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OUTLET SOCKET FITTING FOR CENTRAL VACUUM-CLEANING SYSTEMS

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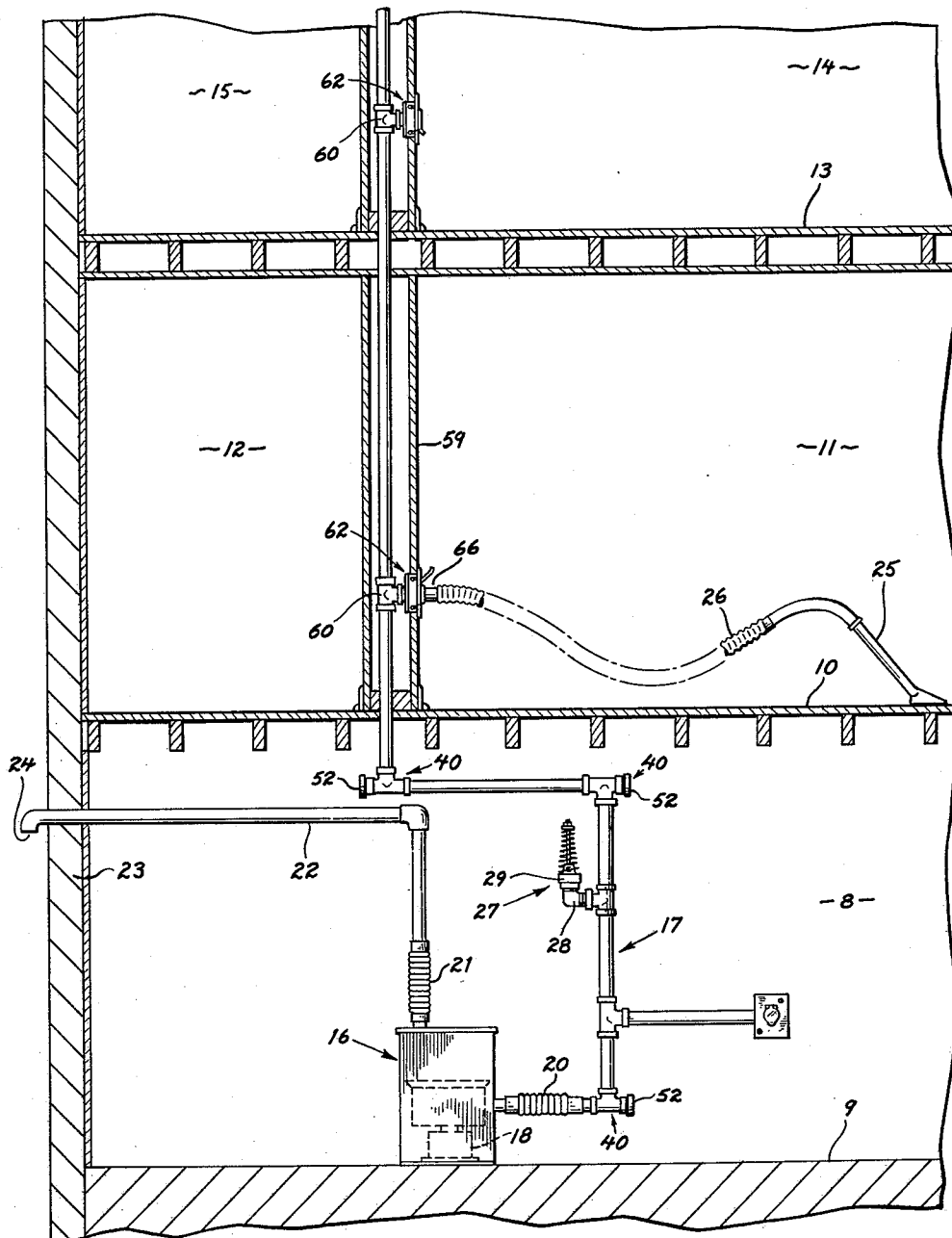


