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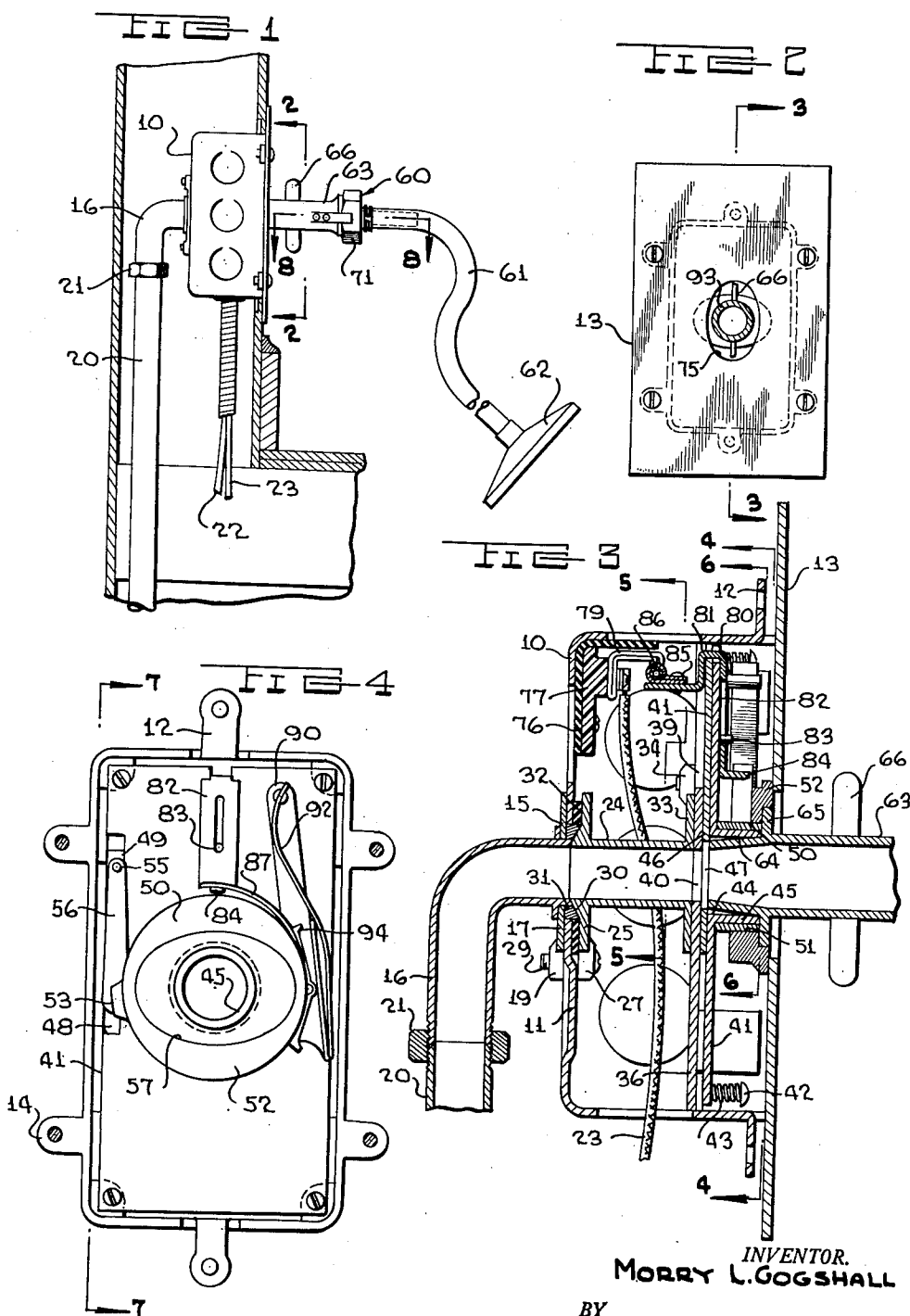
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CONTROL OUTLET FOR VACUUM CLEANING SYSTEMS

