

(19)



(11)

EP 1 863 592 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
19.10.2011 Bulletin 2011/42

(51) Int Cl.:
B05B 15/12 ^(2006.01) **B05C 5/00** ^(2006.01)

(21) Application number: **06739978.2**

(86) International application number:
PCT/US2006/011533

(22) Date of filing: **29.03.2006**

(87) International publication number:
WO 2006/105235 (05.10.2006 Gazette 2006/40)

(54) **POWDER PAINT RECLAIM TRANSPORT SYSTEM**

TRANSPORTSYSTEM FÜR PULVERLACKRÜCKGEWINNUNG

SYSTEME DE TRANSPORT DE RECUPERATION DE PEINTURE EN POUDRE

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI
SK TR**

(30) Priority: **29.03.2005 US 665989 P**

(43) Date of publication of application:
12.12.2007 Bulletin 2007/50

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EP 1 863 592 B1

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Description

PRIOR APPLICATIONS

[0001] The present application claims priority to United States Provisional Patent Application No. 60/665,989 filed on March 29, 2005.

FIELD OF THE INVENTION

[0002] The present application covers a powder paint reclaim system and method for reclaiming powder paint not adhered to an article being painted in a powder paint booth. More specifically, the present application relates to a powder paint reclaim system and method for reclaiming powder paint not adhered to an article being painted using positive gas pressure and gravitational forces to transport the powder paint.

BACKGROUND OF THE INVENTION

[0003] Document DE 41 34 701 A1 discloses a filter unit or a cyclone unit which can alternately be attached to a cabin to draw powder out of the cabin. The units move on wheels. In an operating position adjacent to the cabin, they are automatically aligned with flow connections and can be connected. A common fan for both units is connected with a filter unit via a compressed air cleaning device in terms of flow, if the former is in the operating position, and at the same time it closes off the inlet to a post-filter unit, while when the filter unit is removed and the cyclone unit is in the operating position, this cyclone unit is connected with the fan via the post-filter, and the cyclone unit closes off a flow inlet of the compressed air cleaning unit.

[0004] Document WO 81/02117 A1 discloses a gas recollection unit. The gas recollection unit provided with an aspiration device is fixed for instance at the upper part of a movable powdering cabin and holds a powder reception unit, composed of a filtering unit and a preparation unit fixed thereto. In the powdering cabin the coating powder is projected on the tool by means of an electrostatic spring pistol through an opening. Between the powdering space and the filtering assembly there is a protection grid disposed in a large opening of the cabin. During the powdering an air stream of the same direction is created in the direction of powdering across the powdering space, which stream does not carry towards the filtering assembly the particles sticking to the tool. From the filtering assembly, as well as from the inclined plane, the powder reaches a powder container through a sieve. With the help of a quick coupling member the powder reception unit or its units can be easily exchanged.

[0005] Document GB 2 328 387 A discloses a powder coating apparatus. A paint recovering device is provided for recovering a mixture of the paints sprayed by the spray guns, but not deposit on a workpiece to be coated. The paint recovering device includes a collecting tank situated

under the spray booth and a classifying tank situated under the collecting tank and connected to its bottom. A vibrating mechanism is connected to the classifying tank for vibrating it. The classifying tank has an upper classifying chamber defined above a first screen and communicating with a first recovering tank, a middle classifying chamber defined between the first screen and a second screen and communicating with a second recovering tank, and a lower classifying chamber defined below the second screen and communicating with a third recovering tank.

[0006] To comply with ever-increasingly strict environmental regulations, the original equipment manufacturers such as, for example, automobile manufacturers, have been forced to modify the method by which articles are decorated and protected with paint. While many paint application systems have been converted from solvent-based to water-based paint, it has become apparent that powder paint application systems are preferable in many situations.

[0007] One reason that the application of powder paint is preferable to the application of liquid-based paint is because the nearly 100% transfer efficiency achieved by the paint application process. As is known to those of skill in the art, a high percentage of paint does not adhere to the article being painted even when an electrostatic application process is used. When applying a liquid-based paint, paint not adhered to the article is blown downwardly into a sheet of water disposed below the paint application booth removing the "over-sprayed paint" from the process. The drawback of this system is that the sheet of water that collects the paint must be processed as hazardous waste and the paint must be disposed of.

[0008] In a powder paint application system, over-sprayed paint is collected in a series of collectors disposed beneath the paint application booth where the paint is reclaimed and returned to be reapplied to subsequent articles. While this process increases transfer efficiency to near 100%, the process is known to be complex and costly to maintain due to the pumping systems required to transfer the powder from the collectors to a reclamation hopper for further use. One such prior art system is disclosed in United States Patent No. 6,679,193 to Nordson Corporation, where a number of vacuum pumps are used to draw powder from the collectors disposed beneath the powder paint application booth and subsequently pump the reclaim powder to a powder paint reclamation hopper. The use of vacuum pumps requires the use of complex valving along with a number of the expensive vacuum pumps disbursed throughout the reclamation system.

[0009] Therefore, the need exists to provide a powder paint reclaim system that is simple to use and easy to maintain to reduce the construction and operation costs of the powder paint system while maintaining a near 100% transfer efficiency.

SUMMARY OF THE INVENTION

[0010] The present invention is directed at a powder paint reclaim system and a method of reclaiming powder paint according to the independent claims.

[0011] The powder paint reclaim system in particular includes a plurality of collectors disposed beneath a powder paint booth for collecting powder paint not adhered to the article being painted. Each of the plurality of collectors includes a collector fluidizer for maintaining the powder paint in a fluidized state. A transporter is connected to at least one of the plurality of collectors for transporting powder paint from the collectors to a powder paint reclaim hopper. At least a portion of each transporter is disposed below the collector fluidizer and has a transporter fluidizer for maintaining the powder paint received from the collector in a fluidized state.

[0012] The transporter is connected to at least one of a plurality of collectors by a transfer line that receives powder paint from a substantially lowermost region of the collector to the transporter disposed below the collector. Because the collector maintains the powder paint in a fluidized state, the powder paint flows with the assistance of gravitational forces from each collector to the transporter through the transfer line.