FIG. 1

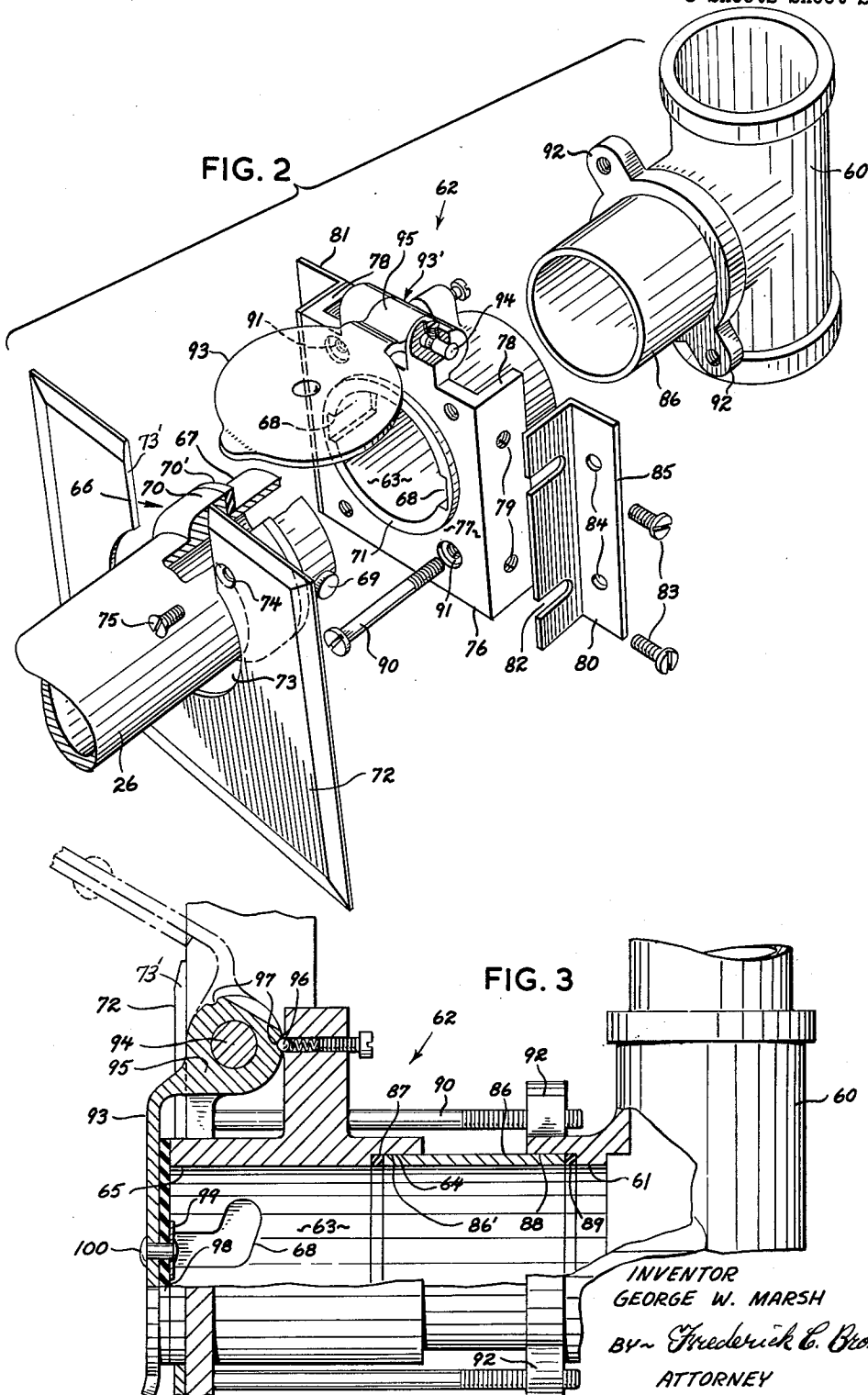
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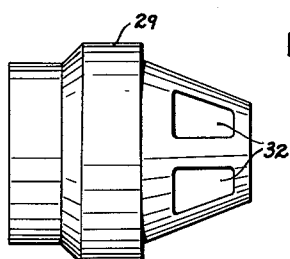