Filed Oct. 31, 1950

2 SHEETS—SHEET 1



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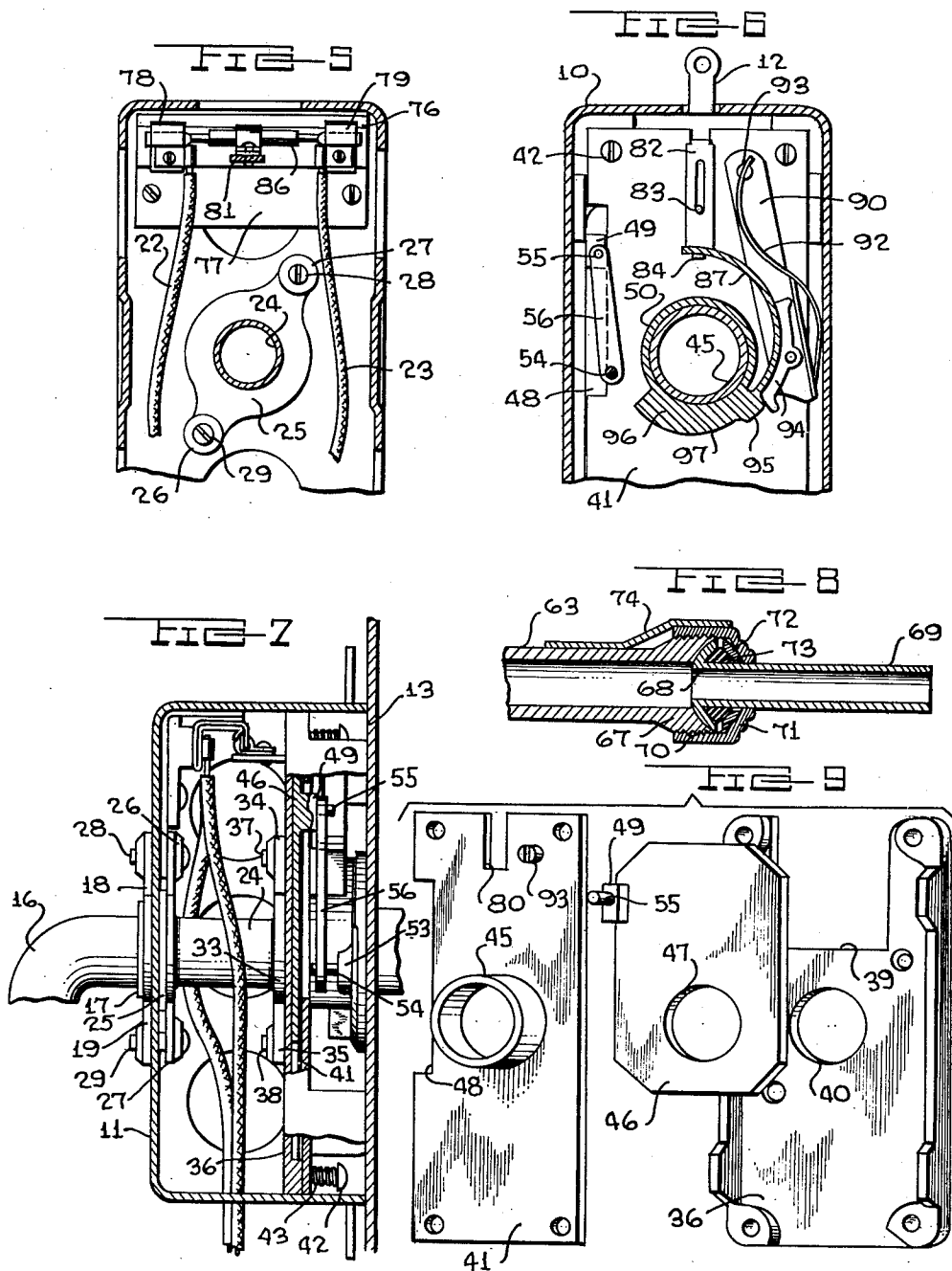
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2 SHEETS—SHEET 2



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## UNITED STATES PATENT OFFICE

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CONTROL OUTLET FOR VACUUM  
CLEANING SYSTEMS

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4 Claims. (Cl. 200—53)

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This invention relates to outlets for vacuum cleaning systems and more particularly to a combined vacuum pipe outlet and electric switch providing a connection for a vacuum cleaner and a control for a suction fan or pump motor.

It is among the objects of the invention to provide an improved outlet assembly for a vacuum cleaning system in the form of an outlet box, a number of which can be conveniently mounted in the walls of a building and connected by vacuum pipes to a central suction apparatus, and a vacuum cleaner plug or fitting which cooperates with the outlet assemblies to connect a vacuum cleaner to the vacuum pipes; which outlet assembly is closed except when a vacuum cleaner is connected thereto so that suction will not occur through any outlet assembly not in use, and is opened when a vacuum cleaner fitting is operatively associated therewith; which includes an electric switch which is automatically closed when the outlet assembly is opened and is automatically opened when the outlet assembly is closed to control the operation of the suction apparatus; which is so constructed that the vacuum cleaner fitting must be completely attached to the outlet assembly before the vacuum line is opened and the switch closed and so that the fitting cannot be detached without closing the vacuum line and opening the switch; which secures the vacuum cleaner fitting thereto against accidental separation during the use of the vacuum cleaner; and which is simple and durable in construction, economical to manufacture, and positive and effective in operation.

