May 29, 1962 C. E. STEVENS 3,036,814

INLET VALVE ASSEMBLY

Filed Dec. 24, 1959 2 Sheets-Sheet 1

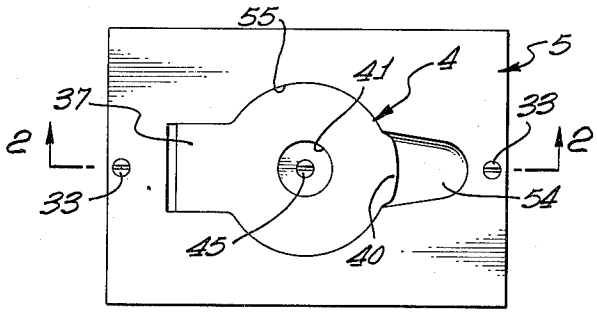


FIG. 1.

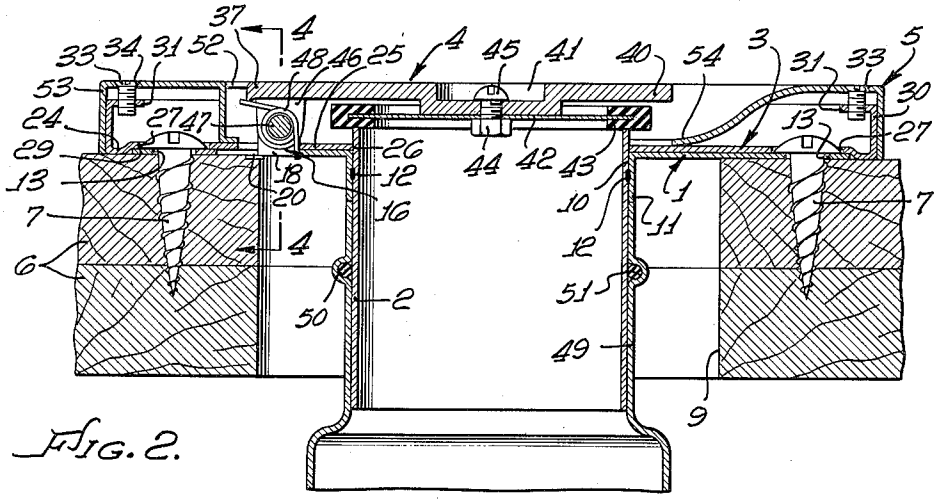


FIG. 2.

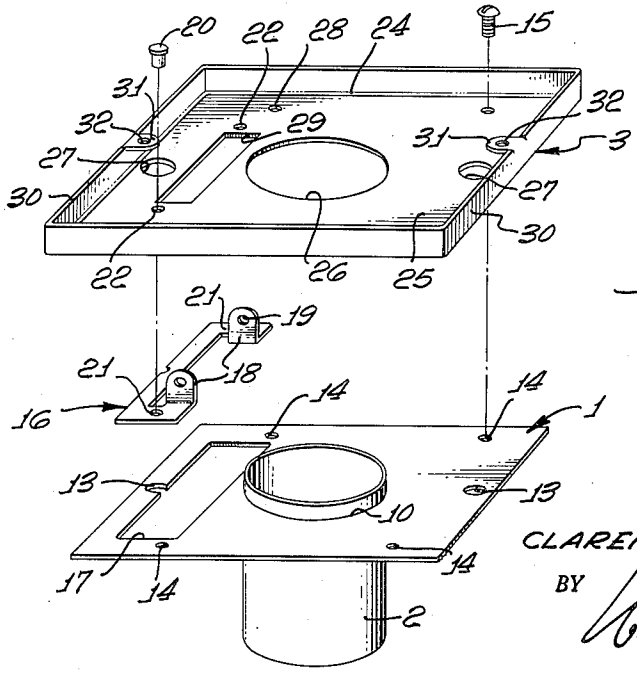


FIG. 3.

INVENTOR.
CLARENCE E. STEVENS
BY
ATTORNEY.

