US 20050066471A1

(19) **United States**

(12) **Patent Application Publication** (10) **Pub. No.: US 2005/0066471 A1**

Miller et al. (43) **Pub. Date: Mar. 31, 2005**

(54) **COLOR-CODED CLEANING NOZZLES AND METHOD OF CLEANING**

(76) Inventors: **Paul R. Miller**, Downingtown, PA (US); **Russell A. Seery**, Lincoln University, PA (US)

Correspondence Address:
JOSEPH M. KONIECZNY, P.C.
PO Box 387
CONSHOHOCKEN, PA 19428-0387 (US)

(21) Appl. No.: **10/676,623**

(22) Filed: **Sep. 30, 2003**

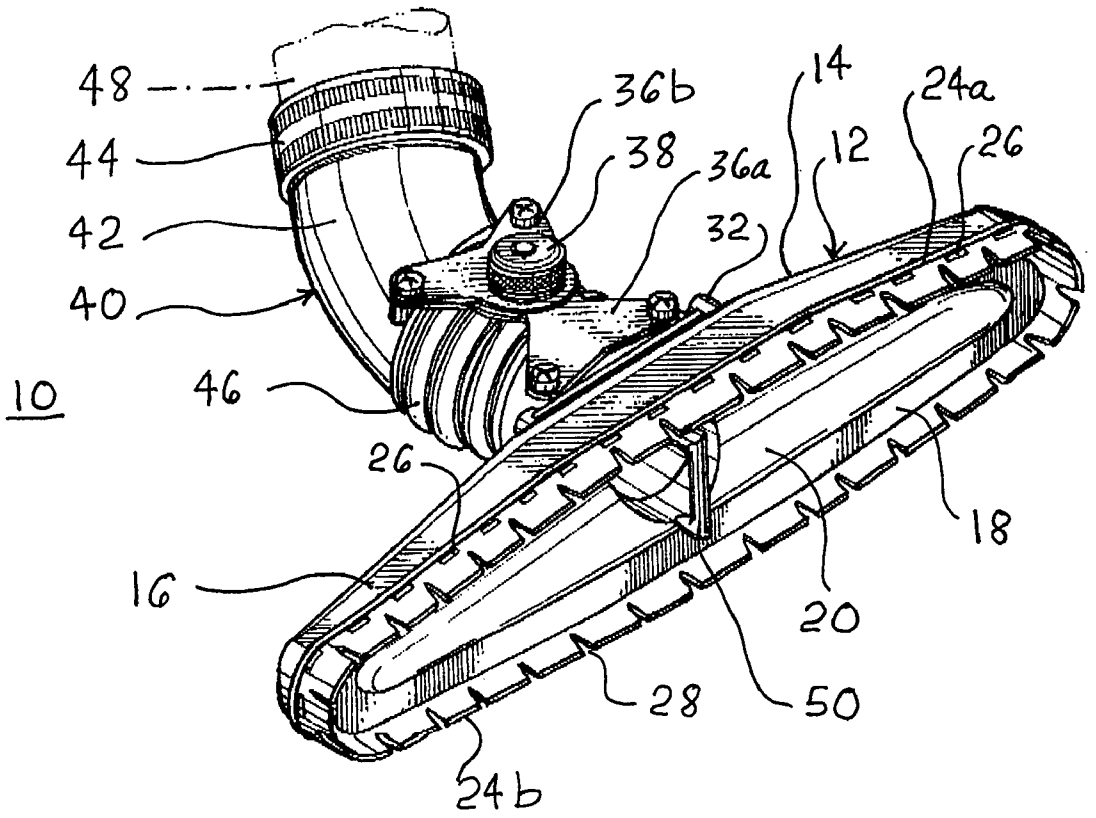
Publication Classification

(51) **Int. Cl.**[7] **A47L 9/06**

(52) **U.S. Cl.** **15/401**

(57) **ABSTRACT**

A plurality of color-coded cleaning nozzles, which are interchanged with a common vacuum cleaner and which are designated for use only in a particular area. A method for preventing cross-contamination between different areas of a facility while cleaning the areas with a common vacuum cleaner. The method includes the steps of providing a plurality of cleaning nozzles that are interchangeable with the vacuum cleaner; applying visual identifying indicia on each of the nozzles to uniquely identify each nozzle; assigning a particular nozzle to each distinct area of the facility; cleaning a first area of the facility with its assigned nozzle; cleaning a second area of the facility only after removing the first assigned nozzle from the vacuum cleaner and replacing it with the nozzle assigned to the second area; and, isolating each of the nozzles from one another.



