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(54) **HVAC ENVIRO-CLEAN VALVE - SO MODEL**

(57)

ABSTRACT

(76) Inventors: **Atwood M. Kimbrough**, Pace, FL (US); **Carl Brian Kimbrough**, Milton, FL (US)

Currently, there are no products available which allow a user to solely remove microbial and bacterial growth inside a blocked HVAC condensate drain line using compressed air without cutting into or disassembling the drain line. Our valve is an in-line condensate drain line valve that can be installed easily, quickly and economically, either during new construction or onto existing HVAC systems. The HVAC user can remove microbial and bacterial growths without cutting into or disassembling the drain line by injecting compressed air through the valve. The design of our valve allows the user to perform safe and routine maintenance to the HVAC drainage system without having to resort to expensive and repetitive service call repairs over the lifetime of the HVAC system. The valve is further designed to prevent undesirable reverse airflows into the HVAC system and home or building, caused by a dry trap in the condensate drain. The prevention of reverse airflows and reduction of microbial and bacterial growth will have a positive impact of Indoor Air Quality.

Correspondence Address:
Atwood M. Kimbrough
P.O. Box 1081
Pace, FL 32571 (US)

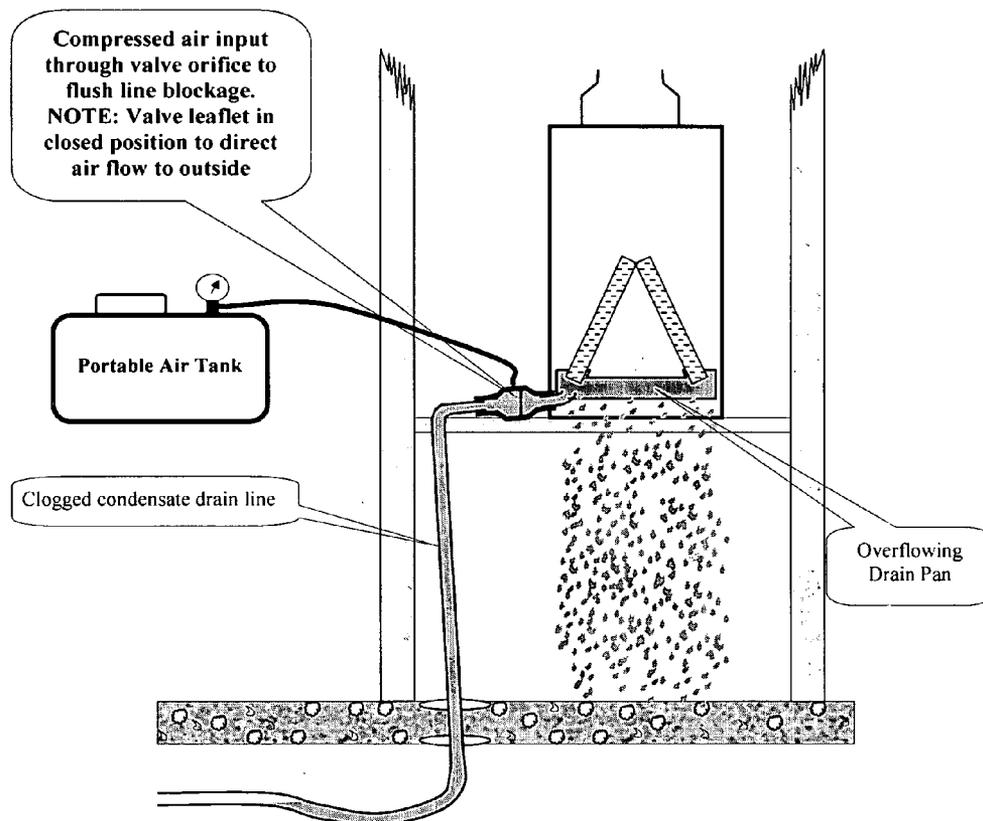
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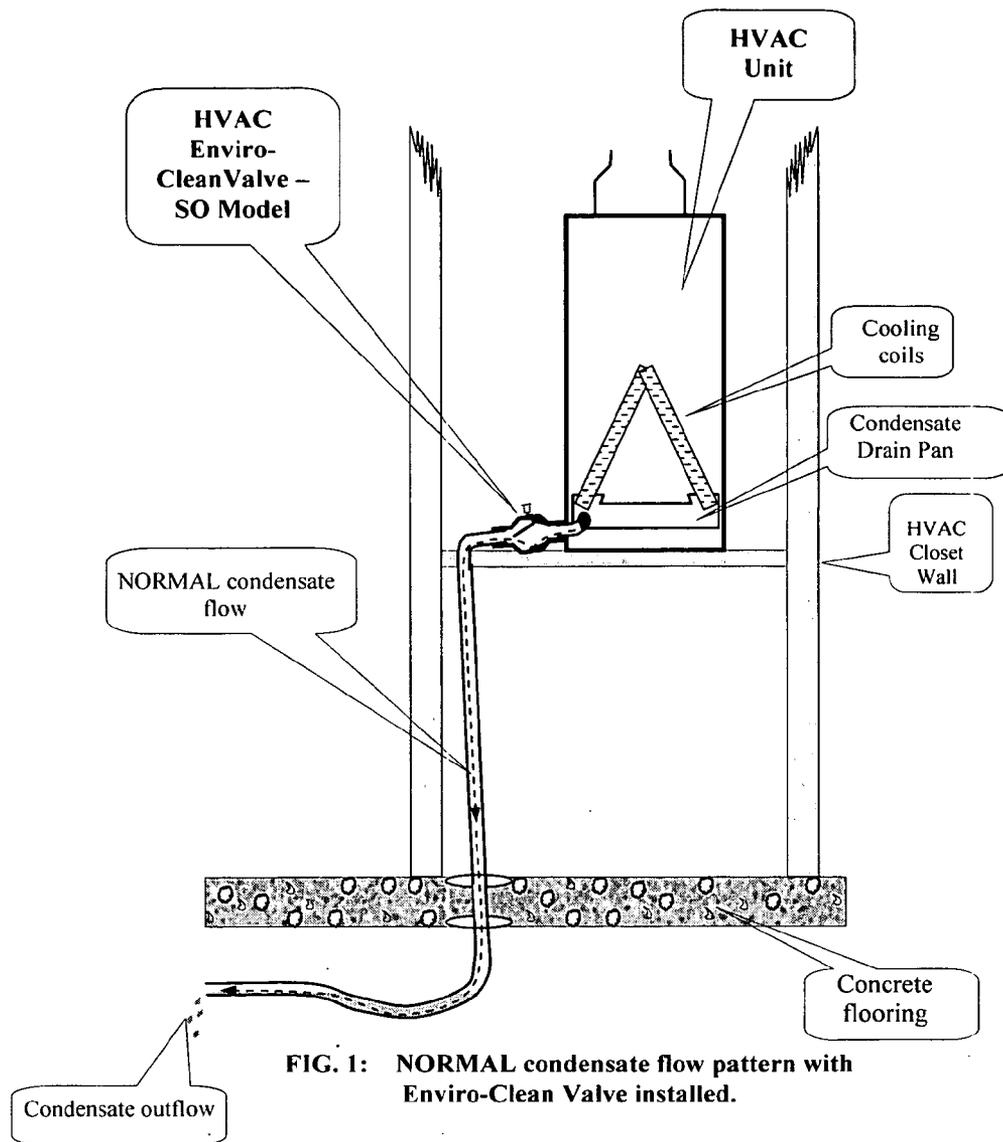


