support the encapsulate cartridge in a linear position.

2. The triggering system that operates the automatic popup device of claim **1**;

more specifically the Infrared triggering actuation system; the radio frequency triggering system; the touch capacitance triggering actuation system and the smart home wifi access triggering actuation system as to the automation of the popup device.

3. The deliver hardware that houses the triggering system of claim **2**: the conventional vanity water faucet; the hybrid vanity water faucet; the electronic motion sensing water faucet as the hardware of embedding the triggering system that operates the automatic popup device as describe herein.

* * * * *