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INLET VALVE ASSEMBLY

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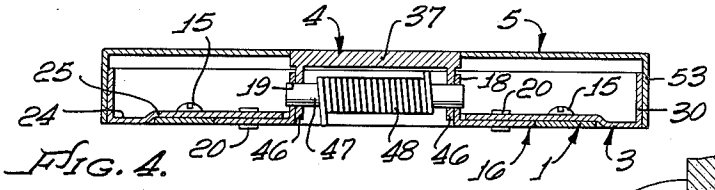


FIG. 4.

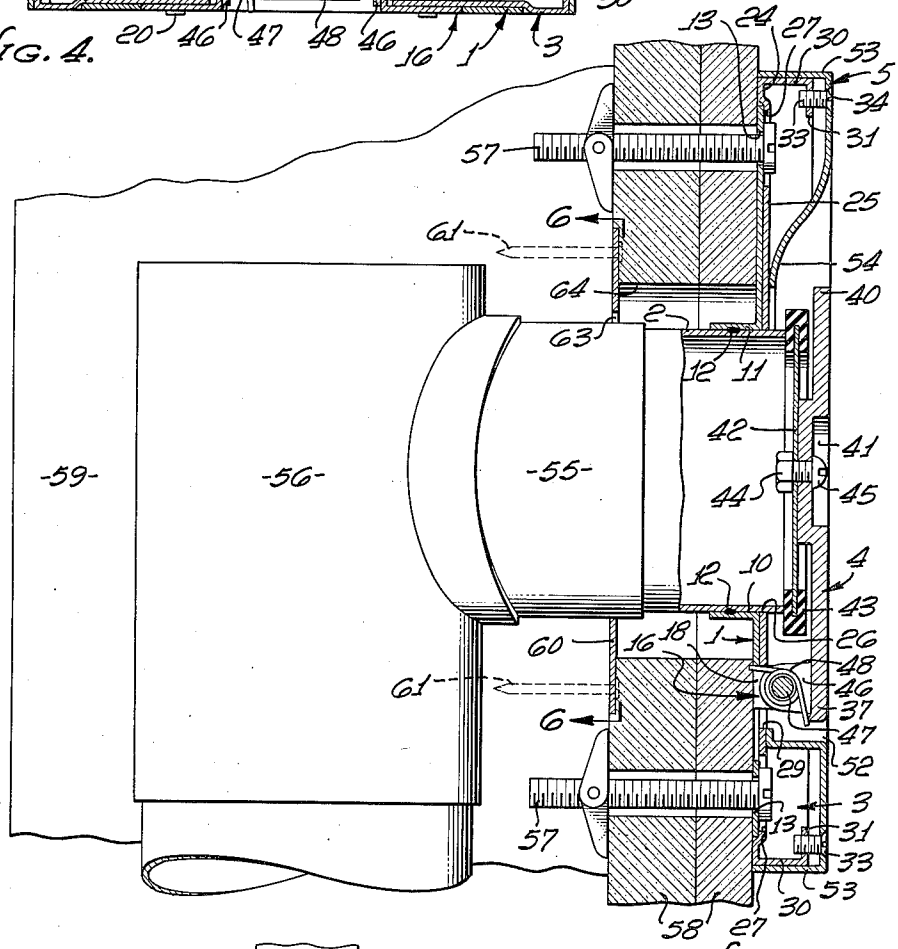


FIG. 5.

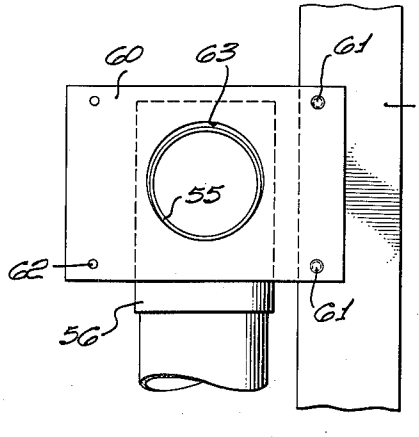


FIG. 6.

INVENTOR.
CLARENCE E. STEVENS
BY
ATTORNEY.

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3,036,814

INLET VALVE ASSEMBLY

Clarence E. Stevens, Pasadena, Calif., assignor to The Filtex Corporation, Los Angeles, Calif., a corporation of Michigan

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This invention relates generally to installed central vacuum cleaning system for use in dwellings, commercial and other type buildings, and more particulraly to an inlet valve assembly for such a system.