FIG. 1: NORMAL condensate flow pattern with Enviro-Clean Valve installed.

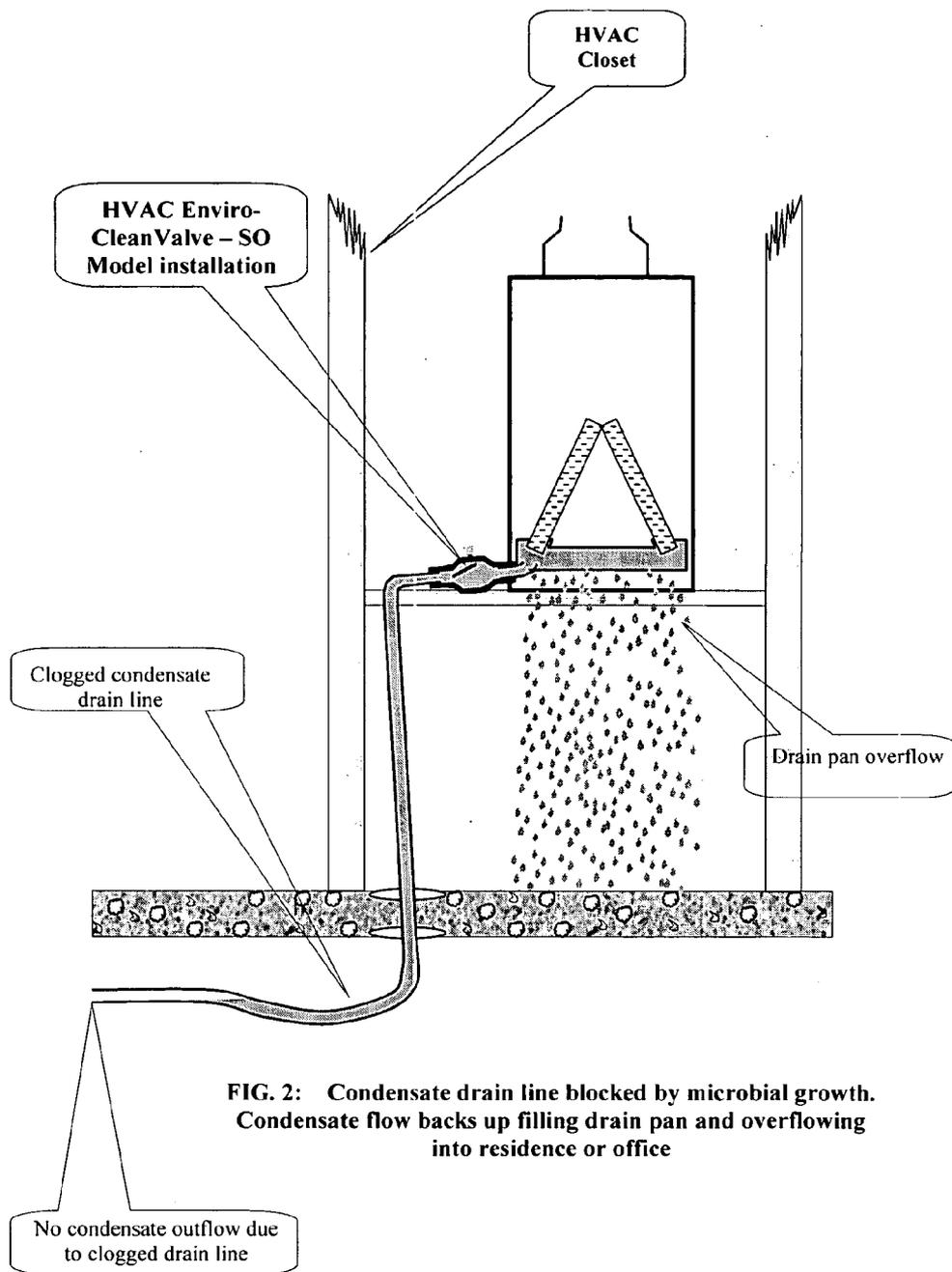


FIG. 2: Condensate drain line blocked by microbial growth. Condensate flow backs up filling drain pan and overflowing into residence or office

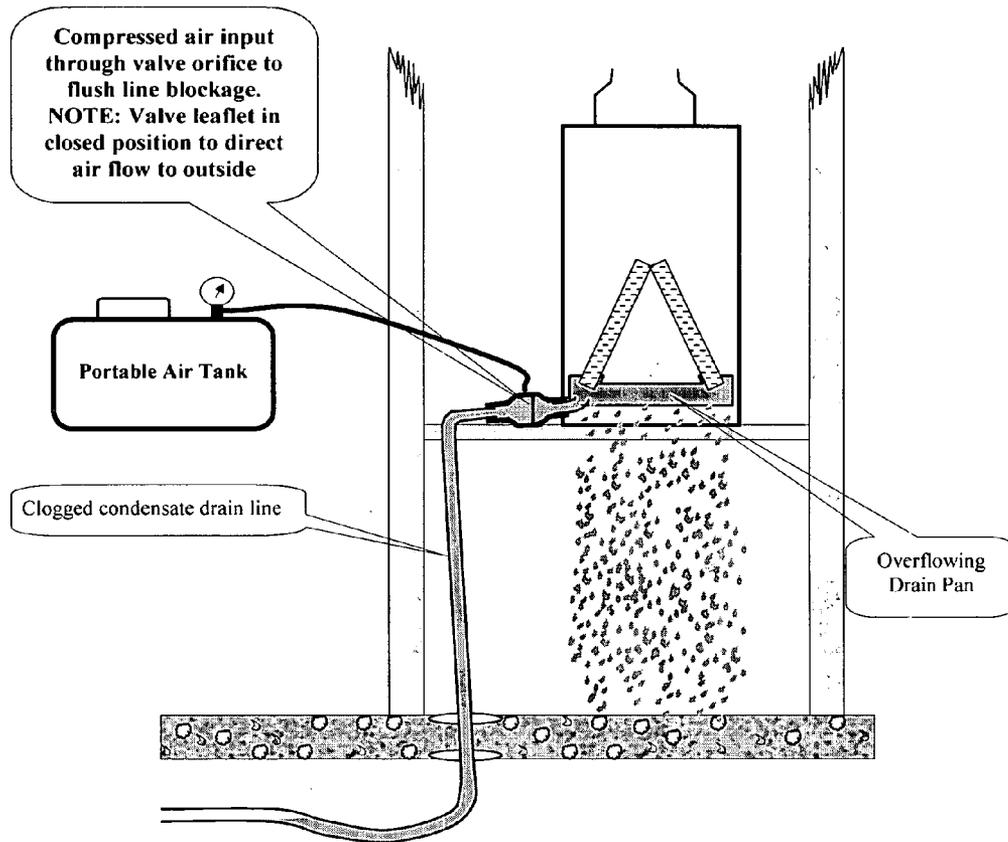


FIG. 3: Compressed air input through valve orifice to flush line drain line blockage. NOTE: Valve leaflet closure to direct air flow toward line blockage.