[0013] The powder paint reclaim system described above solves the problems associated with known systems through the simplicity of using gravitational forces to transfer powder paint from the powder paint collectors to the transporter. Furthermore, a need for a transfer pump is eliminated by the use of air pressure that increases in the transporter through the introduction of fluidizing air through the transporter fluidizer. Therefore, powder paint is transferred from the transporter to the reclaim hoppers by positive pressure not requiring the use of vacuum pumps that are expensive and difficult to maintain.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] Other advantages of the present invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

[0015] Figure 1 is a side elevational view of the assembly showing a plurality of powder paint collectors disposed below a powder paint application booth;

[0016] Figure 2 is a side fragmented view of a lowermost region of a powder paint collector having a exit port for transferring powder paint to a transporter;

[0017] Figure 3 shows a partial schematic view of one embodiment of the inventive transporter connected to a powder paint collector;

[0018] Figure 4 shows a side-elevational view of a plurality of transporters in a powder paint application system; and

[0019] Figure 5 shows an alternative embodiment of a

plurality of transporters in a powder paint application system.

DETAILED DESCRIPTION OF THE INVENTION

[0020] Referring to Figure 1, a powder paint application assembly is generally shown at 10. The assembly has been described in fuller detail in United States Patent Nos. 6,471,737 filed on December 26, 2000 and United States Patent No. 6,723,145 filed January 2, 2002, each assigned to the present applicant. The assembly 10 includes an enclosed application booth (not shown) where articles to be painted, such as, for example, vehicle bodies 12 are conveyed, preferably on a conveyor system, where robotic and stationary applicators (not shown) disburse powder paint. A grating, or other porous floor 14 separates the booth from a continuous air chamber 16, which is disposed below the booth. The continuous air chamber 16, generally extends the length of the booth, and is enclosed upon a bottom end by a plurality of powder paint collectors 18.

[0021] Each powder paint collector 18 includes a filter assembly 20 which filters recirculation air that is transported to an air plenum through a duct 22 for reintroduction into the application booth.

[0022] As best represented in Figure 2, each collector 18 includes a collection chamber 24 and an air chamber 26 separated from the collection chamber 24 by a porous plate 28. As stated above, a flow of air forces powder paint not adhered to the article 12 downwardly into the collectors 18 and, therefore, into the collection chamber 24. A constant flow of fluidizing air enters into the air chamber 26 through air chamber inlet 30 where air flows upwardly through the porous plate 28 into the air chamber 26 fluidizing the powder paint collecting in the collection chamber 24.

[0023] Preferably, the porous plate 28 slopes downwardly toward a powder outlet 32 so that the powder outlet 32 is located in a lowermost portion of the collector 18. The combination of the fluidizing air, the porous plate 28, and the air chamber 26 comprise a fluidizer 34 used to fluidize the powder paint forced into the collectors 18 from the powder paint booth. It should be understood by those of skill in the art that alternative fluidizer designs may be used to fluidize the powder paint disposed within the collection chamber 24 as long as the powder outlet 32 is located in the lowermost section of the collection chamber 24, the purpose of which will become more evident as the assembly 10 is explained further below.

[0024] A transfer line 36 is operably connected to the powder outlet 32 at one end and to a transporter 38 at an opposite end. A plurality of transporters is shown in Figure 1 connected to the plurality of collectors 18. At least a portion of the transporter 38 is disposed below the level of the lowermost portion of the collector 18. More preferably, an upper end 40 of the transporter is disposed between about 76,2 and 152,4 mm (three and six inches) below the lowermost portion of the collection chamber

24 as identified by H, shown in Figure 3. In any event, the connection point of the transfer line 36 to the transporter 38 is below the lowermost portion of the collection chamber 24, or the powder outlet 32, so that gravitational forces allow the fluidized powder paint to flow from the collection chamber 24 to the transporter 38 as will become more evident when explained further below.

[0025] The transfer line 36 slopes downwardly from the collector 18 to the transporter 38 at an angle of between generally 50° and 25° to vertical. More preferably, the slope of the transfer line 36 is below about 45° and still more preferably below about 30° as shown in Figure 3 by angle θ . This has been shown to allow fluidized powder paint to flow from the collection chamber 24 to the transporter 38 with a minimal risk of blockage inside the transfer line 36. A transfer line valve 44 seals the link between the transporter 38 and the collector 18. The transfer line valve 44 is contemplated by the inventors to be a pinch valve. However, other equivalent sealing valves as known of those of skill in the art may be used as desired.

[0026] The transporter 38 includes a transporter fluidizing plate 46 that separates the transporter fluidizing chamber 48 from the transporter air chamber 50 where fluidizing air is injected from a source of fluidizing air to fluidize the powder paint received from the collection chamber 24.

[0027] A vent line 42 extends from the upper end 40 of the transporter 38 to the collection chamber 24 of the collector 18. A vent valve 57 is located in the vent line 42 to seal the vent line 42 preventing air from being transferred from the transporter 38 to the collection chamber 24. The purpose of the vent line 42 is to vent fluidizing air from the transporter fluidizing chamber 48 to the collector 18 at desired intervals as will be described further below.

[0028] A reclaim hopper line 52, or manifold connects the transporter fluidizing chamber 48 to a reclaim hopper 54 where powder paint not adhered to the vehicle body 12 is transferred from the collector 18 via the transporter 38. Fluidized powder paint is transferred from the transporter 38 to the reclaim hopper 54 by positive pressure established inside the transporter by injecting fluidized air.

[0029] During operation, four sequential steps take place, a fill step, a pressurized step, a pushing step, and a venting step. During the filling step, the transfer line valve 44 is open, the vent valve 57 is open, and the reclaim valve 56 is closed. Additionally, fluidizing air is injected into the transporter air chamber 50 at a low pressure, preferably at a pressure of 68,965 kPa (10 psig) or below at a flow rate of 9,44 litre per minute to 14,16 litre per minute (20 to 30 cubic feet per hour). The low pressure and flow rate of fluidizing air allows the powder paint to flow downwardly through the transfer line 36 while still providing enough fluidizing air to fluidize the powder paint entering the transporter 38.

[0030] Once the transporter 38 has been filled to a de-

sired level with powder paint, the pressurizing step is initiated where the transfer line valve 44, the vent valve 57, and the reclaim valve 56 are all closed. The fluidizing air is increased to a flow rate of about 47,20 to 94,40 litre per minute (100 to 200 cubic feet per hour) to build up the pressure in the transporter to between generally 68,948 and 137,896 kPa (10 and 20 psig).