FIG. 5

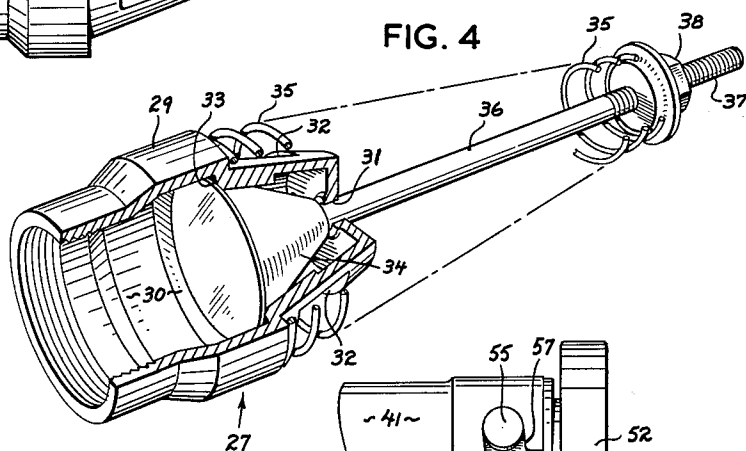


FIG. 4

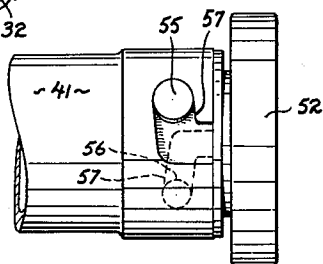


FIG. 7

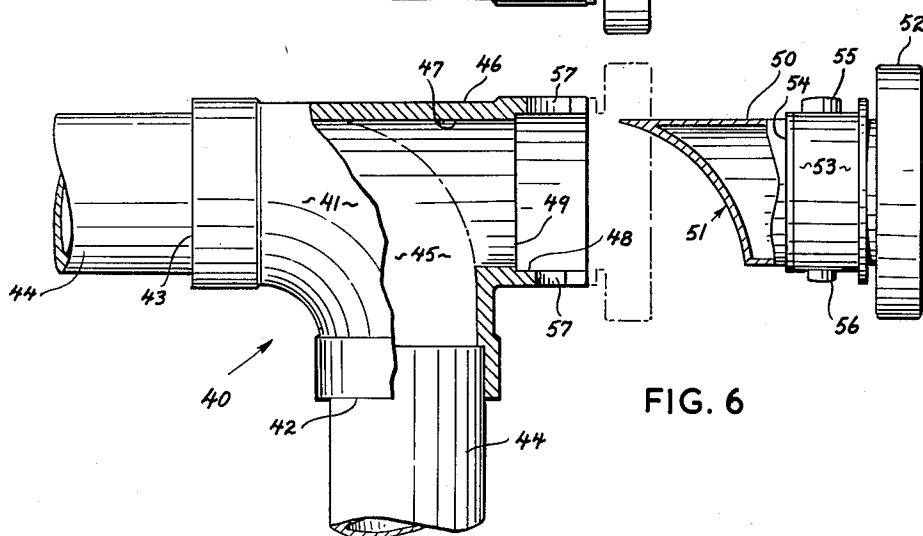


FIG. 6

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OUTLET SOCKET FITTING FOR CENTRAL VACUUM-CLEANING SYSTEMS

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2 Claims. (Cl. 137—360)

This invention relates to improvements in vacuum-cleaning apparatus and in particular to a central vacuum-cleaning system in which the vacuum cleaner is permanently installed in a building.

The general type of portable vacuum cleaner has many shortcomings that are obviated by a central vacuum-cleaning system. Regardless of the type of portable vacuum cleaner it is required to be moved about in carrying out a cleaning operation such as that of cleaning a room in a building. The machine must be manoeuvred around objects in order to avoid striking and possibly marring them, and it is well recognized that this manipulation is tiresome and time consuming. Moreover, the cord is apt to become entangled and disconnected from the base plug.

A difficulty of vacuum-cleaning stairs with a portable machine is well recognized and there are many other attendant disadvantages inherent in the use of a portable vacuum cleaner which are well recognized. Air pollution or processed air is an important problem because the unit is ordinarily located in the room or space to be cleaned, and due to incomplete filtration of dust-laden air the processed air returned to the room may still contain a good percentage of very fine solid particles. It is therefore necessary to dust the furniture after a vacuum-cleaning operation. Moreover, the residual dust may present a health hazard to persons sensitive to dust. To these disadvantageous features, that of the noise factor may be added as portable vacuum cleaners are generally noisy to the extent of being disturbing especially where quietness is desired as in the case of sickness.

