

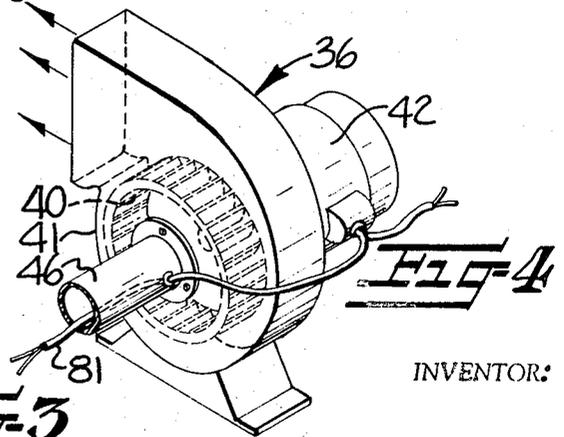
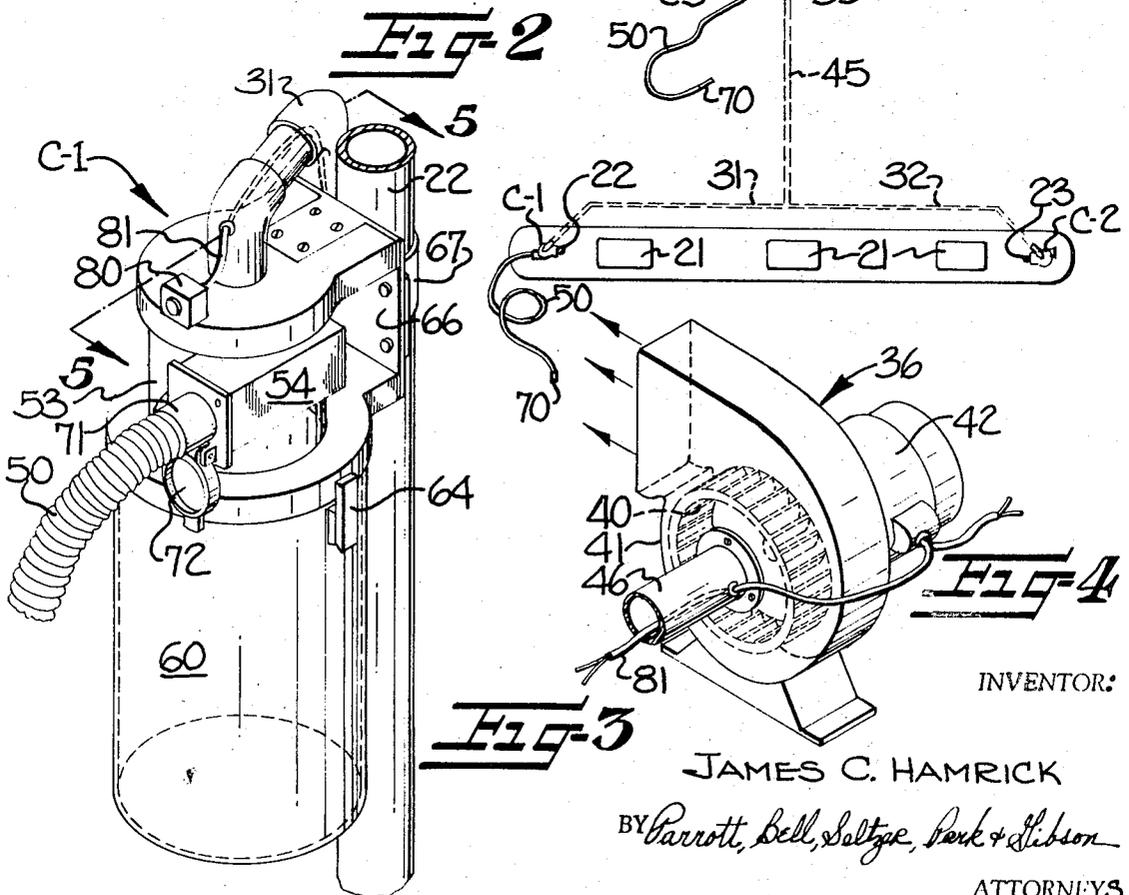
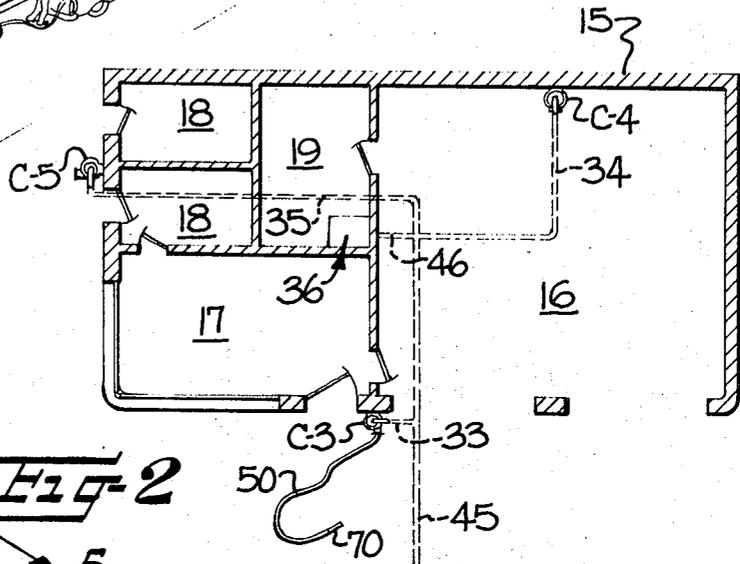
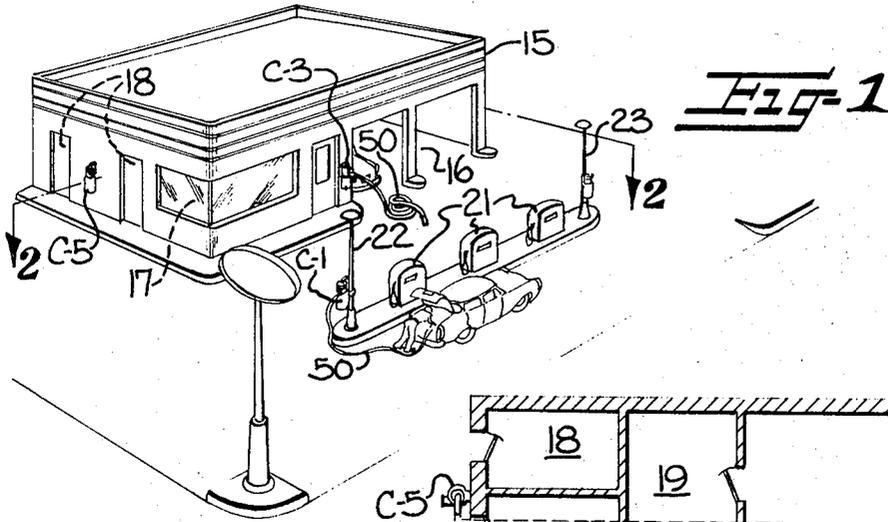
Dec. 1, 1970