Central vacuum cleaning systems for cleaning purposes generally comprise vacuum apparatus including a suction fan with a dust collecting container located in one room of the building, such as a basement or utility room. The central vacuum cleaning apparatus is connected through a system of tubing or conduits which extends within the floors and walls of the building and which terminates in conveniently positioned valve closed ports adapted to receive and seat one end of a flexible air conducting hose usually provided with a portable cleaning attachment at its other end.

The effectiveness of an installed suction cleaning system is dependent upon the pressure of suction throughout the system for it is the flow of air through the cleaning nozzle at the end of the flexible hose that accomplishes cleaning. Leaks at any point in the system permitting air to enter reduces the suction available for careful work and if sufficiently large or numerous render the system entirely ineffective.

It has been determined that the valve-closed ports to which the individual person-propelled cleaning units are attached and detached comprise one of the most important sources of leak. These individual ports, which really comprise valve assemblies, are normally closed by a valve. If the valve does not seat properly, a leak results. Use over a period of time frequently results in injury to or deterioration of the valve assembly making it desirable to replace all or part of the assembly. The present invention comprises a valve assembly in which deteriorated, injured or misaligned parts can be replaced with ease.

According to the invention, the inlet valve assembly comprises a mounting plate securable to an interior surface formed by a floor, ceiling or wall; a sleeve fitted in an aperture of hte mounting plate; an intermediate plate outwardly of and juxtaposed to the mounting plate to which it is removably secured; a valve plate pivotally supported on the intermediate plate and biased to a normally closed position so that the valve it carries seals the end of the sleeve; and a face or cover plate removably secured to the intermediate plate.

The valve proper is formed by a spring metal disc secured to the valve plate and is provided with a resilient gasket at its periphery. Since the valve plate is pivotally secured to the intermediate plate secured to the mounting plate, as is the sleeve, an excellent seal is provided by the valve on the sleeve irrespective of the alignment of the sleeve relative to the interior room surface and the alignment of the mounting plate on the interior room surface.

Accordingly, it is a primary object of the invention to provide an improved inlet valve assembly for installed suction cleaning systems.

It is a principal object of the invention to provide an inlet valve assembly for an installed suction cleaning system in which the valve seal is not affected by the contour of the room surface on which the assembly is mounted or by any misalignment of the inlet tubing with the conduit system.

A further object of the invention is to provide an inlet valve assembly for an installed suction cleaning system

in which the valve plate, the face plate and the intermediate plate which supports the valve plate, may be removed as a unitary assembly for servicing.

It is a still further object of the invention to provide an inlet valve assembly in which all of the valve supporting plates are positioned inwardly of the interior room surface.

It is another object of the present invention to provide an inlet valve assembly in which the valve mounting plate on the interior room surface is mounted and supported independently of the permanently installed tubing on the opposite side of the wall.

These and other more specific objects will appear upon reading the following specification and claims and upon considering in connection therewith the attached drawings to which they relate.

Referring now to the drawings in which a preferred embodiment of the invention is illustrated:

FIGURE 1 is a plan view through the valve assembly comprising the present invention showing the face plate and the valve plate in its normally closed position;

FIGURE 2 is a longitudinal section upon the line 2—2 of FIGURE 1;

FIGURE 3 is an exploded view of the inlet sleeve, the mounting plate, the hinge mounting means and the intermediate plate;

FIGURE 4 is a transverse section on the line 4—4 of FIGURE 2;

FIGURE 5 is a transverse sectional view of an embodiment of the invention installed in a plaster wall; and

FIGURE 6 is a view on the line 6—6 of FIGURE 5 illustrating the additional support of the unit upon an adjacent support or stud.

Referring again to the drawings, the embodiment of the invention as shown in FIGURES 1 to 4 comprises generally the mounting plate 1 in which the inlet sleeve 2 is secured; the intermediate outwardly opening shallow cup-shaped plate 3; the valve plate 4 which carries the valve; and the inwardly opening shallow cup-shaped face plate 5.