It is therefore a major object of this invention to overcome the disadvantages above recounted by providing an improved central vacuum-cleaning system of a highly efficient and serviceable character. Another important object of this invention is to provide a central vacuum-cleaning system comprising a vacuum cleaner unit permanently installed in a basement, for example, or other place where it is inconspicuous and out-of-the-way, and this is preferably in a location outside the spaces to be cleaned.

Still another object of this invention is to provide a central vacuum-cleaning system of simple and rugged construction which may be easily and economically installed in a building. Still another and highly important object of this invention is to supply a central vacuum-cleaning system of the kind referred to incorporating a number of outlets in rooms of the building conveniently located for making a vacuum line connection with a hose of a cleaning tool and characterized in that the vacuum pipes or conduits are concealed in the floors or walls of the building and the outlets are made flush with a floor or wall surface of a room as by the employment of a flush plate which renders the outlet inconspicuous.

A vacuum-line outlet therefore does not have an objectionable protrusion to mar the harmony of a furnished room. On the other hand, it is readily available for supplying a vacuum connection with the cleaning tool hose for use in the room, which, on completion of the cleaning

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operation in the room, may be detached for carrying out a cleaning operation in another room or space to be cleaned. The system therefore presents an optimum advantage in that the cleaning tool along with its light-in-weight hose is all that is necessary for the operator to handle in carrying out a vacuum-cleaning operation. The hose may be of a length to reach any part of an average-sized room in a house or, on the other hand, more than one outlet may be provided in a room if desirable on account of its size or for any other reason. In such a system the use of a wand or other cleaning tool presents no metal parts that may mar the floor or furniture in a cleaning process.

The invention aims to provide a highly advantageous vacuum-cleaning apparatus of the kind described in which a room may be vacuum cleaned along with its contents without producing objectionable dust-laden air; and in which there is easy dust disposal by the use of a disposable dust bag, and in which ample suction power is available and regulated by a governor valve of the relieve type. My central vacuum-cleaning system may be easily installed during the construction of buildings and can also be readily installed in the average one-story building after the building has been erected.

Having described the major objects and advantages of my invention subsidiary objects will become apparent from the ensuing specification and drawings wherein a selected embodiment of the invention is shown.

In the drawings:

FIG. 1 illustrates the invention installed in a two-story building having a basement;

FIG. 2 is an exploded perspective view of the novel flush outlet for a room which forms a part of my invention;

FIG. 3 is a longitudinal sectionized view of the assembled flush outlet depicted in FIG. 2;

FIG. 4 is a view in perspective of a vacuum-regulator valve broken away to show the interior structure;

FIG. 5 is a side elevation of the valve body of FIG. 4;

FIG. 6 is a side-elevation view broken away in section of a clean-out fitting showing a plug part detached; and

FIG. 7 is a top plan view of the clean-out fitting showing the plug assembled.

Referring at first to the showing in FIG. 1 of a typical installation of my central vacuum-cleaning system, the building structure comprises a basement 8 with a floor 9, a first floor 10 with rooms 11 and 12, and a second floor 13 with rooms 14 and 15. The vacuum-cleaning apparatus comprises a vacuum-cleaning unit, generally indicated at 16, shown installed permanently in the basement 8 from which vacuum lines extend, such as that generally indicated at 17. It will, of course, be understood that any number of such vacuum lines may be employed in accordance with requirements of a building.

A standard vacuum-cleaning unit is employed which may be of the well known commercial type including an exhaustor of suitable capacity, indicated at 18 and driven by an electric motor whose circuit is controlled by one or more switches in a circuit control of a known kind (not shown). Desirably electric switches will be distributed in the building in accordance with the outlets of the vacuum lines in the rooms and will serve to enable the operator to conveniently switch control the motor circuit in cleaning operations as the outlets are used. Any known arrangement of switches of a motor control unit may be

employed and the circuit control for the motor does not form a part of my invention per se. A switch may be located adjacent each outlet for a cleaning tool if so desired and is intended that selection of an electric-switch system for the exhaustor motor will be left to the dictates of the manufacturer.