Other objects and advantages will become apparent from a consideration of the following description and the appended claims in conjunction with the accompanying drawings wherein:

Figure 1 is a somewhat diagrammatic view showing a vacuum cleaner outlet assembly illustrative of the invention operatively mounted in a building wall and a vacuum cleaner operatively connected to the outlet assembly;

Figure 2 is a cross sectional view on the line 2—2 of Figure 1 showing the outer surface of the face plate of the assembly;

Figure 3 is a cross sectional view on an enlarged scale on the line 3—3 of Figure 2;

Figure 4 is a cross sectional view on the line 4—4 of Figure 3;

Figure 5 is a fragmentary cross sectional view on the line 5—5 of Figure 3;

Figure 6 is a fragmentary cross sectional view on the line 6—6 of Figure 3;

Figure 7 is a cross sectional view on the line 7—7 of Figure 4;

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Figure 8 is a fragmentary cross sectional view on an enlarged scale on the line 8—8 of Figure 1; and

Figure 9 is an exploded perspective view of certain of the components of the assembly.

With continued reference to the drawings, the outlet assembly includes an outer housing in the form of a rectangular box 10, such as an electric wiring outlet box of known construction, having an open side and a back wall 11 opposite the open side thereof. Apertured lugs 12 project outwardly from the box at the open side thereof to receive suitable fasteners, such as nails, for attaching the box to a building wall with the edge of the box at the open end thereof substantially flush with the outer surface of the wall, and a cover plate 13, somewhat larger than the open side of the box, is secured to the box by other apertured lugs 14 projecting outwardly from the side edges of the box at the open side thereof to cover the open side of the box and a portion of the wall surface immediately surrounding the box.

The back wall 11 of the box is provided with a centrally located opening 15 and an elbow fitting 16 has one end disposed in the opening 15. An annular flange 17 surrounds the elbow fitting 16 at the end of the latter inserted in the opening 15 and diametrically opposite apertured lugs 18 and 19 project outwardly from the flange 17 for securing the fitting to the back wall of the box. At its other end the elbow fitting is secured to the adjacent end of a vacuum pipe 20 by a suitable screw threaded union or coupling 21. The vacuum pipe 20 leads to a central suction apparatus which includes a suction fan or pump and an electric motor for driving the same. Electrical conductors 22 and 23 lead from the motor or from a relay switch, not illustrated, controlling the motor into the box 10 so that the operation of the suction apparatus motor can be controlled from the outlet assemblies.

A tubular conduit section 24 has one end disposed adjacent the inner side of the back wall 11 of the box 10 and extends from the back wall of the box toward the open side of the latter. An annular flange 25 is provided on the end of the conduit section 24 adjacent the back wall of the box and apertured lugs 26 and 27 project outwardly from this flange at substantially diametrical locations around the latter and are disposed in opposition to the lugs 18 and 19 respectively. Screws 28 and 29 extend through the apertures in the flange lugs and through corresponding apertures in the back wall 11 of the box 10 to clamp the back wall of the box between the flanges 18 and 25 and thereby rigidly secure the elbow fit-

ting 16 and the tubular conduit 24 to the back wall of the outlet box.

The end of the conduit section 24 adjacent the elbow fitting 16 is angularly beveled, as indicated at 30, and an annular gasket 31 is disposed in the aperture 15 and between the beveled end 30 of the section 24 and the adjacent portion of the flange 17 of the elbow fitting 16 to provide an airtight seal between the elbow fitting and the conduit section. A washer 32, of resilient material, is disposed between the flange 25 of the conduit section 24 and the adjacent surface of the back wall 11 of the outlet box to permit compression of the gasket 31 and at the same time provide a solid connection between the elbow fitting and the conduit section and the back wall of the outlet box.