As may be best seen in FIGURES 2 and 3, the mounting plate 1 is generally rectangular and substantially flat except for the downwardly directed central circular flange 11 which defines the aperture 10. Inlet sleeve 2, adapted to receive a vacuum cleaning hose, is fixedly and permanently secured to flange 11 by the spot welds 12 or by other suitable means. The plate 1 is removably secured to an interior surface of a room, such as the floor 6, by means of wood screws 7 which extend through the holes 13, with sleeve 2 extending through an opening 9 in the floor. Plate 1 is also provided at one side of the sleeve 2 with a rectangular cutout opening 17 which extends generally parallel to an adjacent edge for a purpose to be referred to later, and also with threaded openings 14 adapted to seat small screws.

The intermediate plate 3 is mounted on and adjacent mounting plate 1 and is substantially rectangular, having a central raised flat bottom 25 surrounded by a peripheral depressed channel portion 24. Upwardly extending from bottom 25 of plate 3 are side walls 30 from which extend the two opposite inwardly directed ears 31 each having a threaded hole 32. Centrally located in bottom 25 is an aperture 26 adapted to fit around sleeve 2 when the plate 3 is secured to the plate 1, as shown in FIGURE 2.

A hinge bracket 16 is secured to the underside of plate 3 by means of rivets 20 which extend through holes 22 in bottom 25 and holes 21 of bracket 16. Spaced ears 18 on the bracket 16 extend upwardly above the bottom 25 through the opening 29 and provide supporting means for the valve plate 4 which is pivotally supported by a suitable pintle 47 extending through an opening 19 in each ear.

The plate 3 overlaps plate 1 around its margins, as

shown in FIGURE 2, the latter being positioned within the raised portion on the underside of the bottom 25 inwardly of peripheral portion 24. Screws 15 removably secure plate 3 to plate 1 extending through the opening 28 in plate 3 and into the threaded openings 14 in plate 1. When the plates 3 and 1 are so engaged, the bracket 16 on the underside of plate 3 lies in the opening 17 in plate 1 which permits plates 1 and 3 to be in flat contact. The heads of screws 7, which secure plate 1 to floor 6, are recessed in enlarged openings 27 in bottom portion 25 of plate 3 for the same reasons.

Valve plate 4 has a circular central body formed with a lip 40 at one side, a central depressed portion 41, and a substantially rectangular extension 37 at the opposite side. Secured to the bottom of valve plate 4, and more particularly to the bottom of depressed portion 41, by means of nut and bolt 44 and 45, respectively, is a flat spring disc 42. The head of bolt 45 lies within the recess formed in the top face of plate 4 by depressed portion 41 to provide a flush appearance and relationship. Spring disc 42 carries a circular resilient gasket around its periphery and, though being held to plate 4 only by the central bolt, is adapted to be deflected and tilted relative to that plate.

Downwardly directed from the extension 37 are spaced ears 46 by which valve plate 4 is hingedly mounted to bracket 16 by means of a pintle 47 extended through the openings in the respective ears. Torsion spring 48, coiled on pintle 47, normally biases the valve plate to its closed position, shown in FIGURE 2, to hold the gasket 43 in abutting sealing relationship on the end of sleeve 2 which plate 4 overlies.

Face plate 5 has the same general exterior dimensions as the intermediate plate 3 but with sufficient additional length and width so as to enable it to overlap the latter with its downwardly directed marginal side walls 53 enclosing the side walls 30 of plate 3. The two plates are secured together by screws 33 which extend through holes 34 in plate 5 and threadedly engage the holes 32 in plate 3. A central opening 52 in plate 5 conforms to the configuration of plate 4 and the relationship is such that the latter, when in its closed position, lies flush at its top surface with the top of plate 5. Adjacent to the lip 40 on the plate 4 is a depression 54 formed in plate 5 to permit the easy engagement of the lip 40 by a finger for pivoting plate 4 to its open position.

Sleeve 2 is seated telescopically within the reduced end of a conduit 49 formed interiorly with a circular groove 51. The sleeve and the tube are secured together as by an adhesive and the presence of an O-ring 50 in the groove 51 provides an air tight relationship between them. Tube 49 is connected directly to the central vacuum apparatus whereby dust and dirt may be carried by an air stream moved by a suction fan through a hose having one end fitted in sleeve 2 and having a suction nozzle on its other end. In addition to being adhesively bonded to sleeve 2, tube 49 is mounted and held in place by additional structure forming no part of the present invention.