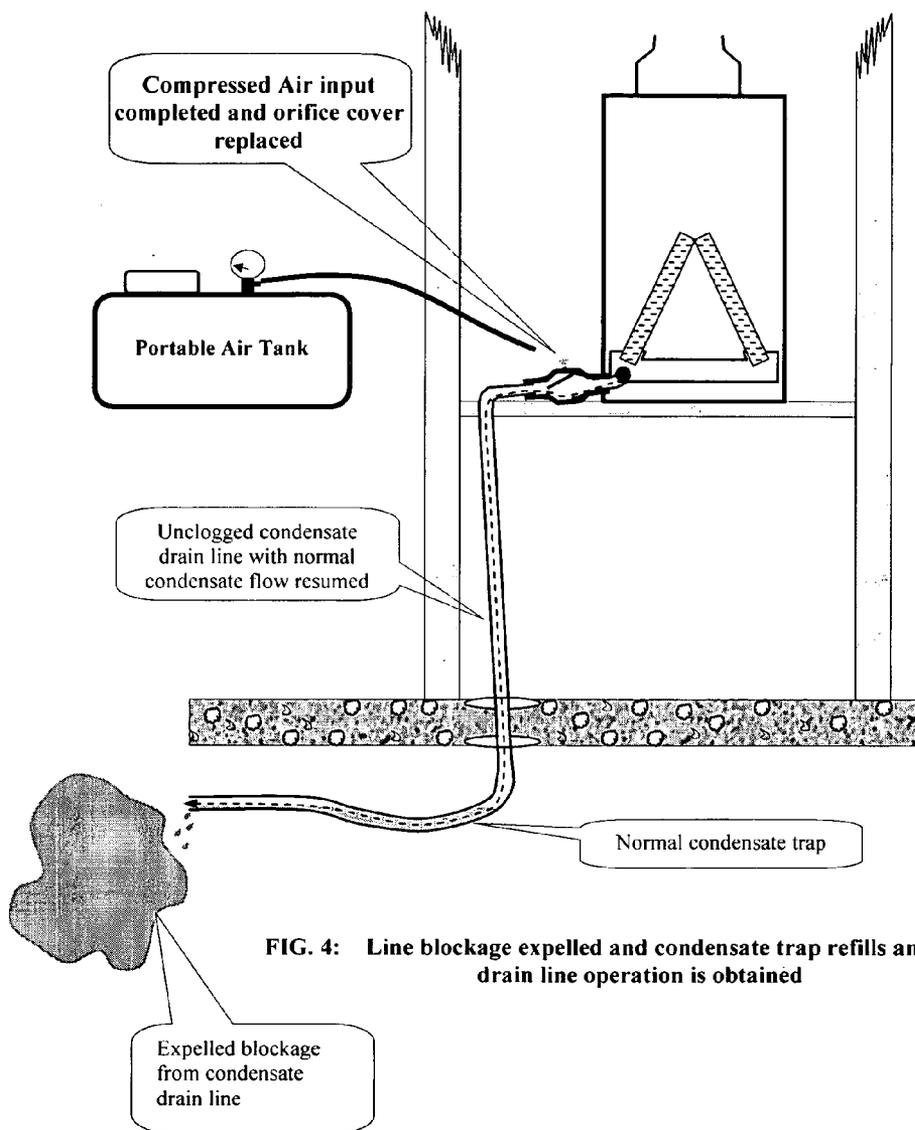


FIG. 4: Line blockage expelled and condensate trap refills and normal drain line operation is obtained