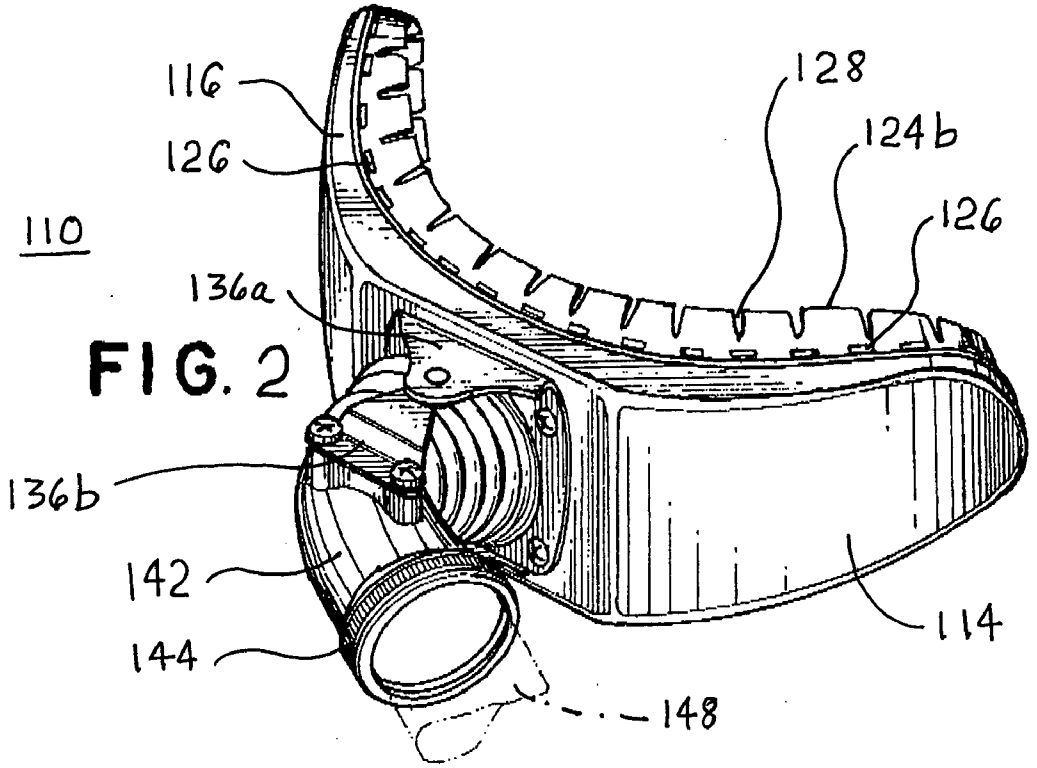

116
126
110
136a
128
124b
126
136b
142
144
148
114

FIG. 2

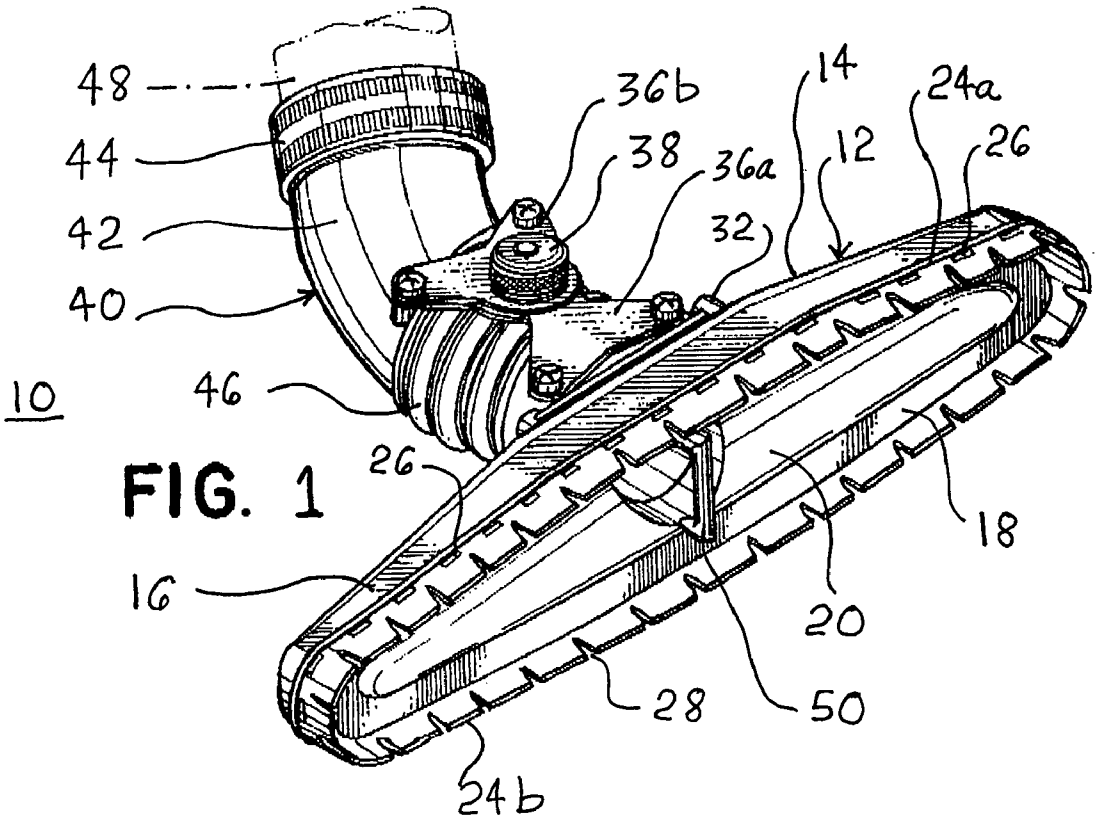

48
44
42
40
10
46
36b
38
36a
14
12
24a
26
32
26
16
18
20
28
50
24b

FIG. 1

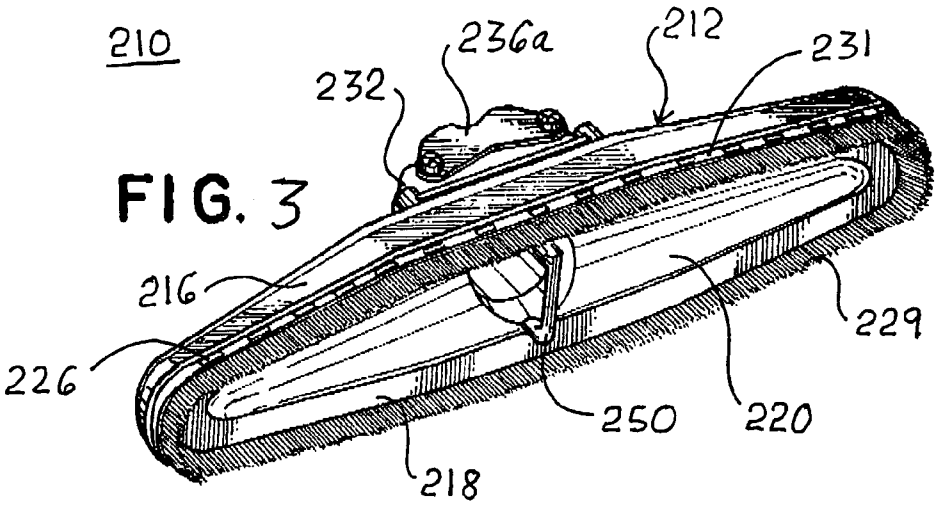

210
236a
212
231
232
216
226
229
250
220
218

FIG. 3

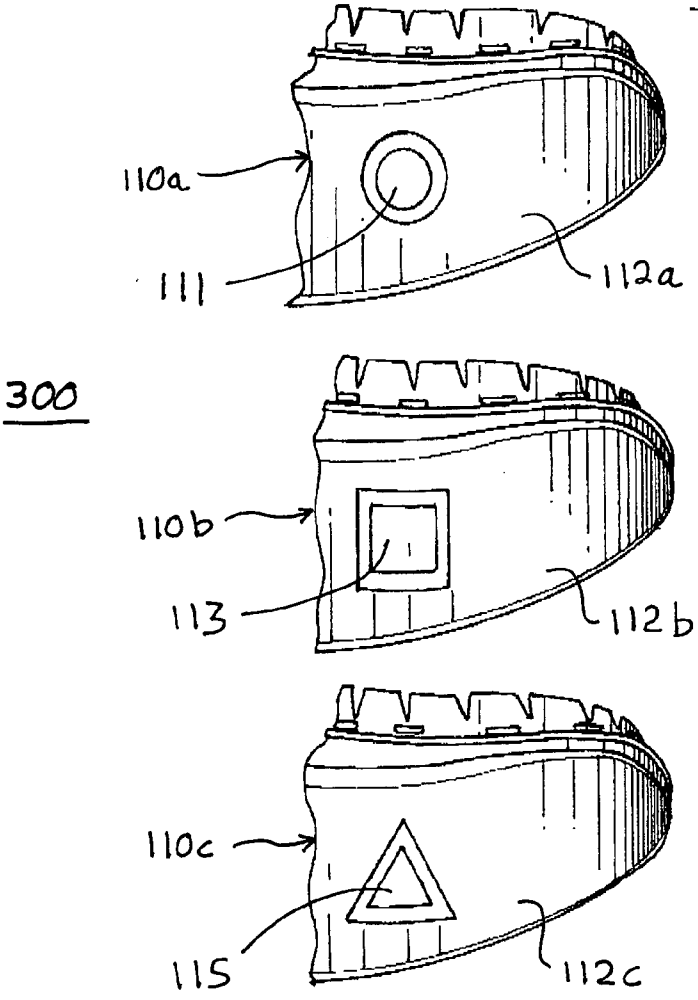

110a
111
112a
300
110b
113
112b
110c
115
112c

FIG. 4

COLOR-CODED CLEANING NOZZLES AND METHOD OF CLEANING

FIELD OF THE INVENTION

[0001] The present invention relates to an apparatus and method of preventing cross-contamination between different areas of a facility while cleaning the areas with a common vacuum cleaner. In particular, the invention relates to a plurality of color-coded cleaning nozzles, which are interchanged with a common vacuum cleaner and which are designated for use only in a particular area.

BACKGROUND OF THE INVENTION

[0002] Industrial vacuum cleaners having a plurality of interchangeable cleaning nozzles are known in the prior art. For example, the intermittent duty and continuous duty vacuum cleaners sold by Nilfisk-Advance America, Malvern, Pa., are provided with various floor nozzles, pipe brushes, crevice tools, etc., which interchangeably connect to the hose/wand of the vacuum cleaner. In many cases, the same vacuum cleaner and attachments are used throughout