From the foregoing, it is clear that plates 1, 3, 4, 5 and the sleeve 2 form a unitary construction as shown in FIGURE 2. It is of great advantage that the valve plate 4 and the valve proper, comprising spring disc 42 and gasket 43, which seats on the outer end of sleeve 2, are mounted directly through the plate 3 and the bracket 16 on the plate 1 which carries sleeve 2. The result is that regardless of the alignment of plates 1 on an interior supporting surface of the room the valve is properly and accurately related to sleeve 2. Any slight variation due, for example to manufacturing tolerances or to deformation in installing, are accommodated by the flexibility of the valve disc 42 which flexes and shifts to enable the gasket 43 to lie flat against the end of sleeve 2.

In FIGURES 5 and 6, the invention is shown installed in an opening 64 in a vertical plaster wall 58. The unitary valve construction including plates and structure on the interior of the room are the same as previously described. Here, however, plate 1 is secured by means of toggle bolts 57 which extend through the wall 58 and are tightened against the side thereof outwardly of the room. In order to facilitate the installation an additional mounting plate 60 is provided which may be secured to a stud or studs 59 behind the wall and near to the opening 64 by nails 61 through holes 62. Plate 60 has an oversized aperture 63 in alignment with the sleeve 2 and is adapted to loosely receive and support the outlet tube 55 of the elbow 56 of the vacuum system during installation.

The conduit system of which the elbow 56 is a part, lies behind the wall 18 and is preferably installed in the building before the wall is made. The mounting plate 60 supports the elbow and the plasterers making the wall are able to judge where to make the wall opening 64. After the wall is completed sleeve 2 is telescoped into tube 55 and is adhesively secured as in the first embodiment. Holes in the plaster wall are drilled for the toggle bolts 57 and the plate 1 is secured in place. In other regards this form is the same as that previously described.

In the use of the present invention suction is made available to the valve assembly which is positioned at a convenient location in each room or series of connected rooms. Depending upon the size of the building the number of installations will vary but they should be sufficient in number and so placed that the interior of the building can be cleaned by the use of a flexible suction hose of reasonable length.

When no cleaning is taking place at a particular installation the valve disc 42 with its gasket 43 seals the end of the sleeve 2 and effectively prevents the entrance of air into the system at that point. Effective sealing is important for air leakage destroys the suction and makes less efficient the entire circuit. When cleaning is to take place at a particular unit, the valve plate 4 is pivoted from the closed position, shown in FIGURES 2 and 6, to an open position in which it extends substantially perpendicularly to the plate 1. The attaching end of the cleaning hose is then inserted in sleeve 2 and serves, while it is in place, to hold the valve plate 4 in open position. Upon the hose being withdrawn, the spring 48 immediately snaps plate 4 to its closed position.

Injury and breakage results in all mechanical devices and the valve assembly of an installed suction system is no exception. Spring breakage, wear of gasket, and deformation are all possibilities. In the unit constructed in accordance with the present invention, the removal of a few screws makes possible the displacement and replacement of the various parts which are subjected to wear. Each part, with the single exception of the mounting plate 1 carrying the sleeve 2, can be readily removed and replaced.

In the event of the breaking of torsion spring 48, face plate 5 may be disassembled from the other plates by the removal of screws 33, and plates 3 and 4 may be removed as a unitary structure from plate 1 by the withdrawal of screws 15 and returned to the factory for repairs, if necessary. It is also possible to make certain repairs as desired while the structure is in place by the mere removal of the plate 5.

While the particular inlet valve assembly herein shown and disclosed in detail is fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiments of the invention and that no limitations are intended to the details of construction or design herein shown other than as defined in the appended claims.