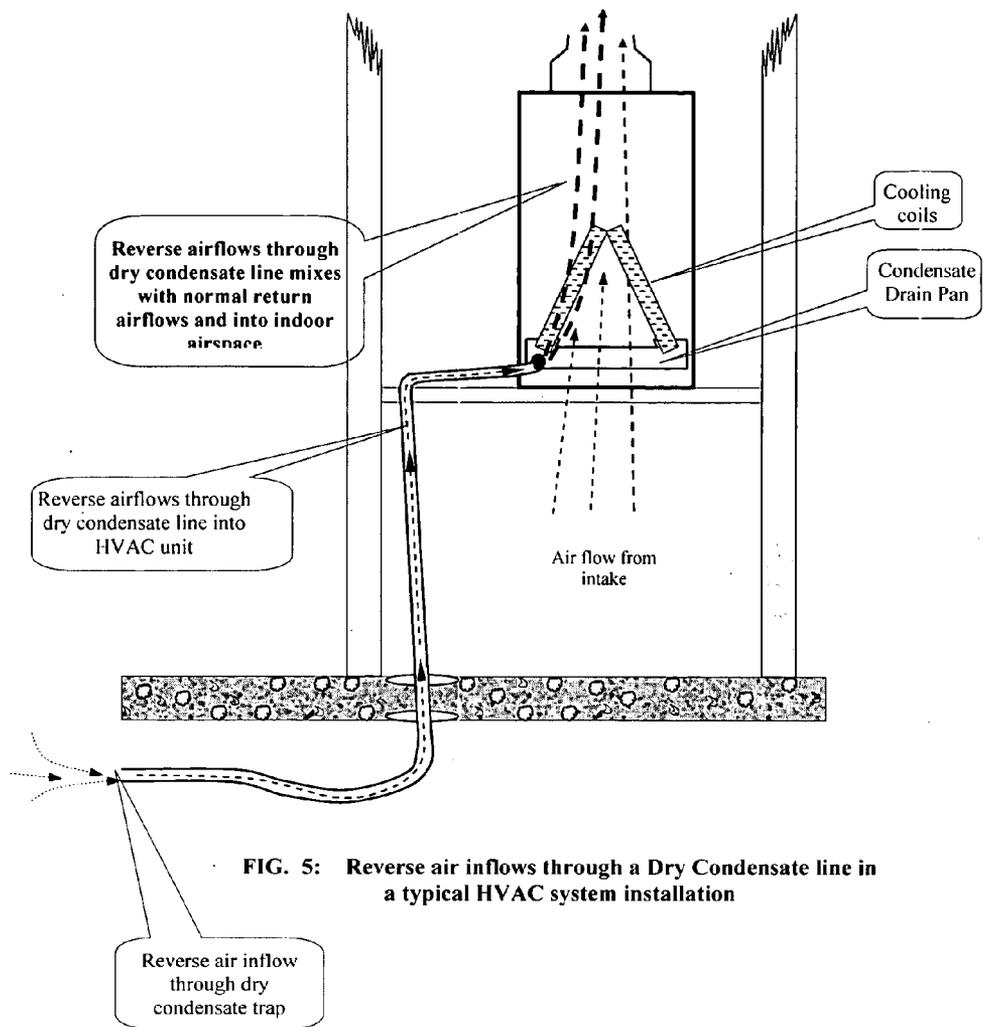
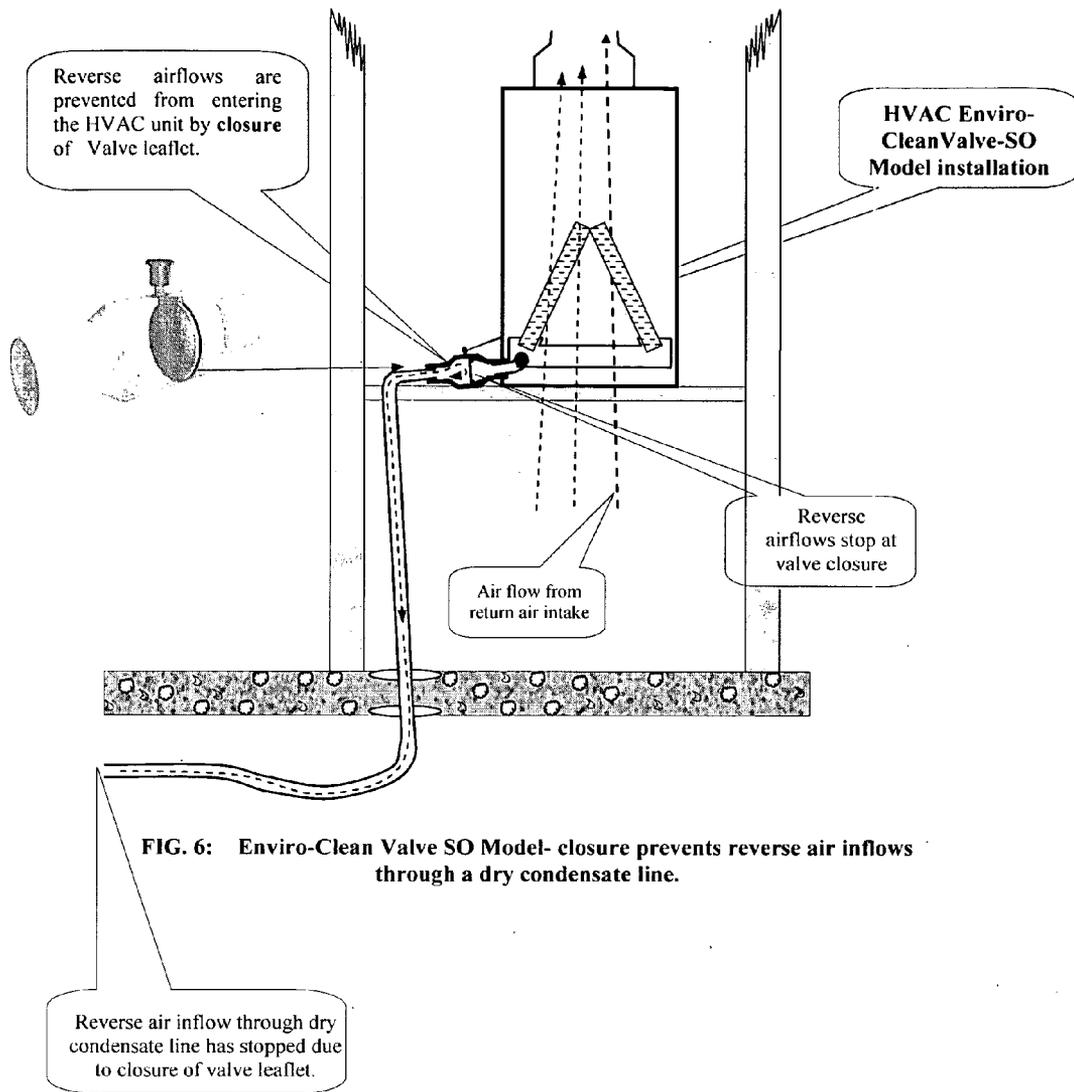


FIG. 5: Reverse air inflows through a Dry Condensate line in a typical HVAC system installation