The vacuum-cleaning unit 16 will preferably employ filter paper and a disposable dust bag, and therefore there will be no bag to empty from time to time. The vacuum line 17 is shown as connected to the cleaning unit 16 as by flexible rubber expansion coupling 20 for reduction of noise and vibration and a similar flexible expansion coupling 21 will be used for the conduit 22 for discharge of filtered air to the outside atmosphere which extends through an outside wall 23 and terminates in the egress 24.

The vacuum line 17 and any other similar vacuum lines which may extend from the vacuum-cleaning generating unit 16 may have any number of outlets for connection with the hose of a cleaning tool. The cleaning tool is illustrated, by way of example but not of limitation, as comprising a conventional wand 25 and a flexible hose 26. Various cleaning tools may be employed and these are well known in the art.

It is desirable to employ in the vacuum line 17 a vacuum governor whereby a partial vacuum of any predetermined amount may be assured. Such a vacuum governor is shown at 27 and detailed in FIGS. 4 and 5. The vacuum governor is a regulating valve which prevents excessive suction at the outlet. The vacuum valve functions to prevent excessive suction at an outlet by opening and closing according to the degree of vacuum and thus ambient air is admitted to keep the suction force within desirable limits. The regulating valve is shown as vertically arranged for best results and is connected in the line 17 as by elbow fitting 28 and comprises a body 29 providing a chamber 30 open at both ends. One of the ends communicates with a suction line and the other provides a valve rod passage 31 which is flanked by air-inlet ports 32. Said chamber is supplied with an annular valve seat 33 inwardly of said valve rod passage and said ports 32.

The valve member 34 is freely disposed in said chamber 30 in the form of a frustrum of a cone and engageable with said seat 33, the engagement being normally maintained by a helical compression spring 35 encircling a valve rod 36. Said valve rod is rigid with the valve member and projects through said valve rod passage and has a threaded terminus 37 which is engaged with a nut 38. Said spring 35 is seated at one end against this nut and at the other end on the body 29. Accordingly, the valve member 34 may be opened under suctional force and regulation of this relief valve may be effected by adjustment of the spring tension as by the adjustment nut 38.

Preferably I employ a vacuum line made up of copper tubing with pipe fittings such as an elbow, T, etc., of brass. The smooth passage provided by copper tubing and brass fittings is desirable and well suited to such a vacuum system as presenting a minimum of resistance to passage therethrough of dust, litter and other particles which may be picked up by the vacuum tools in a cleaning operation. However, it is to be understood that other materials may be employed, such as aluminum for instance.

Desirably I employ elbows in the conduit of a special clean-out type and the construction thereof is novel. These novel elbows are indicated at 40 and are detailed in FIGS. 5 and 6.

An elbow fitting 40 comprises a body 41 having the usual open ends 42 and 43 for connection with the line tubing 44. It may be here mentioned that joints of all fittings are desirably soldered. Said ends 42 and 43 are normal to each other and there is a passage 45 continuously curved through a right angle from one of said end openings to the other. A sleeve extension 46 is integral with said body and extends coaxially with one said end

opening and provides a bore 47 in alignment therewith. The bore 47 is annularly enlarged at its outer end, as indicated at 48, and provides a shoulder 49. A clean-out plug 50 is slidably fitted in bore 47 and has a concave inner end 51 conforming to the curvature of passage wall 45 forming a portion of the wall thereof. At the other end of said clean-out plug there is a knob 52, and adjacent to which there is an annular enlargement 53 providing a shoulder 54 which abuts the shoulder 49. Means are employed to removably secure the plug in said sleeve extension desirably comprising pins 55 and 56 radially extending from the enlargement 53 of the plug and engaged in bayonet slots 57 supplied in the sleeve 46. In order to correctly position the clean-out plug in the sleeve the pin 55 is made larger than the pin 56 and the bayonet slots 57 are respectively dimensioned.

It will be noted that the clean-out elbows installed at both ends of a horizontal run provide for easy cleaning of the horizontal run in the event of clogging. It is only necessary to remove the plugs 50 for clean-out purposes.