[0031] During the pushing step where the powder paint disposed in the transporter fluidizing chamber 48 is transferred to the reclaim hopper 54, the transfer line valve 44 is closed, the vent valve 57 is closed, and the reclaim valve 56 is opened. Because the gas pressure inside the transporter 38 has been increased to between 68,948 and 137,896 kPa (10 and 20 psig), the fluidized powder disposed within the transporter fluidizing chamber 48 is forced through the opened reclaim hopper line 52 to the reclaim hopper 54 without requiring the use of a pump.

[0032] Once the transporter 38 has been sufficiently emptied of the fluidized powder, the venting step takes place where the transfer line valve 44 is closed, the vent valve 57 is opened, and the reclaim valve 56 is also closed. During the venting step, the fluidizing air injected into the transport air chamber 50 is terminated, and excess air from the transporter fluidizing chamber 48 is vented into the collection chamber 24 of the collector 18 substantially equalizing the gas pressure between the transporter 38 and the collector 18 enabling fluidized power to flow downwardly from the collectors 18 to the transporter 38.

[0033] An additional step to clear the transfer line 36 of any plugs, is performed just prior to the fill step when fluidizing air is injected into the transporter 38 creating a pressure of between about 6,895 and 34,474 kPa (1 and 5 psig) for a period of one to ten seconds and the transfer line valve 44 is briefly opened allowing fluidizing air to flow backward through the transfer line 36.

[0034] Referring now to Figure 4, one preferred embodiment of the assembly 10 shows a plurality of collectors 18 arranged in a row below the continuous air chamber 16. In this embodiment, each collector 18 is connected in the manner set forth above to a transporter 38. It is contemplated by the inventors that each transporter 38 has a separate reclaim hopper line 52 for transferring the fluidized powder from the transporter 38 to the reclaim hopper 54. However, it should be understood by those of skill in the art that a common reclaim hopper line 52 to each transporter 38 may also be used.

[0035] Referring now to Figure 5, an alternate embodiment of the inventive assembly is generally shown at 110. In this embodiment, pairs of collectors 118 are oriented so that the lowermost portion of the collection chamber 124 is positioned in an adjacent manner so that a single transporter 138 services two collectors 118. As such, the transporter 138 receives fluidized powder paint through two transfer lines 136, one each connected to the lowermost portion of the adjacent collection chambers 124. In this embodiment, it is believed that only a single vent line 142 is required for each transporter 138

and is linked to a single collector 118. It should also be understood that the process set forth above by which fluidized powder paint is removed from the collection chamber 24 and transferred to the reclaim hopper 54 by way of the transporter 38 is the same as that used by the alternative embodiment of the assembly 110 using the alternative transporter 138 having two transfer lines 136.

[0036] The invention has been described in an illustrative manner, and it is to be understood that the terminology which has been used is intended to be in the nature of words of description rather than of limitation.

[0037] Obviously, many modifications and variations of the present invention are possible in light of the above teachings. It is, therefore, to be understood that within the scope of the appended claim, the invention may be practiced otherwise than as specifically described.

Claims

1. A powder paint reclaim system, comprising:

a plurality of collectors (18) disposed beneath a paint booth for collecting powder paint not adhered to the article being painted, each of said plurality of collectors (18) having a collector fluidizer for maintaining the powder paint in a fluidized state;

a transporter (38) connected to at least one of said plurality of collectors (18) for transporting powder paint from said collectors (18) to a powder paint reclaim hopper (54), each transporter (38) having at least a portion thereof disposed below said collector fluidizer and having a transporter fluidizer for maintaining the powder paint in a fluidized state; and

said transporter (38) being connected to at least one of said plurality of collectors (18) by a transfer line (36) receiving powder paint from a substantially lowermost region of said collector (18) to a portion of said transporter (38) disposed below said collector (18) thereby enabling powder paint maintained in a fluidized state to gravitationally flow from said at least one of said plurality of collectors (18) to said transporter (38) and from said transporter (38) to said powder paint reclaim hopper (54) under positive pressure generated inside said transporter (38); wherein said transporter (38) is connected to a source of fluidizing air providing positive pressure to said transporter (38) thereby transferring fluidized powder paint to said powder paint reclaim hopper (54).

2. The systems as set forth in claim 1, wherein said transfer line (36) is oriented at an angle to vertical of less than about 45 degrees.

3. The system as set forth in claim 1, wherein said transfer line (36) is oriented at an angle to vertical of less than about 30 degrees.

4. The system as set forth in claim 1, wherein said transfer line (36) is connected to said transporter (38) adjacent said collector fluidizer.

5. The system as set forth in claim 1, wherein said collector fluidizer includes a fluidizing plate having a porous composition and sloping downwardly toward said transfer line (36).

6. The system as set forth in claim 1, wherein said transfer line (36) defines slope with to vertical and intersects said transporter (38) at an angle substantially constant with said slope.

7. The system as set forth in claim 1, wherein said collector (18) includes a lower end and said transporter (38) includes an upper end terminating at a location spaced below said lower end of said collector (18).

8. The system as set forth in claim 7, wherein said upper end of said transporter (38) is disposed at least about 76,2 mm (three inches) below said lower end of said collector (18).

9. The system as set forth in claim 1, including a vent line selectively interconnecting said transporter (38) and said collector (18) to vent pressurized air to said collector (18).