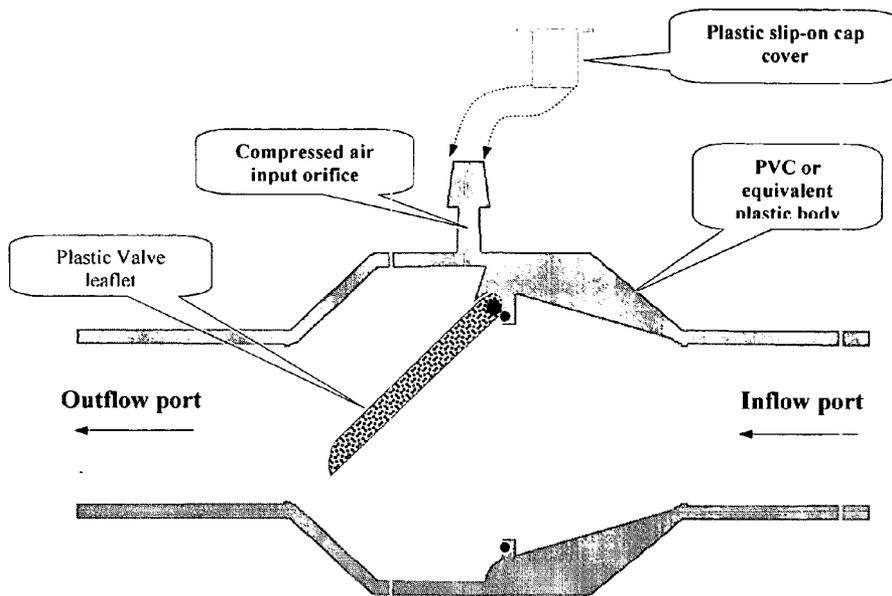


Fig. 7: HVAC Enviro-Clean Valve - SO Model Side view - for typical residential HVAC condensate drain line installation