An annular flange 33 is provided on the end of the conduit section 24 remote from the back wall 11 and apertured lugs 34 and 35 project outwardly from this flange at spaced apart locations therearound. A first rectangular plate 36 is disposed in the box 10 near the open end of the box, spaced from and substantially parallel to the back wall 11 of the box and this plate is rigidly secured to the conduit section 24 by screws 37 and 38 extending through corresponding apertures in the plate 36 and threaded into tapped holes in the corresponding lugs 34 and 35. This plate closely engages the side and end walls of the box but has a rectangular opening or notch 39 in one end thereof for a purpose to be presently described.

The plate 36 has an opening 40 therein registering with the bore of the conduit section 24 and a second plate 41 is disposed in the box 10 spaced from and substantially parallel to the side of the plate 36 remote from the back wall 11 of the box. The plate 41 is secured to the plate 36 by screws 42 disposed one at each corner of the rectangular plate 41 and extending through corresponding apertures in the plate 41 and threaded into tapped holes in the plate 36. Compression springs 43 surround the screws 42 between the heads of the screws and the plate 41 to resiliently force the plate 41 toward the plate 36 for a purpose which will presently appear.

The plate 41 has an opening 44 therein concentric with and larger than the opening 40 in the plate 36 and a cylindrical boss or annular socket 45 is secured at one end to the side of the plate 41 remote from the plate 36 and surrounding the opening 44 in the plate 41. The inner surface of the socket 45 is slightly tapered from the outer end of the socket toward the plate 41 for a purpose which will presently appear.

A rectangular slide plate 46 shorter than the plates 36 and 41 is disposed between the plates 36 and 41 and has an opening 47 therein of substantially the same size as the opening 40 in the plate 36. When the slide plate 46 is in the operative position illustrated in Figures 3 and 7, the opening 47 therein registers with the opening 40 in the plate 36 and the vacuum line through the outlet assembly is opened. When the slide plate 46 is in a different operative position between the plates 36 and 41, a blank area of the slide plate covers the opening 40 in the plate 36, closing the vacuum line through the outlet assembly. The slide plate is compressed between the plates 36 and 41 by the springs 43 to provide a substantially airtight association between these three plates so that when the opening 40 is closed by the slide plate 46 air cannot be drawn through the corresponding outlet assembly.

An elongated notch or recess 48 is provided in

one edge of the plate 41 and a block 49 is secured on the slide plate 46 at the corresponding edge of the latter and projects through and is slidable in the recess 48.

An annular collar 50 is journaled on the socket 45 and comprises a cylindrical sleeve portion 51 closely surrounding the socket and an annular flange portion 52 at the end of the sleeve portion 51 remote from the plate 41. A lug 53 projects outwardly from the periphery of the collar flange 52 and carries a pin 54 projecting toward the plate 41. A pin 55 projects outwardly from the block 49 and a link 56 is provided with apertures disposed one near each end thereof and respectively receiving the pins 54 and 55 to connect the collar to the slide plate 46 so that when the collar is partially rotated in one direction, the slide plate will be moved to its position closing the vacuum line to the outlet, and when the collar is partially rotated in the opposite direction the slide plate will be moved to its position opening the vacuum line.

A flat recess 57, of elliptical shape, is provided in the end of the collar 50 remote from the plate 41, this recess being substantially concentric with the axis of rotation of the collar.

The collar 50 is rotated by a fitting, generally indicated at 60, which is used to connect one end of the vacuum cleaner hose 61 to the outlet, a suitable nozzle 62 being secured to the other end of the hose.

The fitting 60 is particularly illustrated in Figures 1, 3 and 8 and includes a tubular key 63 having at one end an externally tapered portion 64 which fits into the socket 45 and provides a substantially airtight seal with the interior surface of the socket. A flange 65 surrounds the key 63 at the larger end of the tapered portion 64 and has an elliptical shape and a size such that it closely fits the recess 57 in the outer end of the collar 50. Diametrically opposed handles 66 project outwardly from the key 63 intermediate the length thereof for rotating the key and at its other end the key is provided with an externally screw threaded portion 67 having a concave end 68. A tubular connector 69 has on one end an annular flange 70 having a convex outer surface fitting the concave end of the key 63 and a gland nut 71 is threaded onto the screw threaded end portion of the key surrounding the flange 70. A convex washer 72 is disposed within the gland nut in opposition to the flange 70 and a ring 73 of resilient material surrounds the connector 69 between the flange 70 and the washer 72 to provide an airtight fitting between the connector 69 and the key 63. A leaf spring 74 is secured to the key and overlies the gland nut 71 to resiliently resist rotation of the gland nut on the key.