J. C. HAMRICK
VACUUM CLEANING SYSTEM WITH WASTE COLLECTION
REMOTE FROM SUCTION FAN

3,543,325

Filed Dec. 22, 1967

3 Sheets-Sheet 1



INVENTOR:

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ATTORNEYS

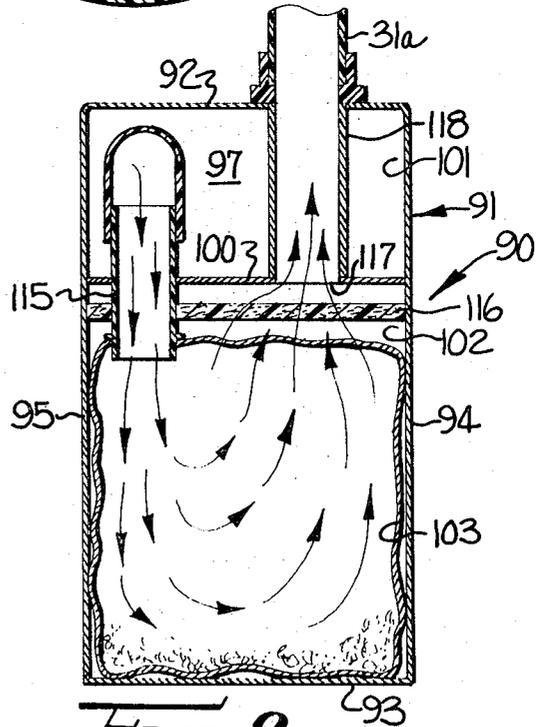
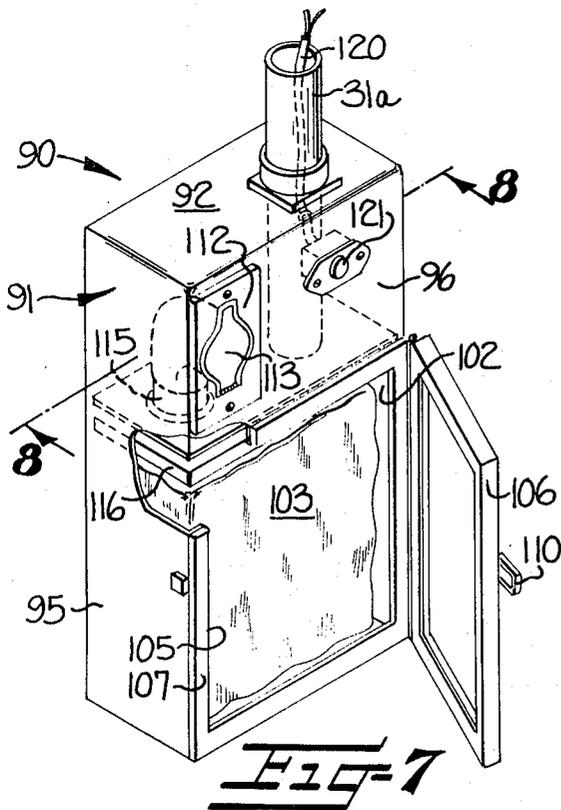
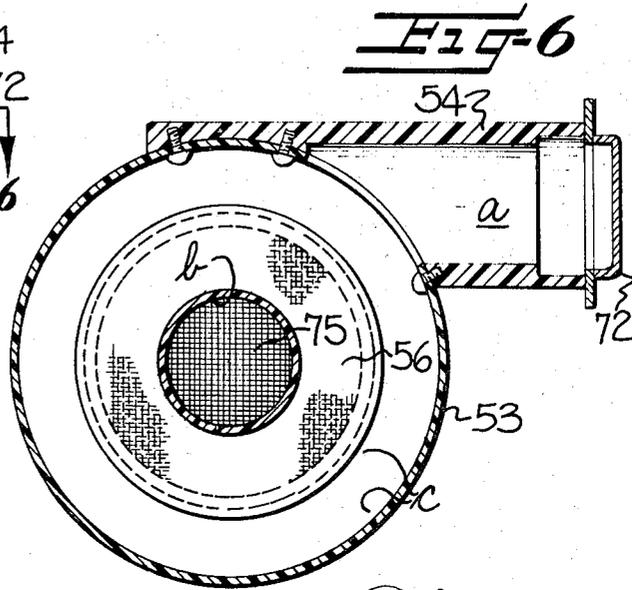
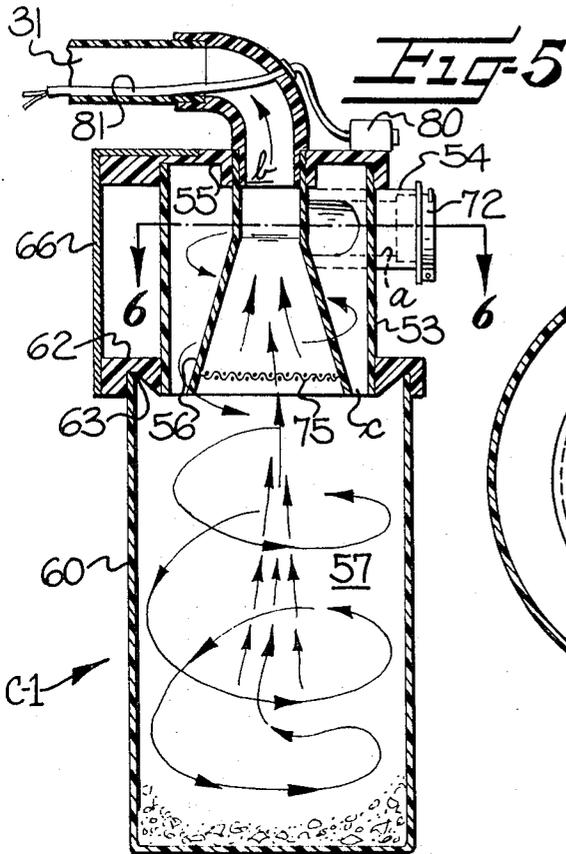
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3 Sheets-Sheet 2