a facility to clean separate and/or distinct areas. As a result of using the same vacuum cleaner and attachments throughout the entire facility, debris collected in one area may be introduced into, and thus contaminate, another area. In many industries, such as the food or pharmaceutical industry, even trace amounts of cross-contamination, can adversely affect product quality. Therefore, it is desirable to provide a method and apparatus for preventing cross-contamination between different areas while cleaning the areas with a common vacuum cleaner.

SUMMARY OF THE INVENTION

[0003] The present invention provides a set of color-coded cleaning nozzles, which are interchanged with a common vacuum cleaner and which are designated for use only in a particular area. Each nozzle includes a base having a top surface, bottom surface and peripheral surface. An agitation skirt is mechanically fastened to the peripheral surface of the base. The agitation skirt may comprise an elastomeric strip having a plurality of serrations, or plurality of bristles.

[0004] A concavity is formed in the bottom surface of the base. An aperture extends through the base from the top surface to the concavity. An articulated connector is mechanically fastened to the top surface of the base. Visual identifying indicia are provided on each nozzle to uniquely identify each nozzle.

[0005] Preferably, the identifying indicia comprise a plurality of different colors. For example, the base of each nozzle is made of a differently-colored polymeric material.

[0006] The nozzles are preferably constructed of materials approved by the FDA for contact with human food and can be sterilized in an autoclave. It is also preferable that the nozzles be made of a material that can be sterilized in a COP tank in a solution selected from the group consisting of hot water or steam; halogen sanitizers; quaternary ammonium compounds; high and low ph sanitizers; and detergent sanitizers.

[0007] The invention also provides a method of preventing cross-contamination between different areas of a facility while cleaning the areas with a common vacuum cleaner. A plurality of cleaning nozzles are provided that are interchangeable with the vacuum cleaner. Visual identifying indicia are applied on each of the nozzles to uniquely identify each nozzle. A particular nozzle is assigned to each distinct area of the facility. A first area of the facility is cleaned with its assigned nozzle. A second area of the facility is then cleaned only after removing the first nozzle from the vacuum cleaner and replacing it with the nozzle assigned to the second area. Each of the nozzles is isolated from one another to prevent cross-contamination.