10. A method of reclaiming powder paint not adhered to an object being painted in a powder paint application booth having a collector (18) disposed below said powder paint application booth wherein the powder paint not adhered to the object being painted is collected for transfer to a powder paint reclaim hopper (54), comprising the steps of:

providing a transporter (38) disposed between said collector (18) and said powder paint reclaim hopper (54) for transferring powder paint from said collector (18) to said powder paint reclaim hopper (54);

equalizing the gas pressure between said collector (18) and said transporter (38);

opening a powder paint link between said collector (18) and said transporter (38) thereby allowing powder paint to flow from said collector (18) to said transporter (38) with gravitational forces;

closing said link between said collector (18) and said transporter (38);

increasing the gas pressure inside said transporter (38) thereby creating a positive pressure inside said transporter (38) greater than atmos-

- pheric pressure; and
opening a link between said transporter (38) and
said powder paint reclaim hopper (54) having a
gas pressure lower than said transporter (38)
thereby pushing the powder paint from said
transporter (38) to said powder paint reclaim
hopper (54).
11. The method set forth in claim 10, wherein said step
of increasing the gas pressure inside said transporter
(38) is further defined by sealing said transporter (38)
and injecting fluidizing gas into said transporter (38).
12. The method as set forth in claim 10, wherein said
step of increasing the gas pressure inside said trans-
porter (38) is further defined by increasing the gas
pressure between about 68,948 kPa (10 psig) and
137,896 kPa (20 psig).
13. The method as set forth in claim 10, wherein said
step of opening a link between said collector (18)
and said transporter (38) is further defined by open-
ing a sealable valve disposed between said collector
(18) and said transporter (38).
14. The method as set forth in claim 10, further including
the step of clearing said link between said transporter
(38) and said collector (18) by opening said link be-
tween said transporter (38) and said collector (18)
after the gas pressure of said transporter (38) has
been increased.
15. The method as set forth in claim 10, wherein said
step of equalizing the gas pressure between said
transporter (38) and said collector (18) is performed
just prior to opening said link between said collector
(18) and said transporter (38).
16. The method as set forth in claim 10, wherein said
step of equalizing the gas pressure between said
transporter (38) and said collector (18) is further de-
fined by venting air from said transporter (38) into
said collector (18).
17. The method as set forth in claim 10, wherein said
step of increasing the gas pressure inside said trans-
porter (38) is further defined by injecting fluidizing air
into said transporter (38) at a volumetric flow rate of
between about 9,44 and 14,16 litre per minute (twenty
and thirty cubic feet per hour).
18. The system as defined in Claim 6, wherein said sys-
tem includes a control connected to discharge valves
opening only one of said discharge valves at a time
to deliver powder paint from one of said plurality of
transporters (38) to said powder paint reclaim hopper
(54) at a time through a manifold line.

19. The system as defined in Claim 6, wherein said sys-
tem includes a plurality of powder paint collection
chambers (24) located beneath a powder paint spray
booth collecting powder paint overspray from said
paint booth and each of said plurality of transporters
(38) is connected to a powder paint collection cham-
ber (24) by a transfer line (36) having a transfer line
valve (44).
20. The system as defined in Claim 8, wherein each of
said plurality of transporters (38) includes a vent line
(42) having an inlet at an upper portion of said trans-
porters (38) and an outlet connected to an upper
portion of a powder paint collection chamber (24).
21. The system as defined in Claim 8, wherein each of
said plurality of transporters (38) is connected to a
plurality of powder paint collection chambers (24) by
a transfer line (36).

Patentansprüche

1. Pulverlack-Rückgewinnungssystem, umfassend:

mehrere Kollektoren (18), die unter einer Lak-
kierkabine angeordnet sind, um Pulverlack zu
sammeln, der nicht am Gegenstand, der lackiert
wird, haften geblieben ist, wobei jeder der meh-
reren Kollektoren (18) einen Kollektorfluidisierer
aufweist, um den Pulverlack in fluidisiertem Zu-
stand zu halten;
einen Transporter (38), der mit mindestens ei-
nem der mehreren Kollektoren (18) verbunden
ist, um Pulverlack von den Kollektoren (18) zu
einem Pulverlack-Rückgewinnungsbehälter
(54) zu transportieren, wobei jeder Transporter
(38) mindestens einen Abschnitt davon unter-
halb des Kollektorfluidisierers aufweist und ei-
nen Transporterfluidisierer aufweist, um den
Pulverlack in fluidisiertem Zustand zu halten;
und
wobei der Transporter (38) mit mindestens ei-
nem der mehreren Kollektoren (18) durch eine
Transferleitung (36) verbunden ist, aufnehmend
Pulverlack von einem im Wesentlichen tiefst ge-
legenen Bereich des Kollektors (18) zu einem
Abschnitt des Transporters (38), der unterhalb
des Kollektors (18) angeordnet ist, wodurch er-
möglicht wird, dass Pulverlack, der in fluidisier-
tem Zustand gehalten wird, durch Schwerkraft
von dem mindestens einen der mehreren Kol-
lektoren (18) zum Transporter (38) und durch
einen im Inneren des Transporters (38) erzeug-
ten Überdruck vom Transporter (38) zum Pul-
verlack-Rückgewinnungsbehälter (54) fließt;
wobei der Transporter (38) mit einer Quelle für
Fluidisierungsluft verbunden ist, die Überdruck

- für den Transporter (38) bereitstellt, wodurch fluidisierter Pulverlack zum Pulverlack-Rückgewinnungsbehälter (54) transferiert wird.
2. System nach Anspruch 1, wobei die Transferleitung (36) in einem Winkel von weniger als 45 Grad zur Vertikalen ausgerichtet ist. 5
 3. System nach Anspruch 1, wobei die Transferleitung (36) in einem Winkel von weniger als 30 Grad zur Vertikalen ausgerichtet ist. 10
 4. System nach Anspruch 1, wobei die Transferleitung (36) angrenzend an den Kollektorfluidisierer mit dem Transporter (38) verbunden ist. 15
 5. System nach Anspruch 1, wobei der Kollektorfluidisierer eine Fluidisierungsplatte aufweist, die eine poröse Zusammensetzung aufweist und sich abwärts zur Transferleitung (36) hin neigt. 20
 6. System nach Anspruch 1, wobei die Transferleitung (36) eine Neigung zur Vertikalen definiert und den Transporter (38) in einem Winkel schneidet, der im Wesentlichen mit der Neigung konstant ist. 25
 7. System nach Anspruch 1, wobei der Kollektor (18) ein unteres Ende aufweist und der Transporter (38) ein oberes Ende aufweist, endend an einer Stelle, beabstandet unterhalb des unteren Endes des Kollektors (18). 30
 8. System nach Anspruch 7, wobei das obere Ende des Transporters (38) mindestens etwa 76,2 mm (drei Inch) unterhalb des unteren Endes des Kollektors (18) angeordnet ist. 35
 9. System nach Anspruch 1, eine Lüftungsleitung aufweisend, die den Transporter (38) und den Kollektor (18) selektiv miteinander verbindet, um dem Kollektor (18) Druckluft zuzuführen. 40
 10. Verfahren zur Rückgewinnung von Pulverlack, der nicht an einem Gegenstand haften geblieben ist, der in einer Kabine zum Aufbringen von Pulverlack lackiert wird, die einen Kollektor (18) aufweist, der unterhalb der Kabine zum Aufbringen von Pulverlack angeordnet ist, wobei der Pulverlack, der nicht am Gegenstand, der lackiert wird, haften geblieben ist, für den Transfer zu einem Pulverlack-Rückgewinnungsbehälter (54) gesammelt wird, folgende Schritte umfassend: 45