The face plate 13 has an elliptical opening 75 therein of the same shape and size as the recess 57 in the outer end of the collar 50 and this opening in the face plate registers with the recess in the collar when the collar is in a rotational position such that the slide plate 46 closes the opening 40 in the conduit section 24. Under these conditions the flanged end of the key can be inserted through the opening in the face plate and the tapered end of the key engaged in the socket 45. When the key is then rotated to turn the collar to a position at which the opening 47 in the slide plate 46 registers with the opening 40 in the plate 36, the recess 57 is moved out of registry with the opening 75 and the key cannot then be pulled out of the socket. This

prevents accidental separation of the vacuum cleaner fitting from the outlet assembly while the vacuum cleaner is in use.

As is particularly shown in Figure 3, a liner 76 of electrically insulative material is disposed in the housing 10 against the back wall and corresponding end wall of the housing opposite the notch 39 in the plate 36 and a bracket 77 of electrically insulative material is mounted on the back wall of the housing over this liner. Two spaced apart, resilient switch contacts 78 and 79 are mounted on the bracket 77 and disposed adjacent the corresponding end wall of the housing and one adjacent each housing side wall.

The plate 41 is provided in its end corresponding to the notched end of the plate 36 with a centrally located notch 80 and a U shaped switch arm 81 has its bight portion received in the notch 80 and one leg 82 extending from the notch 80 along the side of the plate 41 remote from the plate 36. This leg 82 has a longitudinally extending slot therein receiving a pin 83 for guiding the switch arm and restraining its movements relative to the plate 41 to a direction longitudinally of the plate. At its end remote from the bight portion 81 the leg 82 is provided with an outwardly projecting tongue 84 for a purpose to be presently described.

The other leg of the switch arm is provided with a right angle bend so that its end portion 85 is directed from the plate 36 toward the bracket 77. A switch contact bar 86 of electrically conductive material is carried by and electrically insulated from the end portion 85 of the switch arm and is positioned to engage and electrically interconnect the contacts 78 and 79, as illustrated in Figure 5, when the switch arm is in a predetermined position relative to the plates 36 and 41.

The bight portion of the switch arm 81 is engaged by the adjacent end of the slide plate 46 when the slide plate is moved to its position opening the vacuum line through the outlet and is moved by the slide plate to the predetermined position in which the contact bar 86 is brought into electrically conductive engagement with the spring contacts 78 and 79. As the wires 22 and 23 are connected to the spring contacts 78 and 79 respectively, when these contacts are electrically interconnected by the contact bar 86, the suction device will be placed in operation.

The suction device of the system is thus placed in operation whenever the key 63 is inserted into the socket and rotated to move the slide plate 46 to its position in which the opening 47 in the slide plate registers with the opening 40 in the plate 36 to thereby open the vacuum line through the outlet.

A spiral cam finger 87 is secured at one end to the collar 50 and rides over the tongue 84 on the distal end of the leg 82 of the switch arm 81. When the key 63 is turned to rotate the collar 50 in a direction to move the slide plate 46 in a direction such that the opening 47 in the slide plate is moved out of registry with the opening 40 in the plate 36 to thereby close the vacuum line through the outlet, this cam finger moves the switch arm 81 in a direction toward the conduit section 24 thereby moving the contact bar 86 away from the spring contacts 78 and 79 and opening the switch as the vacuum line is closed.

A lever arm 90 is pivotally connected at one end to the plate 41 and has one edge extending past the collar 50. A leaf spring 92 secured at

one end to the plate 41 by the pivot pin 93 which connects the lever to the plate, bears at its other end against the distal end of the latter and resiliently urges the lever toward the collar 50.

A rocker 94 is pivotally mounted intermediate its length on the lever 90 and bears against the adjacent side of the collar. An outwardly projecting cam lug 95 is provided on the collar at the proximal end of the spiral cam finger 87 and an extension 96 of the collar flange provides an annular surface 97 substantially coaxial with the rotational axis of the cam at the side of the lug 95 opposite the cam finger 87. The rocker 94 has beveled ends which are alternatively engageable with the lug 95 depending on the operative position of the collar to releasably hold the collar in each of its limiting operative positions so that the collar will not be accidentally turned but may be manually turned by the handle 66 on the key 63 when the key is inserted in the outlet. This spring biased latch mechanism will thus releasably hold the outlet assembly in either its switch closing, vacuum line opening condition or its switch opening, vacuum line closing position, as determined by rotation of the collar 50 by the key 63.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is, therefore, to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are, therefore, intended to be embraced therein.