[0008] The identifying indicia are preferably provided on the same location of each nozzle, such as the external surface of the nozzles. The method includes the step of preventing removal of the identifying indicia from the nozzle during sterilization or daily use bu, for example, fabricating the base of each nozzle from a differently-colored polymeric material. The nozzles are periodically sterilized in an autoclave or by washing and submersion in a COP tank.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] **FIG. 1** is a perspective view of a cleaning nozzle in accordance with an embodiment of the invention;

[0010] **FIG. 2** is a perspective view of a cleaning nozzle in accordance with a further embodiment of the invention;

[0011] **FIG. 3** is a fragmentary, perspective view of a cleaning nozzle in accordance with another embodiment of the invention; and,

[0012] **FIG. 4** is a fragmentary, perspective of each nozzle of a color-coded set of nozzles in accordance with an embodiment of the invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0013] The apparatus and method of the present invention are described below with reference to **FIGS. 1-4**, wherein like reference numerals are used throughout to designate like elements.

[0014] A first embodiment of a nozzle in accordance with the invention is shown in **FIG. 1** and is designated generally by reference numeral **10**. The nozzle **10** has an elongate base **12** having a top surface **14**, a peripheral surface **16** extending around the periphery of the base **12**, and a bottom surface **18**. An elongate, irregularly-shaped concavity **20** is formed in the bottom surface **18**. The shape of the concavity **20** generally compliments the shape of the base **12** and extends along the length of the base **12**. A central aperture **22** extends through the base **12** from the concavity **20** to the top surface **14**.

[0015] An agitation skirt **24** is fixed to the peripheral surface **16** and extends around the entire base **12**. The agitation skirt **24** contacts and loosens dirt clinging to the surface to be cleaned. In the embodiment shown in **FIG. 1**, the skirt **24** comprises a strip of polymeric material. The strip is fixed along one lengthwise edge **24***a* to the base **12** with a plurality of equally-spaced fasteners **26**. In the preferred embodiment, the fasteners **26** comprise staples. However, other types of mechanical fasteners such as screws, pins, nails, etc. can be used. The strip has a plurality of serrations **28** equally-spaced along the other lengthwise edge **24***b*. The

serrations **28** enhance vacuum air flow through the skirt **24** and allow the skirt **24** to deform locally around obstructions on the surface to be cleaned.

[**0016**] To prevent the skirt **24** from collapsing under vacuum pressure and blocking air flow through the central aperture **22**, a U-shaped support member **50** is mounted on the bottom of the base **12**. In the embodiment shown in **FIG. 1**, the support member **50** straddles the central aperture **22**.

[**0017**] Referring to **FIG. 1**, an articulated connector **30** is fixed to the top surface **14** of the base **12** and is aligned with the central aperture **22**. The connector **30** has a mounting base plate **32**, which is preferably mechanically fastened by screws to the top surface **14** of the base **12**. The connector **30** includes a pair of hinges **34**, each of which is connected at one end **34***a* to the mounting base plate **32** and at the other end **34***b* to opposite sides of a connection sleeve **40**. Each hinge **34** preferably comprises a pair of pivotally-connected, irregularly-shaped leaves **36***a*, **36***b*. Preferably, on at least one of the hinges **34**, the pivotal connection can be locked in infinite positions. In the embodiment shown in **FIG. 1**, the leaves **36***a*, **36***b* are connected by a thumbscrew **38** having a knurled head. The hinge **34** can be locked in position simply by tightening the thumbscrew **38**.

[**0018**] The connection sleeve **40** comprises a curved tube segment **42**, a compression ring **44** at one end of the segment **42**, and a flexible rubber sleeve **46** at the other end of the segment **42**. The compression ring **44** removably locks the connection sleeve **40** to tubular wands **48** of various lengths. The rubber sleeve **40** seals and connects the tube segment **42** to the central aperture **22** in the base **12**.

[**0019**] In an alternative embodiment of the nozzle **110** shown in **FIG. 2**, the base **112** is curved instead of flat. This embodiment of the nozzle **110** is adapted for use in cleaning pipes and other curved surfaces. The nozzle **110** can be provided in a variety of curvatures to accommodate different pipe sizes. Otherwise, the nozzle **110** has the same construction as the nozzle **10** shown in **FIG. 1**. All elements of the nozzle **110** that are identical to the nozzle **10** shown in **FIG. 1** are identified with counterpart reference numerals plus **100**.