Bereitstellen eines Transporters (38), der zwischen dem Kollektor (18) und dem Pulverlack-Rückgewinnungsbehälter (54) angeordnet wird, um Pulverlack vom Kollektor (18) zum Pulverlack-Rückgewinnungsbehälter (54) zu transfe- 50
 11. Verfahren nach Anspruch 10, wobei der Schritt des Erhöehens des Gasdrucks im Inneren des Transporters (38) ferner durch Abdichten des Transporters (38) und Einspritzen von Fluidisierungsgas in den Transporter (38) definiert wird.
 12. Verfahren nach Anspruch 10, wobei der Schritt des Erhöehens des Gasdrucks im Inneren des Transporters (38) ferner durch Erhöhen des Gasdrucks auf zwischen ungefähr 68.948 kPa (10 psig) und 137.896 kPa (20 psig) definiert wird.
 13. Verfahren nach Anspruch 10, wobei der Schritt des Öffnens einer Verbindung zwischen dem Kollektor (18) und dem Transporter (38) ferner durch Öffnen eines abdichtbaren Ventils definiert wird, das zwischen dem Kollektor (18) und dem Transporter (38) angeordnet ist.
 14. Verfahren nach Anspruch 10, ferner umfassend den Schritt des Freigebens der Verbindung zwischen dem Transporter (38) und dem Kollektor (18) durch Öffnen der Verbindung zwischen dem Transporter (38) und dem Kollektor (18) nach Erhöhung des Gasdrucks des Transporters (38).
 15. Verfahren nach Anspruch 10, wobei der Schritt des Ausgleichens des Gasdrucks zwischen dem Transporter (38) und dem Kollektor (18) kurz vor Öffnen der Verbindung zwischen dem Kollektor (18) und dem Transporter (38) ausgeführt wird.
 16. Verfahren nach Anspruch 10, wobei der Schritt des Ausgleichens des Gasdrucks zwischen dem Transporter (38) und dem Kollektor (18) ferner durch Zuführen von Luft vom Transporter (38) in den Kollektor 55

(18) definiert wird.

17. Verfahren nach Anspruch 10, wobei der Schritt des Erhöehens des Gasdrucks im Inneren des Transporters (38) ferner durch Einspritzen von Fluidisierungsluft in den Transporter (38) mit einer Volumenfließrate von zwischen ungefähr 9,44 und 14,16 Liter pro Minute (zwanzig und dreißig Kubikfuß pro Stunde) definiert wird.

5

18. System nach Anspruch 6, wobei das System eine Steuerung aufweist, verbunden mit Ablassventilen, öffnend jeweils nur eines der Ablassventile, um Pulverlack von einem der mehreren Transporter (38) zum Pulverlack-Rückgewinnungsbehälter (54) jeweils durch eine Verteilerleitung zu leiten.

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19. System nach Anspruch 6, wobei das System mehrere Pulverlack-Sammelkammern (24) aufweist, angeordnet unter einer Pulverlack-Spritzkabine, sammelnd Pulverlack-Overspray von der Lackierkabine, und wobei jeder der mehreren Transporter (38) durch eine Transferleitung (36), die ein Transferleitungsventil (44) aufweist, mit einer Pulverlack-Sammelkammer (24) verbunden ist.

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20. System nach Anspruch 8, wobei jeder der mehreren Transporter (38) eine Lüftungsleitung (42) aufweist mit einem Einlass an einem oberen Abschnitt der Transporter (38) und einem Auslass, der mit einem oberen Abschnitt einer Pulverlack-Sammelkammer (24) verbunden ist.

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21. System nach Anspruch 8, wobei jeder der mehreren Transporter (38) durch eine Transferleitung (36) mit mehreren der Pulverlack-Sammelkammern (24) verbunden ist.

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Revendications

1. Système de récupération de peinture en poudre, comprenant :

une pluralité de collecteurs (18) disposés au-dessous d'une cabine de peinture pour collecter la peinture en poudre qui n'a pas adhéré à l'élément peint, chacun de ladite pluralité de collecteurs (18) comportant un dispositif de fluidification de collecteur pour maintenir la peinture en poudre dans un état fluidifié ;
un transporteur (38) relié à au moins l'un de ladite pluralité de collecteurs (18) pour transporter la peinture en poudre desdits collecteurs (18) vers une trémie de récupération de peinture en poudre (54), chaque transporteur (38) ayant au moins une partie de celui-ci disposée au-dessous dudit dispositif de fluidification de collec-

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teur et comportant un dispositif de fluidification de transporteur pour maintenir la peinture en poudre dans un état fluidifié ; et
ledit transporteur (38) relié à au moins l'un de ladite pluralité de collecteurs (18) par une conduite de transfert (36) recevant la peinture en poudre d'une région sensiblement inférieure dudit collecteur (18) dans une partie dudit transporteur (38) disposée au-dessous dudit collecteur (18), permettant de ce fait à la peinture en poudre maintenue dans un état fluidifié de s'écouler par gravitation dudit au moins un de ladite pluralité de collecteurs (18) vers ledit transporteur (38) et dudit transporteur (38) vers ladite trémie de récupération de peinture en poudre (54) sous une pression positive générée à l'intérieur dudit transporteur (38) ;
dans lequel ledit transporteur (38) est relié à une source d'air de fluidification fournissant une pression positive audit transporteur (38), transférant de ce fait la peinture en poudre fluidifiée à ladite trémie de récupération de peinture en poudre (54).