Now turning to outlets for making a connection between the vacuum line 17 and the hose of a cleaning tool, such as that indicated at 25, a special arrangement of conduit fittings and outlet fittings is employed whereby each outlet fitting is disposed flush with the adjacent surface area of a support (wall) through which the outlet fitting extends for connection with the connecting end of a hose and is supplied with a flush plate in order to present an attractive but inconspicuous appearance. Such outlet fittings do not detract from the appearance of a room and may be placed in a floor or wall. This special outlet fitting and the conduit fitting are important features of improvements in such a central vacuum-cleaning system and are novel. The conduit fitting may be a T or an elbow, in the instant disclosure the vacuum line 17 is shown as extending through a partitioning wall 59 of the building and there is a T fitting 60 for each of the rooms.

The T fitting 60 which is herein termed a conduit fitting may be of any type such as a T or elbow and has the conduit fitted in it as by soldered joints previously referred to. The side openings are in the form of the usual orifices, indicated at 61, for providing a lateral passage to the socket of the outlet fitting, generally denoted at 62.

The outlet fitting is supplied with a bore 63 which is open at both of its ends, there being an inner end 64 and an outer end 65. Said outer end constitutes a socket which receives the connecting end 66 of the flexible hose belonging to the cleaning tool 25. A suitable fitting is used at the connecting end of the hose for insertion in the socket 65 as a slip fit and is releasably retained by a locking device shown in the form of a bayonet connection comprising diametrically opposite bayonet slots 68 formed in the bore of the orifice 65 and engageable by diametrical pins 69 on the end fitting 67 of the hose 26. The bayonet slots do not extend through the wall of the bore but are shallow recesses which do not provide undesirable openings in the bore that would adversely effect the suctional effort of the vacuum line.

The end fitting 67 of the hose is solid and may be made of metal or other suitable material according to dictates of manufacture and there is an annular stop shoulder 70 supplied thereon with a sealing ring 70' of rubber or other suitable material.

The socket is supplied with a radial seating face 71 at its outer end which is engaged by the sealing ring 70' on the end of the hose which is brought about by the engagement of the pins 69 in the bayonet slots 68 by which a leak-proof connection is supplied.

In attachment of the outlet fitting to a wall support illustrated as in the drawings the outlet fitting is positioned to project through an aperture leading to the outer face of the partitioning wall with the socket portion 65 slightly projecting through the opening so that the radial seating face 71 is fully exposed for engagement by a seal-

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ing gasket or ring 70'. A flush plate 72 is detachably secured to the outlet fitting to set off the surrounding area of the outer wall surface of the partition and to make the exposed socket portion of the outlet fitting attractive in appearance, similar to a flush plate of an ordinary electric wall receptacle. Said flush plate 72 is provided with a circular aperture 73 to allow it to fit over the outer socket end of the outlet fitting. Also provided in the upper portion of said flush plate is a vertically extending slot 73' which communicates with said circular aperture 73. Slot 73' serves to permit a sealing cap to swing clear of said flush plate in an opening movement, and the sealing cap will be described later. Additionally said flush plate is provided with openings as at 74 to receive screws 75 by which it is attached to an attachment wall 76 integral with the outlet fitting 62. The attachment wall 76 is disposed at right angles to the bore 63 and the socket portion 65 of this bore projects together with the radial seating face 71 slightly beyond the front face 77 of the attachment wall 76. Said radial seating face 71 is circular in extent as will be best seen from an inspection of FIG. 2.

The attachment wall 76 is shown as supplied at its sides with integral flanges 78 which form part of the attachment means. These flanges may have topped holes as at 79. Said attachment means includes the angle plates 80 and 81 shown as supplied with slotted apertures 82 which receive the screws 83 by which they are attached respectively to said flanges 78. The screws 83 are received in the tapped holes 79 and holes 84 are supplied in the outturned legs 85 of the angle plates for receiving fastening elements (not shown) whereby the outlet fittings are fastened to a support such as a 2" x 4" stud forming a part of the room wall 59. It will be gathered that according to this construction an outlet fitting may be fastened to a 2" x 4" frame stud in the erection of a wall of a building as by use of either of the angle plates 80 and 81. The attachment wall 76 may have its outer face 77 disposed flush with the plaster face of the finished wall of the building. The flush plate 72 when assembled on the outlet fitting conceals the attachment wall 76. A feature of this construction is that when the outlet fitting is attached to a support as by the use of one of the angle plates 80, 81, the other angle plate may be removed and in its place there may be attached a box of a standard outlet switch which may be used as a part of the electric system for controlling the vacuum-cleaning unit 16.