[**0020**] In an alternative embodiment of the nozzle **210** shown in **FIG. 3**, the agitation skirt **224** comprises a curtain of cleaning bristles **229**, which are fixed to the peripheral surface **216** of the base **212**. The bristles **229** are interconnected by a base strip **231**, which is fixed to the peripheral surface **216** of the base **212** by plurality of mechanical fasteners **226**. In the embodiment shown in **FIG. 3**, the mechanical fasteners comprise staples; however, other types of mechanical fasteners such as described above can be used. Otherwise, the nozzle **210** shown in **FIG. 3** has the same construction as the nozzle **10** shown in **FIG. 1**. All elements of the nozzle **210** that are identical to the nozzle **10** shown in **FIG. 1** are identified with counterpart reference numerals added to **200**.

[**0021**] In each of the embodiments described above, the nozzles **10**, **110**, **210** are preferably constructed of materials approved by the FDA for contact with food so that the nozzles can be used in food processing facilities, particularly those facilities concerned with allergen control. In particular, the materials should comply with FDA guidelines set forth in 21 C.F.R. § 1 et seq. Further, as described below, the pigments used to color the nozzle base copolymer should also be approved for coloring of plastics to be applied in contact with food.

[**0022**] The nozzles **10**, **110**, **210** are also preferably made of materials and assembled in a manner such that the nozzle **10**, **110**, **210** can be sterilized in an autoclave. It is also preferred that the nozzles be manufactured from non-corrosive materials so that the nozzles can be washed down and submersed in clean out of place (COP) tanks using one or more of the following cleaning solutions: hot water or steam; halogen sanitizers; quaternary ammonium compounds (QUATS); high and low ph sanitizers; and, detergent sanitizers. Therefore, mechanical fasteners, not adhesives, are recommended to assemble the nozzle. In the preferred embodiment, the nozzle base is made of FDA approved copolymer polypropylene. The agitation skirt **24**, **124** and rubber sleeve **46**, **146** are made of FDA approved silicon rubber. The hinges **34**, tube segment **42**, compression ring, and mechanical fasteners are made of stainless steel or aluminum.

[**0023**] In the preferred embodiment, a plurality of nozzles **10** is provided as a set **300** as shown in **FIG. 4**. Within the set **300**, each nozzle **10** has a different color or has other identifying indicia applied thereto to visually distinguish one nozzle from another. Referring to **FIG. 4**, an-enlarged portion of the base of each nozzle **110***a*, **110***b*, **110***c* of a three-nozzle set **300** is shown in which each nozzle **110***a*, **110***b*, **110***c* has identifying indicia applied to the base **112***a*, **112***b*, **112***c* of the nozzle. The unique identifying indicia, which may comprise colors, letters, numbers, symbols or the like, are represented in **FIG. 4** by different geometric shapes.

[**0024**] The identifying indicia preferably comprise a plurality of colors. In the preferred embodiment, the base **112** of each nozzle **110***a*, **110***b*, **110***c* is made from a copolymer, which is blended with a different color pigment. For example, the bases **112***a*, **112***b*, **112***c* of the nozzles could be made from copolymers colored red **111**, yellow **113** and green **115**, respectively. The use of bright colors enables users to easily match each nozzle to a unique application or area of the facility. Because the base is made of a colored polymer, the identifying indicia cannot be mistakenly removed or wear off over time. The bright color also will not be visually obstructed over time by dirt.

[**0025**] Alternatively, color can be applied to a portion of the nozzle to uniquely identify each nozzle. For example, the top surface of the base of each of the nozzles may be painted with a color that is different than each of the other nozzles. In a further embodiment, each nozzle may be provided with some other type of identifying indicia to visually distinguish one nozzle from another. In each case, it is preferred that the identifying indicia be located at the same location on each nozzle for easy identification.

[**0026**] The invention also provides a method of preventing cross-contamination between different areas of a facility while cleaning the areas with a common vacuum cleaner. In accordance with the method of the present invention, the color-coded cleaning nozzles are interchanged with a common vacuum cleaner but are used only in a particular assigned area of a facility or for collecting a particular material.