2. Système selon la revendication 1, dans lequel ladite conduite de transfert (36) est orientée selon un angle par rapport à la verticale inférieur à environ 45 degrés.

3. Système selon la revendication 1, dans lequel ladite conduite de transfert (36) est orientée selon un angle par rapport à la verticale inférieur à environ 30 degrés.

4. Système selon la revendication 1, dans lequel ladite conduite de transfert (36) est reliée audit transporteur (38) à proximité dudit dispositif de fluidification de collecteur.

5. Système selon la revendication 1, dans lequel ledit dispositif de fluidification de collecteur comprend une plaque de fluidification ayant une composition poreuse et s'inclinant vers le bas vers ladite conduite de transfert (36).

6. Système selon la revendication 1, dans lequel ladite conduite de transfert (36) définit une pente par rapport à la verticale et croise ledit transporteur (38) selon un angle sensiblement constant par rapport à ladite pente.

7. Système selon la revendication 1, dans lequel ledit collecteur (18) comprend une extrémité inférieure et ledit transporteur (38) comprend une extrémité supérieure se terminant à un emplacement espacé au-dessous de ladite extrémité inférieure dudit collecteur (18).

8. Système selon la revendication 7, dans lequel ladite extrémité supérieure dudit transporteur (38) est disposée au moins environ 76,2 mm (trois pouces) au-dessous de ladite extrémité inférieure dudit collecteur (18). 5
9. Système selon la revendication 1, comprenant une conduite d'évacuation interconnectant de manière sélective ledit transporteur (38) et ledit collecteur (18) pour évacuer l'air sous pression vers ledit collecteur (18). 10
10. Procédé de récupération de la peinture en poudre qui n'a pas adhéré à un objet peint dans une cabine d'application de peinture en poudre comportant un collecteur (18) disposé au-dessous de ladite cabine d'application de peinture en poudre, dans lequel la peinture en poudre qui n'a pas adhéré à l'objet peint est collectée pour être transférée à une trémie de récupération de peinture en poudre (54), comprenant les étapes consistant à : 15
- prévoir un transporteur (38) disposé entre ledit collecteur (18) et ladite trémie de récupération de peinture en poudre (54) pour transférer la peinture en poudre dudit collecteur (18) à ladite trémie de récupération de peinture en poudre (54) ; 25
- égaliser la pression de gaz entre ledit collecteur (18) et ledit transporteur (38) ; 30
- ouvrir une liaison de peinture en poudre entre ledit collecteur (18) et ledit transporteur (38), permettant de ce fait à la peinture en poudre de s'écouler dudit collecteur (18) vers ledit transporteur (38) par des forces gravitationnelles ; 35
- fermer ladite liaison entre ledit collecteur (18) et ledit transporteur (38) ;
- augmenter la pression de gaz à l'intérieur dudit transporteur (38), créant de ce fait une pression positive à l'intérieur dudit transporteur (38) supérieure à la pression atmosphérique ; et 40
- ouvrir une liaison entre ledit transporteur (38) et ladite trémie de récupération de peinture en poudre (54) ayant une pression de gaz inférieure à celle dudit transporteur (38), poussant de ce fait la peinture en poudre dudit transporteur (38) vers ladite trémie de récupération de peinture en poudre (54). 45
11. Procédé selon la revendication 10, dans lequel ladite étape d'augmentation de la pression de gaz à l'intérieur dudit transporteur (38) est en outre définie en scellant ledit transporteur (38) et en injectant un gaz de fluidification dans ledit transporteur (38). 50
12. Procédé selon la revendication 10, dans lequel l'étape d'augmentation de la pression de gaz à l'intérieur dudit transporteur (38) est en outre définie en augmentant la pression de gaz entre environ 68,948 kPa (10 psig) et 137,896 kPa (20 psig). 55
13. Procédé selon la revendication 10, dans lequel ladite étape d'ouverture d'une liaison entre ledit collecteur (18) et ledit transporteur (38) est en outre définie en ouvrant une vanne pouvant être fermée hermétiquement disposée entre ledit collecteur (18) et ledit transporteur (38).
14. Procédé selon la revendication 10, comprenant en outre l'étape de dégagement de ladite liaison entre ledit transporteur (38) et ledit collecteur (18) en ouvrant ladite liaison entre ledit transporteur (38) et ledit collecteur (18) après que la pression de gaz dudit transporteur (38) a été augmentée.
15. Procédé selon la revendication 10, dans lequel l'étape d'égalisation de la pression de gaz entre ledit transporteur (38) et ledit collecteur (18) est effectuée juste avant d'ouvrir ladite liaison entre ledit collecteur (18) et ledit transporteur (38).
16. Procédé selon la revendication 10, dans lequel ladite étape d'égalisation de la pression de gaz entre ledit transporteur (38) et ledit collecteur (18) est en outre définie en évacuant l'air dudit transporteur (38) dans ledit collecteur (18).
17. Procédé selon la revendication 10, dans lequel ladite étape d'augmentation de la pression de gaz à l'intérieur dudit transporteur (38) est en outre définie en injectant de l'air de fluidification dans ledit transporteur (38) à un débit volumique entre environ 9,44 et 14,16 litres par minute (vingt et trente pieds cubes par heure).
18. Système selon la revendication 6, dans lequel ledit système comprend une commande reliée à des vannes d'évacuation n'ouvrant qu'une seule desdites vannes d'évacuation à la fois pour délivrer la peinture en poudre de l'un de ladite pluralité de transporteurs (38) à ladite trémie de récupération de peinture en poudre (54) à la fois à travers un collecteur.
19. Système selon la revendication 6, dans lequel ledit système comprend une pluralité de chambres de collecte de peinture en poudre (24) situées au-dessous d'une cabine de pulvérisation de peinture en poudre collectant l'excès de pulvérisation de peinture en poudre de ladite cabine de peinture et chacun de ladite pluralité de transporteurs (38) est relié à une chambre de collecte de peinture en poudre (24) par une conduite de transfert (36) comportant une vanne de conduite de transfert (44).
20. Système selon la revendication 8, dans lequel chacun de ladite pluralité de transporteurs (38) com-

prend une conduite d'évacuation (42) comportant une entrée au niveau d'une partie supérieure desdits transporteurs (38) et une sortie reliée à une partie supérieure d'une chambre de collecte de peinture en poudre (24).