I claim:

1. A hose coupling and valve assembly adapted for use at the terminal ends of a built-in duct system for an installed type suction cleaning apparatus, said assem-

bly comprising as its principal sub-assemblies an inner mounting assembly adapted to be secured across an opening into a room comprising an open-ended sleeve connectable at its inner end to said built-in duct system and having its outer end projecting axially slightly beyond a mounting means secured thereto, and a second sub-assembly comprising valve mounting means securable over an opening into the room after said inner mounting assembly has been rigidly secured in place, said valve mounting means including an opening therethrough registering with the exposed end of said sleeve, a valve supporting closure plate pivotably supported about said last-mentioned opening including a spring -biased self-aligning valve member positioned to close against said sleeve end, means for detachably securing said second sub-assembly across the opening into said room, said second sub-assembly including an outer appearance plate having an opening lying in the same plane as said valve supporting closure plate through which said valve supporting closure plate and said valve member are pivotable, and means for detachably securing together said inner mounting member and said appearance plate.

2. The assembly defined in claim 1 characterized in that the pivotal support for said valve supporting closure plate is constructed and arranged to be normally concealed by said closure plate and being accessible for servicing upon the detachment of said appearance plate without disturbing the positions of any other components of said coupling and valve assembly.

3. The assembly defined in claim 1 characterized in that said self-aligning valve comprises a thin disc of resilient material rigidly supported only at the center thereof, and resilient gasket means interposed between the periphery of said disc and the juxtaposed rim edge of said sleeve end and adapted to be held in sealing contact with one another by the suction pressure acting on the inner surface of said disc during operation of a suction cleaning apparatus with which said assembly is adapted to be used.

4. A coupling and valve assembly adapted for use at the terminal ends of a built-in duct system for an installed-type suction cleaning apparatus, said assembly comprising; a mounting plate adapted to be secured across an opening in a room, an open-ended sleeve secured to an opening in said mounting plate and having an outer end projecting axially from one side of said mounting plate and an inner end projecting axially from the other side thereof, valve mounting means having an opening therethrough registering with said outer projecting end of said sleeve and detachably secured to said mounting plate, a valve-supporting closure plate, means on said valve mounting means spaced from the opening therethrough providing a pivotal connection for said valve-supporting closure plate, a spring biased self-aligning valve means centrally connected to said valve-supporting closure plate, said valve means being positioned to close against said outer projecting sleeve end, an outer appearance member detachably secured to said valve mounting means and having an opening therethrough conforming generally to the shape of said valve-

supporting closure plate and lying in the same plane as said valve-supporting closure plate.

5. A coupling and valve assembly as defined in claim 4 characterized in the provision of temporary support means adapted to be permanently mounted in alignment with an opening into a room, said temporary support means having an opening to receive and support the end of a built-in duct system until the inner end of said open-ended sleeve is assembled thereto, and the opening in said temporary support means being in axial alignment with said open-ended sleeve.

6. A coupling and valve assembly as defined in claim 4 characterized in that said self-aligning valve means includes a pivotal support normally concealed by said appearance member and being exposed and accessible for servicing by the detachment of said appearance member.

7. An article of manufacture comprising a unitary valve and mounting assembly for mounting in an opening therefor in a room wall and to which the flexible hose of a suction cleaning nozzle is attachable when it is desired to suction clean carpets and the like in the room, said assembly comprising a non-threaded smooth-surfaced open-ended tube, the inner end of which is adapted to have a close telescopic fit with respect to the smooth-surfaced inlet end of an installed suction cleaner duct system concealed within the walls of a building, the outer end of said tube extending through but terminating close to the inner plane of the wall surface, a flat mounting plate having an opening through which the outer end of said tube projects and to which said tube is rigidly fixed, said mounting plate bridging the wall opening and being securable to the inner surface of the wall, an appearance cover sub-assembly including a pair of plates having upturned edges facing toward one another and having a nesting fit within one another, both of said pair of plates having large-area aligned central openings, the inner one of which fits about the outer end of said tube, spring-baised pivoting valve means including a hinge therefor anchored to the inner one of said pair of plates, said valve means normally being seated against the outer end of said tube and being pivotable away therefrom through the said central opening in the outer one of said pair of plates of said appearance cover sub-assembly said valve means having an outer surface lying in the same plane as said central opening in the outer one of said pair of plates, means for holding the inner one of said last-mentioned plates to the wall, and separate means independent of said valve means for holding the outer one of said plates detachably assembled directly to the inner one of said pair of plates.

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