[**0027**] Each nozzle is interchangeable with the vacuum cleaner and includes unique visual identifying indicia

thereon. In the preferred method, the identifying indicia comprise different pigmented copolymers from which each of the nozzle bases are formed. The user assigns a particular color to each distinct area of the facility or material to be collected. A first area of the facility is cleaned using the colored nozzle assigned to that area. After cleaning is completed in the first area, the user proceeds to a second area of the facility only after removing the nozzle assigned to the first area and replacing it with the nozzle assigned to the second area. To further prevent cross-contamination, the nozzles are isolated from one from one another during storage.

[0028] To further decrease the risk of cross-contamination, the nozzles are periodically sterilized in an autoclave. Alternatively, the nozzles are periodically sterilized by washing and submersion in a COP tank using one or more of the solutions described above. Because the base of the nozzles are made from pigmented copolymer, the color identifying indicia are not removed during repeated sterilization using any of the above-described techniques.

[0029] While the principles of the invention have been described above in connection with specific embodiments, it is to be clearly understood that this description is made only by way of example and not as a limitation on the scope of the invention.

1. A method of preventing cross-contamination between different areas of a facility while cleaning the areas with a common vacuum cleaner, including the steps of:

a) providing a plurality of cleaning nozzles that are interchangeable with the vacuum cleaner;

b) applying visual identifying indicia on each of the nozzles to uniquely identify each nozzle;

c) assigning a particular nozzle to each distinct area of the facility;

d) cleaning a first area of the facility with its assigned nozzle;

e) cleaning a second area of the facility only after removing the first assigned nozzle from the vacuum cleaner and replacing it with the nozzle assigned to the second area; and,

f) isolating each of the nozzles from one another.

2. The method recited in claim 1, wherein each nozzle has the same structural configuration but has different visual identifying indicia.

3. The method recited in claim 1, wherein the identifying indicia are provided on the same location of each nozzle.

4. The method recited in claim 1, wherein the identifying indicia are applied to the external surface of the nozzles.

5. The method recited in claim 1, wherein the identifying indicia comprise a plurality of different colors.

6. The method recited in claim 5, wherein at least a common portion of each nozzle has a different color.

7. The method recited in claim 5, wherein a common component of each nozzle is made from a differently-colored common material.

8. The method recited in claim 1, including the step of preventing removal of the identifying indicia from the nozzle.

9. The method recited in claim 1, including the step of periodically sterilizing each nozzle without removing the identifying indicia.

10. The method recited in claim 9, including the step of periodically sterilizing each nozzle in an autoclave or by washing and submersion in a COP tank.

11. The method recited in claim 1, including the step of forming the nozzles from materials that are approved by the FDA for contact with human food.

12. A vacuum cleaner nozzle set comprising a plurality of vacuum nozzles, each nozzle including:

a) a base having a top surface, bottom surface and peripheral surface;

b) an agitation skirt mechanically fastened to the peripheral surface of said base;

c) a concavity formed in the bottom surface;

d) an aperture extending through said base from the top surface to said concavity;

e) a pivotal connector mechanically fastened to the top surface of said base; and,

f) visual identifying indicia on each nozzle;

wherein said identifying indicia uniquely identify each nozzle.

13. The vacuum cleaner nozzle set recited in claim 12, wherein said visual identifying indicia comprise a plurality of different colors.

14. The vacuum cleaner nozzle set recited in claim 13, wherein the base of each nozzle is made of a differently-colored polymeric material.

15. The vacuum cleaner nozzle set recited in claim 12, wherein said nozzles are constructed of materials approved by the FDA for contact with human food.

16. The vacuum cleaner nozzle set recited in claim 12, wherein said nozzles can be sterilized in an autoclave.

17. The vacuum cleaner nozzle set recited in claim 12, wherein said nozzles can be sterilized in a COP tank in a solution selected from the group consisting of hot water or steam; halogen sanitizers; quaternary ammonium compounds; high and low ph sanitizers; and detergent sanitizers.

18. The vacuum cleaner nozzle set recited in claim 12, wherein said agitation skirt comprises an elastomeric strip having a plurality of serrations.

19. The vacuum cleaner nozzle set recited in claim 13, wherein said agitation skirt comprises a plurality of bristles.

20. A vacuum cleaner nozzle set comprising a plurality of vacuum nozzles, each nozzle having the same structural configuration as the other but having different visual identifying indicia thereon.

* * * * *