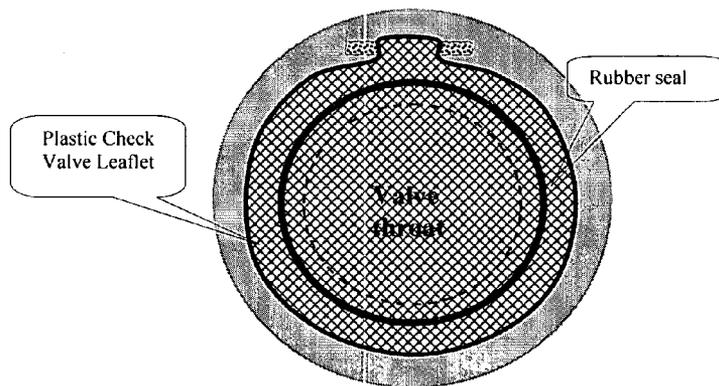


FIG. 8: Frontal view at check valve

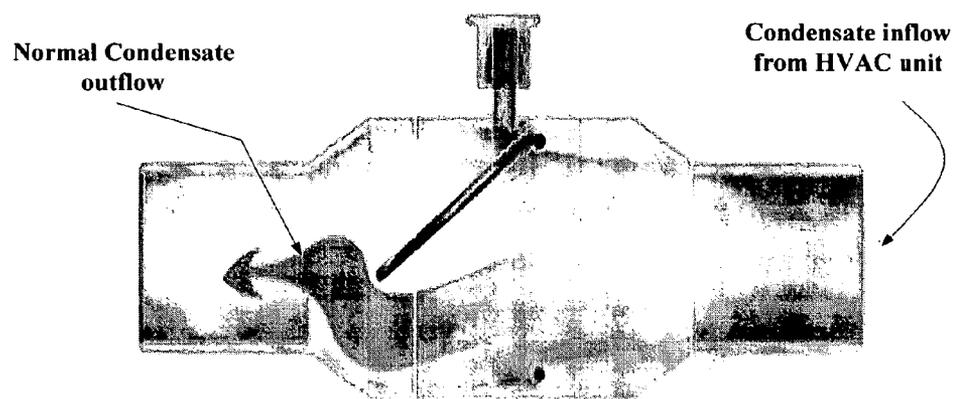


Fig. 9: Normal condensate inflow and outflow patterns

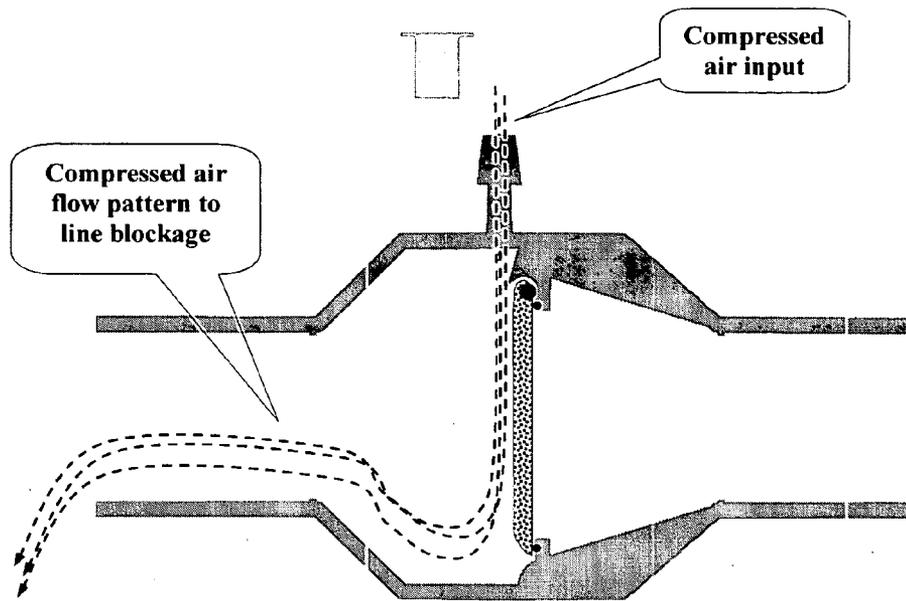


Fig. 10: Compressed input and air flow pattern to condensate line for removal of condensate line blockages

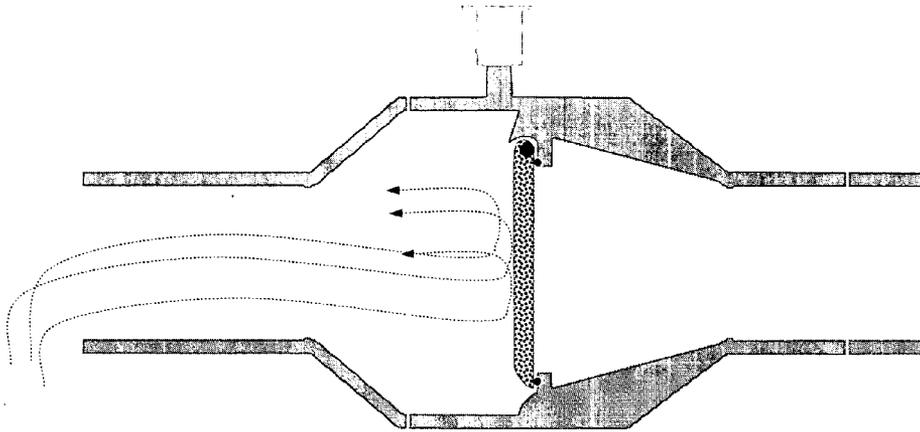


Fig. 11: Reverse air inflows through a "DRY CONDENSATE" line closes valve leaflet blocking the entry of the reverse air flow into HVAC unit.

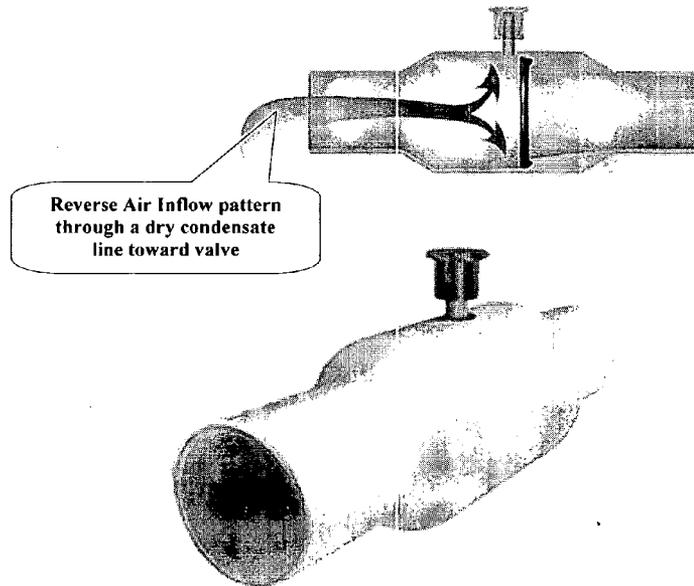


Fig. 12: HVAC Enviro-Clean Valve – SO Model

HVAC ENVIRO-CLEAN VALVE - SO MODEL

BACKGROUND OF THE INVENTION

[0001] The field of endeavor to which our invention pertains is Heating, Ventilation and Air Conditioning systems for the home, office, and apartment or wherever a heating and cooling air-handling unit may be installed.

[0002] Current technology addressing HVAC problems our invention solves is as follows:

[0003] 1. When a blockage occurs in a condensate drain line, a HVAC repairman must be called to disassemble the drain line and inject compressed air into the line to remove the blockage. This normally results in a costly repair bill and considerable down time to the consumer. Another method of cleaning the drain line involves using a water hose to force water into the drain line from the outlet end and many times results in spillage of water, bacteria and microbial matter into the HVAC unit and interior of the building or dwelling, all of which have a negative impact on Indoor Air Quality. An additional method used to remove microbial growths is to suction the blockage from the drain line and drain pan using a vacuum cleaner which results in large volumes of unclean air being released into the home or building interior by this cleaning process.

BRIEF SUMMARY OF THE INVENTION

[0004] One of the most common problems that a user of a Heating, Ventilation and Air Conditioning (HVAC) system faces, is that of clogged condensate drain lines and overflowing drain pans which cause untold damage annually. Typically, when this occurs, the owner or user of the HVAC system must call a repairman to cut the drain line, remove the blockage and clear the line for normal use. This usually occurs numerous times during the life of the HVAC system and results in a costly expense for the consumer for the service call and repair, inconvenience, damage to carpet and building or dwelling interior and a danger to Indoor Air Quality (IAQ).