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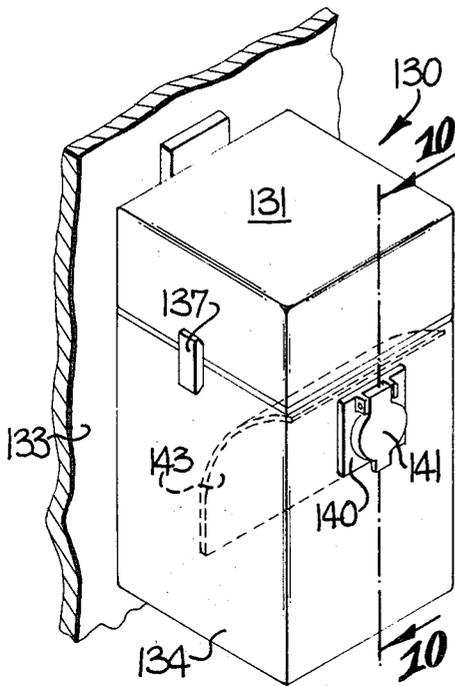


Fig-9

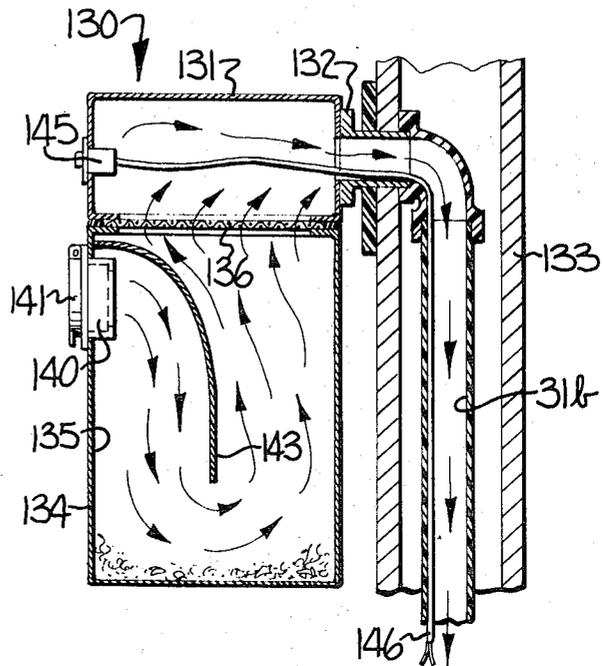


Fig-10

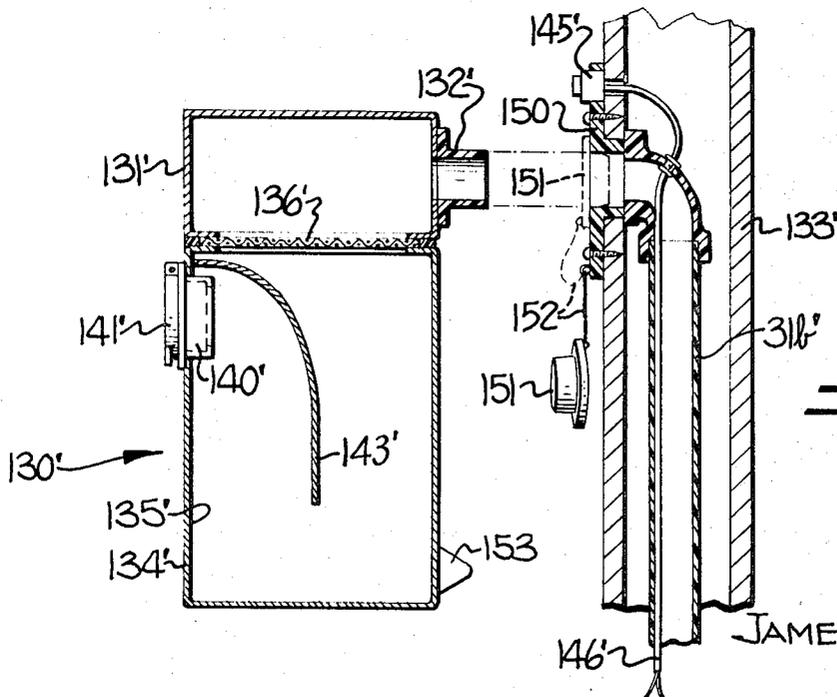


Fig-11

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3,543,325

VACUUM CLEANING SYSTEM WITH WASTE COLLECTION REMOTE FROM SUCTION FAN

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U.S. Cl. 15—314

14 Claims

ABSTRACT OF THE DISCLOSURE

A vacuum cleaning system having a stationary conduit connected to a source of suction and wherein waste material, which heretofore would flow through the stationary conduit and be collected adjacent the far end thereof, is prevented from entering the conduit and collected outside of the conduit through use of an expansion chamber for separating the waste material from the suction air currents to thereby prevent accumulation of waste material in and clogging of the stationary conduit. The expansion chamber which also serves to collect waste may be detachably connected to the outer end of the conduit carried by a vertical support, such as a wall or post, for supporting the expansion chamber on the vertical support above the underlying floor surface. A readily accessible switch is disposed adjacent the outer end of the conduit with an electrical conductor line connected thereto and extending through the conduit to the source of suction.