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21. Système selon la revendication 8, dans lequel chacun de ladite pluralité de transporteurs (38) est relié à une pluralité de chambres de collecte de peinture en poudre (24) par une conduite de transfert (36).

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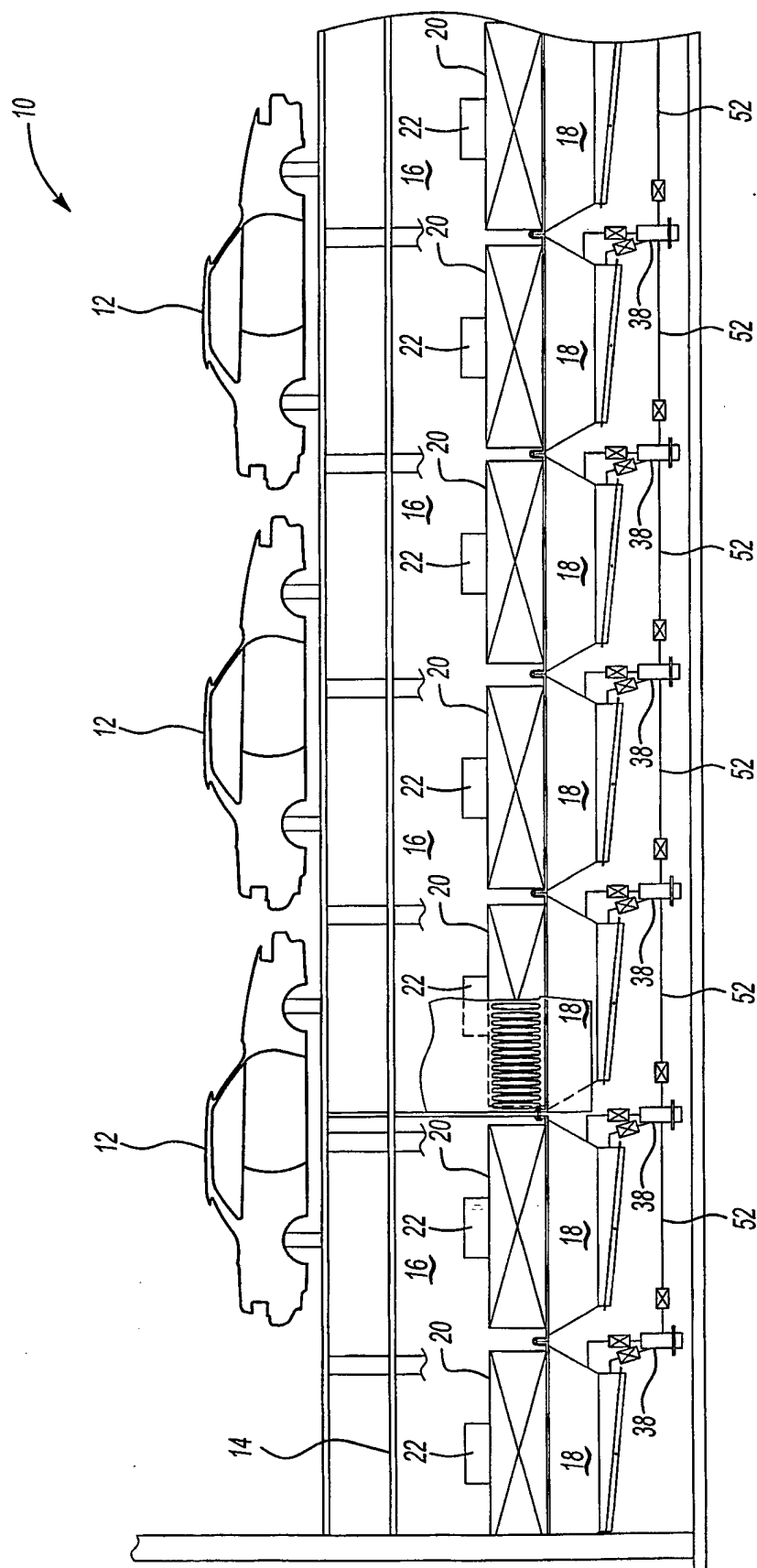