What is claimed is:

1. An outlet assembly for a vacuum cleaning system comprising a box mountable in a building wall and having an open side adapted to open to the surface of the wall, said box having an opening in the back wall thereof opposite said open side, a vacuum pipe fitting secured to the outer side of said back wall in registry with said opening, a conduit section extending from the inner side of said back wall toward the open side of said box and connected to said vacuum pipe fitting in registry therewith, a first plate disposed transversely of said box near the open side of the latter and in engagement with the adjacent end of said conduit section, said first plate having an opening therein registering with said conduit section, flanges on said conduit section disposed one at each end thereof and respectively secured to said back wall and said first plate, a second plate secured in said housing and spaced from the side of said first plate remote from said back wall, said second plate having an opening therein registering with the opening in said first plate, an annular socket on the side of said second plate remote from said first plate surrounding the opening in said second plate, a collar journaled on said socket and having a non-circular recess in the end thereof remote from said second plate for receiving an end of a tubular key for rotating said collar, a slide plate disposed between said first and second plates and having an opening therein registering with the openings in said first and second plates when said slide plate is in a predetermined position relative to said first and second plates, a link connecting said collar to said slide plate to move said slide plate upon rotational movement of said collar to bring the opening in said slide plate into

and out of registry with the openings in said first and second plates for opening and closing the vacuum line through the outlet assembly, spaced apart contacts carried by said box adjacent one end of said second plate, an arm slidably mounted on said second plate at said one end of the latter and extending to a location adjacent said switch contacts, a contact bar carried by said arm and engageable with said switch contacts to electrically interconnect the latter, said slide plate engaging said arm and moving said contact bar to switch closing position when said slide plate is moved to position to open the vacuum line, a cam on said collar engaging said arm and moving said contact bar to switch opening position when said slide plate is moved to position to close the vacuum line, a spring pressed latch carried by said second plate and engaging said collar to releasably hold the latter in either of two limiting rotational positions corresponding to the positions of said slide plate when opening and closing the vacuum line through said outlet assembly, and a third plate secured to said housing at the open side of the latter and at the end of said collar remote from said second plate and having a noncircular opening therein which fully registers with the recess in said collar when the latter is in its vacuum line closing position and is partially out of registry with the recess in said collar when the latter is in its vacuum line opening position to secure said tubular key in said recess when the vacuum line has been opened.

2. An outlet assembly for a vacuum cleaning system comprising a box having a back wall and an open side opposite said back wall, a first plate secured in said box spaced from and substantially parallel to said back wall, conduit means extending through said back wall and secured at one end to said first plate, said first plate having an opening registering with the interior of said conduit means, a second plate spaced from the side of said first plate remote from said back wall and having an opening therein registering with the opening in said first plate, an annular socket on the side of said second plate remote from said first plate and surrounding the opening in said second plate, a slide plate slidable between said first and second plates, a collar journaled on said socket, means connecting said collar to said slide plate for moving the latter to open and close the opening in said first plate upon rotation of said collar, a switch mounted in said box and actuated by said collar to open and close when said slide plate closes and opens the opening in said first plate, said collar having a key receiving recess in the end thereof remote from said second

plate, and means releasably holding said collar in the positions in which said slide plate opens and closes the opening in said first plate.

3. An outlet assembly for a vacuum cleaning system comprising a box having a back wall and an open side opposite said back wall, a first plate secured in said box spaced from and substantially parallel to said back wall, conduit means extending through said back wall and secured at one end to said first plate, said first plate having an opening registering with the interior of said conduit means, a second plate spaced from the side of said first plate remote from said back wall and having an opening therein registering with the opening in said first plate, an annular socket on the side of said second plate remote from said first plate and surrounding the opening in said second plate, a slide plate slidable between said first and second plates, a collar journaled on said socket, means connecting said collar to said slide plate for moving the latter to open and close the opening in said first plate upon rotation of said collar, and a switch mounted in said box and actuated by said collar to open and close when said slide plate closes and opens the opening in said first plate, said collar having a key receiving recess in the end thereof remote from said second plate.

4. An outlet assembly for a vacuum cleaner system comprising a housing, conduit means extending into and terminating in said housing and providing a vacuum line, a valve in said housing intercepting said conduit means for opening and closing the latter, a switch supported by said housing, a hollow member rotatably mounted in said housing adjacent to and in communication with said conduit means and connected to said valve and said switch for simultaneously opening said valve and closing said switch and closing said valve and opening said switch upon rotation of said member in respectively opposite directions, and a tubular key received at one end in said hollow member for rotating the latter, said key being interiorly in communication with said conduit means when said valve is open.

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