This invention relates to vacuum cleaning systems for domestic and industrial use of the type having one or more stationary conduits. Usually of considerable length, connecting respective hose-receiving receptacles to a suction source. Some of these systems, wherein a plurality of such stationary conduits is employed, are commonly known as centralized vacuum cleaning systems.

It is common practice to locate the suction and collecting unit of a centralized vacuum cleaning system in a utility room, basement or other location remote from the vacuum hose-receiving receptacles. Generally, such centralized systems have been quite satisfactory; especially for domestic use. There are particular installations, however, in which the system is to be used for collecting large amounts, large pieces and/or oily or wet waste material which might accumulate or lodge in and even clog the conduit. Because of the small diameter and usual long length of such stationary conduits, the removal of any obstructions therein could be quite difficult. Such particular installations may include automobile service stations, machine shops, hospitals and the like.

It is an object of this invention to provide a vacuum cleaning system of the type described wherein a separator-collector of large capacity is located adjacent the entrance end of each conduit leading to the suction fan to prevent waste material from entering the conduit to thereby obviate the clogging of the conduit which might otherwise occur.

It is a more specific object of this invention to provide a vacuum cleaning system for collecting large amounts of waste material at a location spaced a substantial distance from a suction fan to prevent waste material from ac-

cumulating in a stationarily mounted conduit means leading to the air inlet of the suction fan, and wherein the vacuum cleaning system comprises a waste material separator-collector having an air inlet to which a suction hose is connectable, which hose preferably is flexible and whose free end may be adapted for manual manipulation for sucking waste material from areas to be cleaned. The conduit means includes at least one stationary suction conduit of considerable length having its distal ends communicatively connecting the outlet of the separator-collector to the air inlet of the suction fan, and the separator is provided with an air expansion chamber positioned between the inlet and the outlet thereof and through which suction currents flow in their course to said conduit. The expansion chamber is arranged to permit expansion and consequent reduced velocity of the air currents therein with respect to the velocity of the air currents in the suction hose and the conduit, such that the waste material is separated from the suction currents and collects in the expansion chamber, with the result that substantially clean air currents flow through the conduit and are exhausted from said fan thereby avoiding clogging of said conduit by large pieces of waste material or by excessive accumulation of waste material therein.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds when taken in connection with the accompanying drawings, in which

FIG. 1 is a perspective view showing one embodiment of the vacuum cleaning system of this invention as installed, for example, in an automobile service station;

FIG. 2 is a plan view of the installation of FIG. 1;

FIG. 3 is a perspective view of a cyclone-separator form of collecting means positioned between one of the stationary conduits of FIGS. 1 and 2 and a corresponding movable hose;

FIG. 4 is a perspective view of the suction fan, particularly showing electrical conductor means extending along and within the corresponding conduit and thence to the fan motor;

FIG. 5 is a vertical sectional view through the cyclone-separator form of collector taken substantially along line 5—5 in FIG. 3;

FIG. 6 is an enlarged sectional plan view taken substantially along line 6—6 in FIG. 5;

FIG. 7 is a perspective view of a second form of collecting means which may be substituted for the first form of collecting means in the vacuum system of FIGS. 1—6;

FIG. 8 is a vertical sectional view taken along line 8—8 in FIG. 7;

FIG. 9 is a perspective view of a third form of collecting means which may be substituted for that shown in FIGS. 1—6;

FIG. 10 is a vertical sectional view taken along line 10—10 in FIG. 9; and

FIG. 11 is a view similar to FIG. 10, partially exploded, showing a fourth embodiment of the separator-collector as it may be arranged to permit its use interchangeably at other stationary conduits.

Referring more specifically to the drawings, the vacuum cleaning system of this invention is shown in FIGS. 1 and 2 as being installed in association with an automobile service station, which is a non-limiting example repre-

sentative of various types of installations, and wherein a first embodiment of waste material collecting means is shown incorporated in the installation, with details of the system of FIGS. 1 and 2 being shown in FIGS. 3-6. The vacuum cleaning system of this invention also is useful in association with various types of industrial buildings, such as textile plants, machine shops and the like, as well as residences.

Typically, the automobile service station of FIGS. 1 and 2 includes a building 15 which may be suitably partitioned to form a garage area 16, an office area 17, rest room areas 18, and a storage area 19. Fuel dispensing pumps 21 are shown spaced from building 15. Posts or columns 22, 23 are usually provided adjacent the pumps 21.

As shown in FIG. 2, the vacuum cleaning system comprises stationary conduit means in the form of a plurality of stationary conduits 31-35 all of which are communicatively connected to a common suction source 36 shown schematically positioned within the storage area 19 of building 15 in FIG. 2. Suction source 36 is shown in FIG. 4 in the form of an electrically operable suction fan of the centrifugal type comprising a rotary air impeller 40 positioned within a volute housing 41 and driven by an electric motor 42.

Conduits 31, 32, 33 are connected to an intermediate conduit 45. Corresponding ends of conduits 34, 35, 45 are communicatively connected to a common air inlet conduit 46 extending from the air inlet of suction fan housing 41 (FIG. 4). As shown, the major portions of conduits 31-35, 45 and 46 may be hidden and inaccessibly positioned beneath the floor of building 15 and beneath the surface of the ground or ramp of the service station. It is apparent that the stationary conduits may be of considerable length in that they may extend along and/or within vertical walls of the building or through the wall space between the ceiling and roof of the building, depending upon the type of installation or as may be convenient.