[0005] The instant invention allows for easy access whereby one can easily treat the condensate drain line with inexpensive household bleach to minimize the potential for microbial and bacterial growth while favorably affecting IAQ. If the drain line does become blocked, the line can be cleared by the introduction of compressed air to clear the blockage without the necessity of cutting into the drain line. Additionally, problems associated with a "dry condensate trap" will be eliminated by the prevention of reverse airflows through the drain line. "Dry condensate trap" problems occur during times in which the HVAC unit is sparingly used and the water trap evaporates, thus leaving the drain line open and become a source of air intake for the HVAC system and have a detrimental effect on health and IAQ. Incorrect condensate drain line configuration can also cause the improper formation of a condensate trap.

[0006] The primary value of our product to consumers and HVAC system owners is as follows:

[0007] 1: Economic: Installation can be made during the initial installation of the HVAC unit or a retrofit can be made by the user or owner at anytime, inexpensively and without special tools.

[0008] 2: Ease of use: If a condensate drain line becomes blocked by microbial growths, compressed air can be injected through a valve orifice by the consumer to quickly and easily remove the line blockage. Disassembly of the condensate line is not necessary.

[0009] 3. Indoor Air Quality: By reducing microbial and bacterial growth and reducing drain pan spillages onto carpeting and interior of homes and buildings, there will be an improvement to Indoor Air Quality. Reverse airflows will be eliminated in systems operating with a "dry condensate trap" which will further enhance IAQ.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

[0010] 1. FIG. 1: HVAC normal condensate flow pattern

[0011] 2. FIG. 2: Blocked Condensate line and overflow

[0012] 3. FIG. 3: Compressed air input through HVAC Condensate Ejection Valve

[0013] 4. FIG. 4: Removed line blockage and normal line function resumed

[0014] 5. FIG. 5: Reverse air inflows through a dry condensate line

[0015] 6. FIG. 6: Valve closure preventing reverse airflows entering HVAC unit

[0016] 7. FIG. 7: HVAC Condensate Ejection Valve—cut away—side view

[0017] 8. FIG. 8: Internal Check Valve—side view

[0018] 9. FIG. 9: Normal condensate flow pattern through valve

[0019] 10. FIG. 10: Compressed Air flow pattern through valve

[0020] 11. FIG. 11: Reverse Air Flow Pattern into valve from dry condensate line—side view

[0021] 12. FIG. 12: HVAC ENVIRO-CLEAN VALVE—SO Model

DETAILED DESCRIPTION OF THE INVENTION

[0022] The instant invention is composed of a Poly Vinyl Chloride (PVC) or equivalent plastic body with an inlet port connection end which allows for connection at the HVAC unit. The valve contains an internal plastic wafer check valve designed to prevent reverse air inflows into the HVAC unit which may occur through a dry condensate line. The outflow end has an outlet port for connection to the outflow portion of a condensate drain line. One inlet orifice on the top side of the valve body allows the introduction of compressed air and is covered by a slip on plastic cap when not in use (See FIGS. 7, 8, 9).

[0023] The HVAC Enviro-Clean Valve—SO Model is designed to be installed in a condensate drain line (See FIG. 1) and allows for easy access by the consumer to quickly and easily remove HVAC condensate drain line blockages using compressed air (See FIG. 3, 4, 10).

[0024] It is desirable to prevent HVAC drain pans from overflowing and causing interior damage to homes and other

buildings. Odors caused from damaged carpets which can remain wet for extended period of time and be a source of microbial and bacterial growth which cause a reduction in IAQ and is unhealthy to the consumer. It is desirable to prevent reverse air inflows into the HVAC system as a result of a "dry condensate trap". The HVAC Enviro-Clean Valve—SO Model is designed to prevent reverse airflows into the HVAC system through a dry condensate drain line. (See **FIGS. 6, 11**)

1. A plastic flow control device attached to a HVAC unit condensate drain line for removal of blockages within the drain line by the introduction of compressed air into the drain line through the valve and is comprised of

an inlet port of the flow control device having one end connected to a condensate outlet port of the HVAC unit;

an outlet port of the flow control device having the other end connected to an upstream end of the condensate line;

a flushing port or orifice of the flow control device, adapted to allow an outside compressed air source to be introduced, for the purpose of flushing any blockages or microbial growth within the condensate line; and

a single internal check valve disposed within the flow control device for the purpose of directing compressed air flow therein and simultaneously preventing reverse compressed air and reverse fluid flow into the HVAC unit, whereby during normal operation the check valve is allowed to open freely when fluids flow from the HVAC unit.

2. The flow control device of claim 1, wherein the check valve remains open during normal operation and moves to a closed position without manual intervention upon the introduction of compressed air into the flushing port for the purpose of removing any -blockages within the condensate line.

3. The flow control device of claim 1, wherein the check valve remains open during periods of normal operation and allows the check valve to move to a closed position without manual intervention in the event of a dry condensate line, thus reducing or preventing air inflows across residual microbial growth within the condensate line and into dwelling or office airspace.

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