The bore 63 of the outlet fitting communicates with the orifice 61 of the conduit fitting 60 by means of a spacing sleeve 86. This tubulation 86 is interfitted with the rear end of the bore 63 and is interfitted with the orifice. Said tubulation is shouldered in the bore 63 as by an annular reduction 86' and there is an interposed sealing ring 87 of rubber or other suitable material and likewise the said tubulation is shouldered in the orifice 61 as by an annular reduction 88 and there is an interposed sealing ring 89.

This construction has the advantage that the length of the spacing sleeve may be varied to enable the front face 77 of the attachment wall 76 to be disposed flush with the corresponding wall surface of the room wall 59 after the conduit 17 along with the conduit fitting 60 is installed in the wall. It will be appreciated that the distance between the face of the wall and the centre line of the conduit may vary and as a matter of fact will vary with each installation. Therefore some provision must be made to accommodate the variation. In making an installation in a building the spacing sleeve may be cut to size for each fitting.

A fastening device is employed to secure the outlet fitting to the conduit fitting 60 and to this end there is shown headed screws 90 which fit in holes 91 in the at-

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tachment wall 76 and have threaded engagement in lugs 92 provided on the conduit fitting 60. The screws when tightened have a clamping effect on sleeve 86 causing it to be forced into sealing contact with the rings 87 and 89.

When the outlet fitting is not in use it is necessary to seal the socket 65 which is carried out after each removal of the tool hose 26. A sealing cap 93 is provided for this purpose and is movable between closed and open positions as by hinge connection 93' including a pintle 94 and a knuckle 95 which forms a part of the sealing cap. The slot 73' allows the sealing cap to clear the cover plate 72. A detent device is used to hold the cup in its closed position and also in its open position. The detent device comprises a spring-pressed ball 96 engageable in recesses 97, one for the open position and the other for the closed. The cap is supplied at its inner side with a gasket of rubber or other suitable material as at 98 for engaging the radial seating face 71 of the orifice 63 and this gasket is secured by a washer 99 and rivet 100.

From the preceding description it will be manifest that I have disclosed in a selected form a highly desirable and useful central vacuum-cleaning system which has the facility of operation as explained above and which is not only highly efficient but also smooth and quiet in operation. It is to be understood that I do not wish to limit myself to the precise details of construction as herein disclosed and that such changes and variations may be resorted to as fairly come within the scope of the subjoined claims.

What I claim is:

1. In a central vacuum system, a wall socket assembly for use on an apertured vertical wall, said assembly comprising an outlet fitting including a transverse bore terminating at one end in an enlarged diameter portion forming an annular shoulder thereat, said outlet fitting including at least one substantially longitudinal slot on the inner surface thereof opening into the other end of said bore and said slot continuing with a lateral slotted portion spaced from said other end of said bore for detachably receiving a conduit having at least one lateral pin received in said slot and lateral slotted portion, at least one angle plate adjustably attached to said outlet fitting, said angle plate including means for mounting it on a wall and further including a slotted mounting portion for receiving a fastener and permitting relative adjustment of said outlet fitting with respect to the wall upon which said angle plate is mounted, said outlet fitting including a journal portion defining a pivot axis disposed above and inwardly of the other end of said bore, a closure flap pivotally connected in said journal portion and including a plate portion sealingly engageable on said other end of said outlet fitting opening, a cover plate surrounding said other end of said outlet fitting bore and detachably engaged on said outlet fitting, a spacing sleeve sealingly engaged in said annular shoulder and projecting axially from said outlet fitting, a conduit fitting including an orifice having an internal annular increased diameter portion forming a shoulder, said sleeve being received on and sealingly engaging said fitting shoulder and projecting axially from said orifice, and connecting elements extending from beneath said cover plate and extending through said outlet fitting on opposite sides of said spacing sleeve and terminally connected to said outlet fitting for retaining said outlet and conduit fittings in clamped relation at opposite ends of said spacing sleeve.

2. The structure of claim 1, said closure flap including a recess portion adjacent said journal portion, said outlet fitting including a vertical support portion spaced from said journal portion, and a spring urged detent element on said vertical support in alignment with said flap

recess portion and detachably engageable therein for retaining said closure flap in an open position.

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