The outer ends (inlet ends) of conduits 31-35, remote from suction fan 36, are adapted for connecting one or more, preferably movable, suction hoses thereto. However, in order to substantially prevent any waste material or liquid from entering the outer end of each stationary conduit 31-35, and more especially, to prevent large masses or heavy pieces of waste material from entering the outer ends of stationary conduits 31-35, individual waste separator-collectors C-1-C-5 are provided adjacent the outer ends of respective stationary conduits 31-35 and are adapted for connection thereto of a movable suction hose or hoses. In the illustrated installation of the vacuum cleaning system, two movable suction hoses 50 are shown, each of which may be used interchangeably in association with any or all of the waste collectors C-1-C-5. It is to be understood, however, that a single hose or additional hoses similar to hoses 50 may be used in association with the various waste collectors, as desired.

With the exception of the particular stationary structural member or members on which the waste collectors C-1, C-5 are supported, all the waste collectors in the first embodiment may be identical and, therefore, only the waste collector C-1 will be described in detail. Waste collector C-1 is a form of cyclone separator and comprises an upper cylindrical body 53 mounted on a substantially vertical axis and to the upper end portion of which a tubular hose-receiving receptacle or inlet member 54 is suitably secured in off-center relation thereto. The internal passage *a* of receptacle 54 extends substantially tangentially with respect to the inner cylindrical surface of upper body 53 so the air currents directed into the upper cylindrical body 53 impinge on the adjacent curved inside surface thereof and are directed thereby in a circular or helical path around the inside of the curved wall of the upper body 53.

The top wall 55 of upper cylindrical body 53 has the smaller upper end of a substantially frusto-conical or tapered tubular outlet member 56 or air deflector attached thereto which communicates through an outlet opening *b* with the outer or inlet end of the corresponding stationary conduit 31 suitably connected to the top wall 55. Outlet member 56 is substantially centrally located with respect to the vertical axis of upper cylindrical body 53 and its larger lower end terminates substantially on the same level as the lower end of upper cylindrical body 53. The lower end of tubular outlet member 56 is of substantially lesser diameter than the diameter of the inner surface of cylindrical body 53 to provide a relatively narrow annular passage *c* therebetween, downwardly through which the suction currents and the waste material borne thereby pass into an expansion chamber 57 defined by a collection box 60. Collection box 60 is preferably of cylindrical form and at least its upper portion has an internal cross-sectional area substantially greater than the internal cross-sectional area of upper cylindrical body 53. Also, the volumetric capacity of collection box 60 is considerably greater than that of the upper cylindrical body surrounding the tubular outlet member 56.

An intermediate wall or partition 62 surrounds and is suitably secured to the lower end portion of upper body 53 and serves as a top wall partially closing the upper end of collection box 60. The upper end of collection box 60 is suitably removably secured to the intermediate wall 62 so that it may be removed from intermediate wall 62 for emptying the same, as desired. Accordingly, the lower surface of intermediate wall 62 is provided with a suitably formed groove 63 for matingly receiving therein the upper end portion of collection box 60. Additionally, suitable latch members 64 (FIG. 3) may be provided for releasably securing collection box 60 to intermediate wall 62.

In order to secure waste collector C-1 to a vertical wall or other structural member with the axis of upper body member 53 extending in a substantially vertical plane, top and intermediate walls 55, 62 extend rearwardly with respect to receptacle 54 and upper and lower portions of a rigid plate member 66 are suitably secured to the outwardly projecting portions of walls 55, 62. Plate member 66 may be secured to a vertical wall or structural member in any desired manner and in the particular illustration of FIG. 3, since post 22 is shown as being of circular cross-section and of lesser diameter than the width of plate member 66, a substantially U-shaped clamping member 67 is shown engaging post 22 and flanges thereof are suitably attached to plate member 66.

Various forms of hoses may be connected to receptacle 54 and, as shown in FIGS. 1, 2 and 3, each hose 50 may be of pliable construction and preferably is provided with a nozzle 70 on its outer end suitable for attachment of suitable cleaning implements thereto, as desired. The inner end of hose 50 is provided with a suitable adapter 71 thereon which may be inserted in receptacle 54 as shown in FIG. 3 during use. Of course, adapter 71 may be readily removed from receptacle 54 of waste collector C-1 when the hose is to be used in association with another of the waste collectors C-2-C-5, as desired. When a hose is not plugged into receptacle 54, it may be sealed against flow of air therethrough by a suitable closure member 72 hingedly connected to receptacle 54.

As is well known, in addition to dust and dirt particles, heavier waste materials, such as wads of paper, metal objects, liquids and the like, collect in motor vehicles such as automobiles, trucks, trailers and the like. In utilizing a centralized vacuum cleaning system for removing such waste materials from motor vehicles, it is apparent that if such waste materials are permitted to enter the stationary conduit, there is a tendency for such waste material, especially wet waste material, to adhere to the inner surfaces of the conduits. Obviously, this reduces the efficiency of the vacuum cleaning system and

sometimes results in clogging the corresponding conduit or conduits to such an extent that the suction in a particular conduit may be entirely ineffective at the nozzle of a corresponding movable hose.

Also, it is contemplated that the vacuum cleaning system may be utilized in machine shops and the like for picking up metal filings and masses of residual metal waste material which is so often oily. It can be appreciated that it is important that such waste materials do not enter the corresponding stationary conduit or conduits. By providing a waste collector which separates the waste material from the air currents at a point between the movable suction hose and the corresponding stationary conduit or conduits according to the present invention, the problem of accumulation of waste material in the stationary conduit or conduits is practically eliminated, as can be more fully appreciated from the following description of the method of operation of the present apparatus.

Further, in a centralized vacuum cleaning system having a common source of suction for a plurality of hoses, waste of different types, such as various types of metal filings in a machine shop, for example, is more readily maintained segregated with a separate waste collector for each hose. This results in enhancing the marketability of such waste, and in many cases converting previously clogged waste of no market value into saleable waste.

Assuming that suction fan 36 is operating and that a pliable hose 50 is being manually manipulated at an area to be cleaned, as suction currents enter cylindrical body 53 (FIGS. 3, 5 and 6), they are caused to flow in the aforementioned manner in a helical path downwardly through annular passage *c*. The circular or helical path of the air currents is also induced by the frusto-conical shape of outlet member 56.

Although the air currents are compressed to some extent as they flow downwardly around outlet member 56, this provides for a violent and sudden expansion of the air currents as they pass through annular passage *c* and enter expansion chamber 57 and thus effects a sudden and substantial reduction in the velocity of the air currents. The sudden expansion and reduced velocity of the air currents results in the waste material precipitating out of the air currents toward the bottom of collection box 60.

In order that the velocity of the air currents within expansion chamber 57 remains relatively low, it should be noted that the orifice at the bottom of outlet member 56 has a substantially greater cross-sectional area than the effective area of annular passage *c* so that, as the air currents initially enter outlet member 56 they move upwardly relatively slowly and their velocity gradually increases as they approach the outlet opening *b* of the waste collector and enter the outer end of the corresponding stationary conduit 31. This further ensures that the waste material is effectively separated from the air currents in the expansion chamber before the air currents flow into the stationary conduit. In instances where in the waste material being sucked into the movable suction hose is of very light weight but may be of relatively large mass, such as lint, it may be desirable to provide a suitable filter such as is indicated at 75 in FIGS. 5 and 6 at the inlet end of tubular outlet member 56 so as to obstruct the passage of the latter type of waste material into the corresponding conduit 31.

Another important advantage in separating the waste material from the air currents before they enter the conduit or conduits of the vacuum cleaning system is that, since the conduit or conduits remain substantially clean, they also may be employed for containing electrical conductors therein extending from a switch adjacent the corresponding suction source or fan. As shown in FIGS. 3 and 4, for example, a manually operable switch 80 is suitably mounted on the top wall 55 of waste collector C-1 and

has electrical conductor means 81 extending therefrom which penetrate an adjacent portion of conduit 31 and then extend along and within conduit 31. It is apparent that conductor means 81 may then extend along conduits 45 and 46 (FIGS. 2 and 3), whereupon the electrical conductor means 81 may extend through the wall of conduit 46 and thence to electric motor 42. Thus, electric motor 42 and, consequently, rotation of impeller 40 may be controlled by operating switch 80 adjacent the particular waste collector then being used. It is apparent that similar switches may be provided adjacent all the waste collectors C-1-C-5 for controlling operation of the electrically operable suction fan 36. If desired, switch 80 may be of the push-button type and positioned in inlet member 54 so as to be actuated automatically by the adapter 71 as it is being inserted in outlet member 54.

Referring to FIGS. 7 and 8, there is shown a bag-type waste separator-collector 90 which may be substituted for any one or more of the waste collectors C-1-C-5 of FIGS. 1 and 2, and which is particularly adaptable for installation within the vertical wall of a building. The waste collector 90 comprises a casing 91 which may be of substantially box-like or rectangular configuration and includes top and bottom walls 92, 93, spaced sidewalls 94, 95, and front and rear walls 96, 97. A substantially horizontal partition 100 divides casing 91 into upper and lower chambers 101, 102, the lower chamber 102 serving as an expansion chamber and containing a filter bag 103 therein. To provide access to filter bag 103, the lower portion of the front wall 96 of casing 91 is provided with a relatively large opening 105 which may be opened and closed by means of a hinged door 106. A resilient sealing member 107 may surround opening 105 and be attached to front wall 96 to prevent leakage of air from expansion chamber 102 past the door 106 when the same occupies closed position. A suitable latch means 110 may be provided for releasably securing door 106 in closed position.

A tubular inlet receptacle 112 is mounted in front wall 96 of casing 91 above expansion chamber 102 for reception of the inner end of a movable or pliable hose such as the hose 50 of FIGS. 1-3. When the inlet receptacle 112 is not being used, it may be closed by a hinged cover 113. Tubular inlet receptacle 112 curves downwardly within upper chamber 101 and is provided with a tubular inlet extension 115 which penetrates partition 100 as well as a secondary filter 116 in the upper portion of expansion chamber 103. The lower end of tubular inlet extension 115 penetrates the upper portion of filter bag 103. Filter 116 may be omitted, but is desirable to prevent filter bag 103 from being drawn upwardly against partition 100 and thereby blocking the air outlet opening 117 provided in partition 100. Secondary filter 116 also prevents fine particles from entering conduit 31a. A tubular air outlet member 118 communicates with opening 117 and is positioned within upper chamber 101 of casing 91. The upper end of air outlet member 118 communicates with corresponding stationary conduit 31a which is the equivalent of conduit 31 in FIGS. 2 and 3 leading to suction fan 36.

In utilizing the waste collector 90, it will be noted that, here again, all the waste material picked up by the corresponding movable hose and directed through receptacle 112 is collected and separated from the air currents by virtue of collection bag 103 in expansion chamber 102. Thus, relatively clean air flows through the stationary conduit 31a whenever the corresponding suction fan, not shown, is operating. Accordingly, electrical conductor means 120 for the suction fan to which conduit 31a is communicatively connected, may extend longitudinally along and within conduit 31a. As shown in FIG. 7, the conductor means 120 extends downwardly within tubular outlet member 118 and then extends through the wall of outlet member 118 to a suitable manually operable switch 121 which may be mounted on the front wall 96 of casing 91, as shown in FIG. 7.

Referring to FIGS. 9 and 10, there is shown a third form of waste separator-collector 130 which also may be substituted for any one or more of the waste collectors C-1-C-5 of FIGS. 1 and 2. Waste collector 130 comprises a main or upper hollow body 131 which is preferably, but not necessarily, of substantially rectangular configuration and whose rear wall is provided with an outlet member 132 to which the outer end of a corresponding stationary suction conduit 31b is connected. As shown, the main body of waste collector 130 may be mounted on a building wall or other structural member 133 which may be the equivalent of the structural members heretofore described with respect to FIGS. 1, 2 and 3.

Removably secured to and extending downwardly from main body 131 is a collection box 134 defining an expansion chamber 135 therein which is open at the top thereof for communication with main body 131. A suitable filter 136 is positioned at the juncture of main body 131 with collection box 134. Collection box 134 may be removably secured to main body 131 of waste collector 130 by suitable latch members 137, only one of which is shown in FIG. 9.

The front wall of collection box 134, adjacent the upper portion thereof, is provided with a suitable tubular receptacle 140 which may be closed by means of a hinged cover 141 when the corresponding waste collector is not being used. It is apparent that receptacle 140 serves as an inlet for collection box 134 and is adapted for the reception therein of the inner end of a hose, such as the hoses 50 of FIGS. 1, 2 and 3.

A deflector 143, made from suitable rigid sheet material, extends entirely across the width of collection box 134 within the same and also extends from the front wall of collection box 134, above the level of receptacle 140, and then curves rearwardly and downwardly and terminates a substantial distance below the level of receptacle 140. However, the lower edge of deflector 143 or at least a portion thereof is spaced a substantial distance above the bottom wall of collection box 134.

Thus, as air currents and waste material borne thereby enter receptacle 140, not only are the air currents permitted to expand in expansion chamber 135, but deflector 143 deflects the air currents and the waste material toward the bottom of expansion chamber 135. Thereupon, the air currents pass upwardly rearwardly of deflector 143 and are relatively clean as they flow through the filter 136 thereabove. Filter 136 further ensures that any small dust particles are separated from the air currents before they pass through the main body 131 of waste collector 130 and before the air currents enter the corresponding stationary suction conduit 31b.

As is the case with respect to the forms of waste collectors described heretofore, waste collector 130 is also provided with a suitable manually operable switch 145 which may be positioned in the front wall of main body 131 and from which suitable conductor means 146 extend rearwardly and thence into and along the conduit 31b to the corresponding electrically operable suction fan, not shown in FIGS. 9 and 10, but which may be identical to that shown in FIG. 4.

Referring to FIG. 11, the separator-collector 130' there shown is quite similar to that of FIGS. 9 and 10 and typically illustrates how all embodiments may be arranged so they may be used interchangeably with any of the stationary conduits 31-35 of FIG. 2, for example. Those parts shown in FIG. 11 which are similar to those shown in FIGS. 9 and 10 will bear the same reference characters, with the prime notation added, to avoid repetitive description.

In order to detachably connect separator-collector 130' with the outer end of stationary conduit 31b', building wall 133' has a tubular receptacle 150 secured thereto, and aligned with the outer end of conduit 31b', for slidably receiving therein the outlet member 132'. It is apparent that the tubular receptacle 150 may be con-

sidered as forming a part or extension of conduit 31b' to thus define the outer end of the conduit. To facilitate removal of outlet member 132' from receptacle 150, switch 145' may be conveniently located on wall 133' adjacent receptacle 150 without having the conductors 146 extending into collector 130' as is the case with respect to collector 130.

When separator-collector 130' is moved from conduit 35b' to another conduit, a suitable closure member 151 may be used for closing receptacle 150 against the flow of suction currents thereinto. As shown in FIG. 11, closure member 151 is suspended from receptacle 150 by a chain 152, and the reduced body of closure member 151 may fit within receptacle 150 in sealing engagement therewith, as shown in dotted lines.

A spacing member 153 may be secured to the rear wall of collection box 134' so as to bear against wall 133' to aid in supporting separator-collector 130' in an upright position when outlet member 132' is plugged into receptacle 150.

It is thus seen that I have provided an improved vacuum cleaning system in which an expansion chamber is provided for permitting substantial reduction in the velocity of suction air currents in their course from a suction hose to the inlet end of a permanently installed stationary conduit which may be of considerable length and wherein the outlet end of the stationary conduit is communicatively connected to a source of suction. The reduction in the velocity of the air currents serves to substantially separate waste material entering the expansion chamber from entering the stationary conduit to thereby obviate restriction of the air flow through the conduit or clogging of the conduit which might otherwise occur.

Utilizing a separator-collector wherein the same is provided with a secondary filter, such as the filters 75, 116, 136 and 136' of FIGS. 5, 8, 10 and 11, respectively, so as to entrap all fine particles, it is apparent that this avoids the need for any filter means whatsoever adjacent the suction source, as is commonly employed in centralized vacuum cleaning systems.

Where a plurality of stationary conduits is employed as in FIGS. 1 and 2, it is apparent that there are many advantages in providing an independent separator-collector adjacent the outer end of each conduit. Not only does this substantially, if not entirely, prevent waste material from entering each stationary conduit, but it also provides for segregation of the various types of waste material as explained earlier herein, and the collection boxes 60, 130, 130' or filter bag 103 may be removed from the respective separator-collectors for emptying and cleaning the collection boxes or replacing filter bag 103 with another filter bag, as the case may be. On the other hand, from the economical point of view, it may be desirable to use a single separator-collector interchangeably for several stationary conduits as described with respect to FIG. 11.

In the drawings and specification there have been set forth several embodiments of the invention and although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation.

I claim:

1. In a vacuum cleaning system having a suction source including an electrically operable suction fan, conduit means including at least one stationary conduit having a predetermined length thereof inaccessibly positioned and having one end thereof communicatively connected to the suction source, and hose means including at least one suction hose adapted for communication with the outer end of said stationary conduit; the combination therewith of means for collecting waste material and substantially preventing the same from entering said conduit and including a separator-collector having an air outlet communicatively connected to the outer end of said stationary conduit, said separator-collector having an air inlet

adapted for communication with said suction hose, and said separator-collector having an expansion chamber therein communicating with said air inlet and said air outlet, said expansion chamber being arranged to permit substantial expansion and consequent substantial reduction in the velocity of the air currents therein with respect to the velocity of the air currents in the suction hose and with respect to the velocity of the air currents in the stationary conduit such that waste material is separated from the suction air currents in their course from the air inlet of the separator-collector into the stationary conduit, whereby waste material that would otherwise flow into said stationary conduit is retained in said separator-collector, switch means adjacent said separator-collector, and conductor means extending along and within at least a portion of said inaccessibly positioned length of said stationary conduit and electrically connecting said switch means to said suction fan for controlling operation of said suction fan.

2. A structure according to claim 1, in which said separator-collector has a filter through which said suction currents pass in their course from said expansion chamber into said stationary conduit.

3. A structure according to claim 1, wherein said separator-collector is adapted to be mounted in a substantially vertical position and further comprises a substantially cylindrical upright wall of substantially less cross-sectional area than said chamber and being located above said chamber said chamber having a top wall thereon provided with a substantially circular opening therethrough of about the same diameter as said cylindrical wall and aligned with and in communication with said cylindrical wall, closure means for the upper end of said cylindrical wall, said separator-collector outlet being formed in said closure means and being of substantially less diameter than said cylindrical wall, a frusto-conical tubular air deflector having open upper and lower ends with its open upper end being of small diameter relative to its lower end and being connected to said outlet, and said separator-collector inlet being communicatively connected to the upper portion of said cylindrical wall and arranged to direct said suction currents and waste material borne thereby against the inner surface of said cylindrical wall in a path tangent thereto to cause the air and waste material to move in a helical path around said air deflector and downwardly into said expansion chamber such that the waste material gravitates toward the bottom of said chamber as the air changes direction and flows upwardly through said air deflector to said outlet.

4. A structure according to claim 3, including filter means arranged to entrap waste material tending to be borne into said deflector by said suction currents.

5. A structure according to claim 1, including a filter bag housed within said expansion chamber and having an inlet opening in direct communication with said inlet of said separator-collector for collecting waste material therein as said suction currents pass through said bag to said stationary conduit.

6. A structure according to claim 1, in which said air outlet of said separator-collector is communicatively connected to the outer end of said stationary conduit by means detachably connecting said air outlet to said stationary conduit.

7. A structure according to claim 1, in which said separator-collector is adapted to be mounted in a substantially vertical position and includes filter means defining an upper wall portion of said expansion chamber, said expansion chamber having a bottom wall spaced below said filter means, said separator-collector inlet being arranged for direct communication with said expansion chamber, said separator-collector outlet being arranged so that said suction currents flow through said filter means in their course from said expansion chamber to said outlet, and baffle means in said chamber in the plane of flow of said

suction currents therethrough to intercept waste material conveyed into said chamber.

8. In a vacuum cleaning system having a suction source including an electrically operable suction fan, a plurality of stationary conduits having corresponding ends thereof communicatively connected to the suction source, at least one of said stationary conduits having a predetermined length thereof inaccessibly positioned, and suction hose means adapted for communication with the outer ends of said stationary conduits; the combination therewith of means associated with each conduit and including an expansion chamber for collecting waste material and substantially preventing the same from entering said conduits, said expansion chamber being arranged to permit substantial expansion and consequently substantial reduction in the velocity of the air currents therein with respect to the velocity of the air currents in a corresponding suction hose and with respect to the velocity of the air currents in the corresponding stationary conduit, whereby waste material that would otherwise flow into said conduits is retained in the respective expansion chambers, switch means adjacent said outer end of at least said one conduit, and conductor means extending along, and within at least a portion of said inaccessibly positioned length of said one conduit and electrically connecting said switch means to said suction fan for controlling operation of said suction fan.

9. A structure according to claim 8, wherein said means for collecting waste material for substantially preventing the same from entering said conduits includes filter means.

10. A structure according to claim 8, wherein said means for collecting waste material for substantially preventing the same from entering said conduits includes first and second filter means.

11. The combination with a vertical support, such as a wall or post, of a vacuum cleaning system having a suction source, conduit means including at least one stationary conduit having an outer end fixedly positioned on and carried by said vertical support and having its inner end communicatively connected to the suction source, and hose means including at least one suction hose adapted for communication with the outer end of said stationary conduit; the combination therewith of means for collecting waste material and substantially preventing the same from entering said conduit and including a separator-collector having means defining an air outlet communicatively connected to the outer end of said stationary conduit, said air outlet connecting said separator-collector as a unit to said stationary conduit for detachably supportingly positioning said separator-collector to said stationary conduit alongside said vertical support free of the underlying floor surface, said separator-collector having an air inlet adapted for communication with said suction hose, and said separator-collector having an expansion chamber therein communicating with said air inlet and said air outlet, said expansion chamber being arranged to permit substantial expansion and consequent substantial reduction in the velocity of the air currents therein with respect to the velocity of the air currents in the suction hose and with respect to the velocity of the air currents in the stationary conduit such that waste material is separated from the suction air currents in their course from the air inlet of the separator-collector into the stationary conduit, whereby waste material that would otherwise flow into said stationary conduit is retained in said separator-collector.

12. A structure according to claim 11 wherein said suction source includes an electrically operable suction fan and wherein said stationary conduit has a predetermined length thereof inaccessibly positioned, switch means adjacent said outer end of said stationary conduit, and conductor means extending along and within at least

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a portion of said inaccessibly positioned length of said stationary conduit and electrically connecting said switch means to said suction fan for controlling operation of said suction fan.

13. A structure according to claim 11 wherein said means defining an air outlet for said separator-collector and detachably supportingly positioning said separator-collector on the outer end of said stationary conduit is so located that the separator-collector is suspendedly supported on the outer end of said stationary conduit.

14. A structure according to claim 11 wherein said means defining an air outlet for separator-collector and detachably supportingly positioning said separator-collector on the outer end of said stationary conduit is constructed to be matingly interconnected with the outer end of said stationary conduit.

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