Fig-1

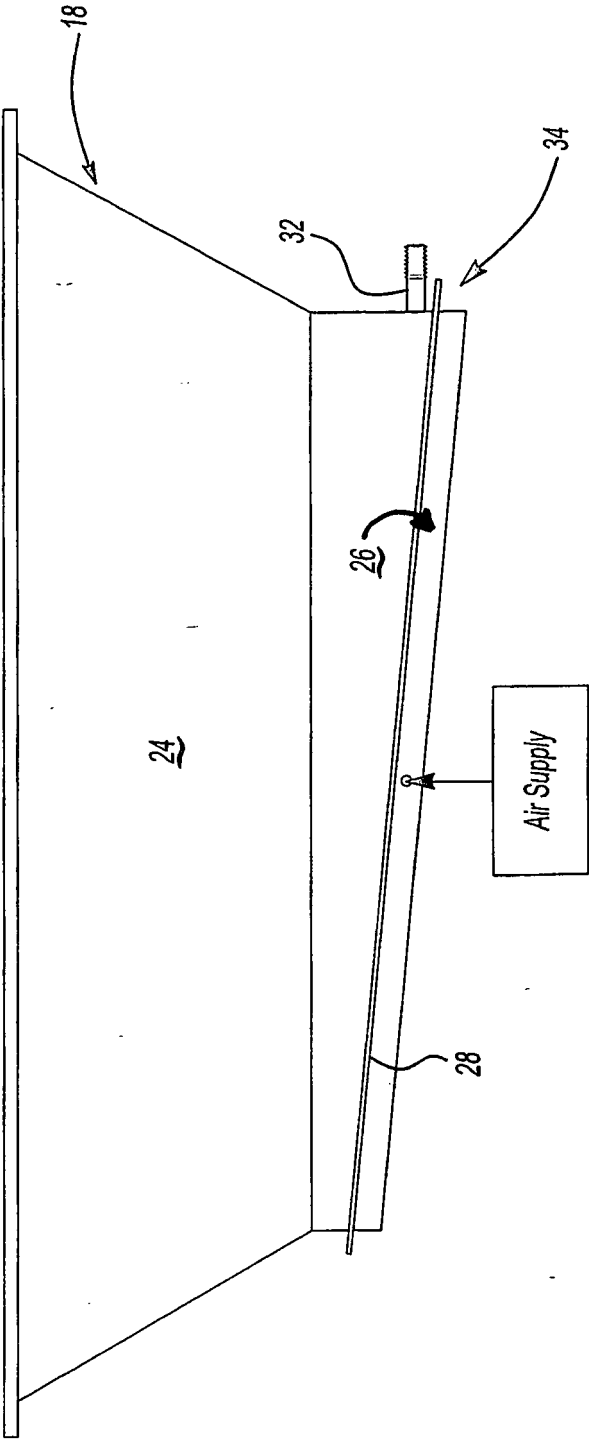
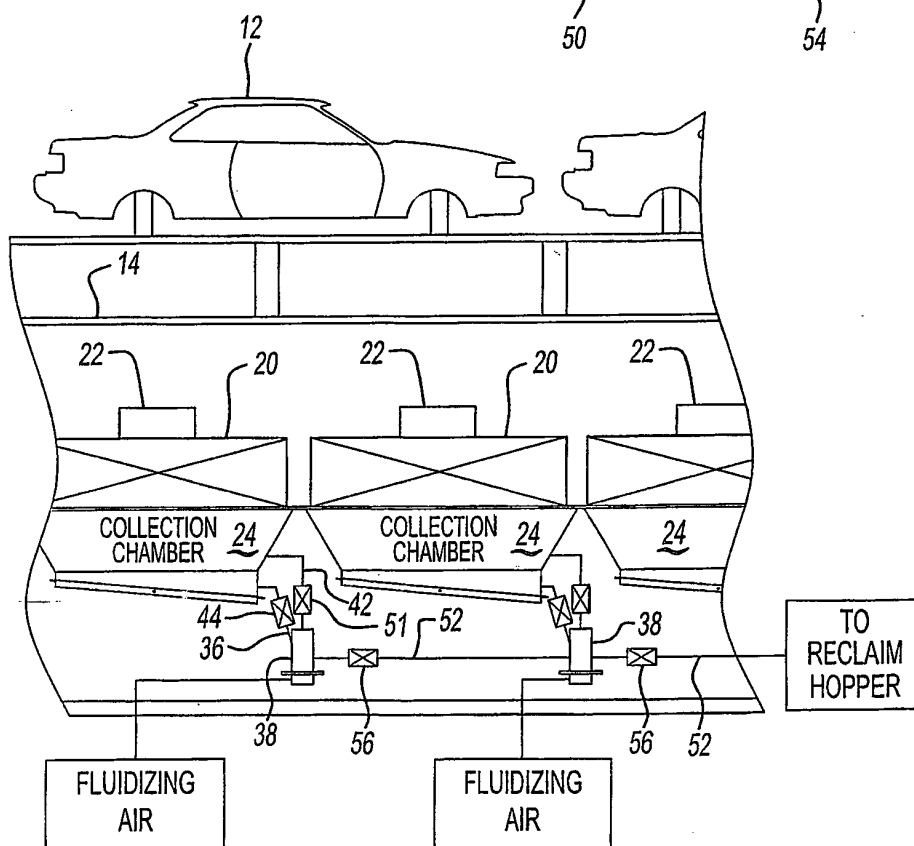
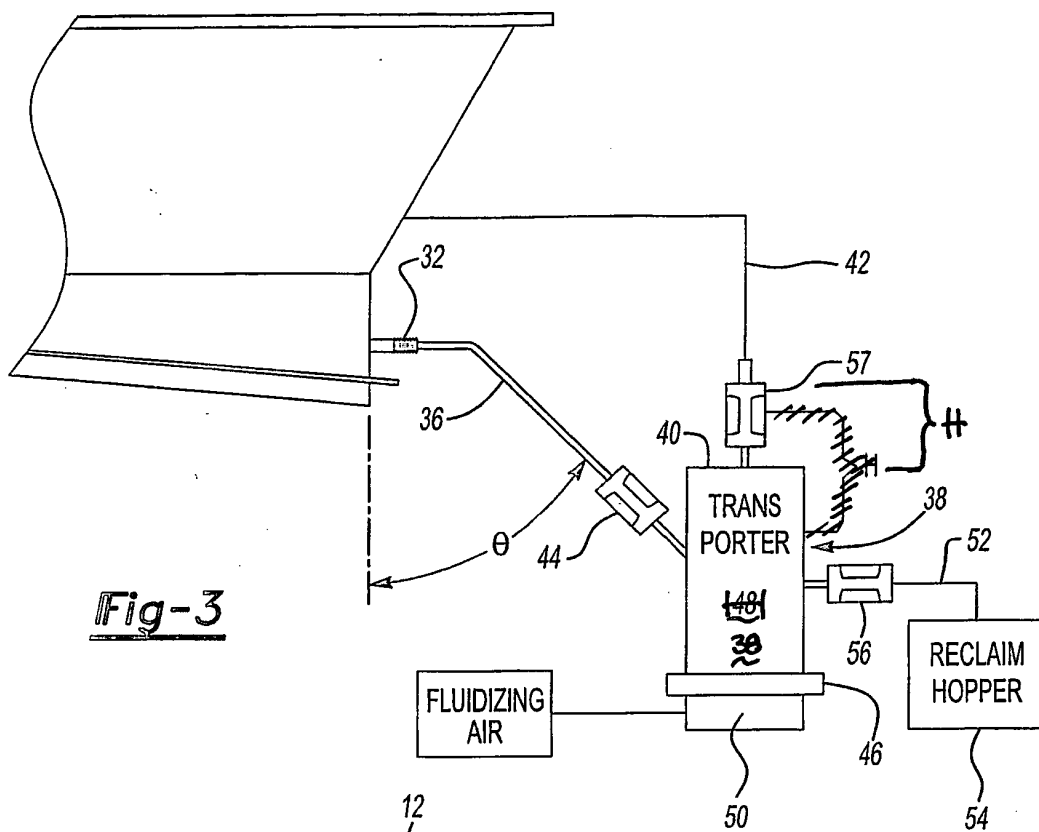


Fig-2



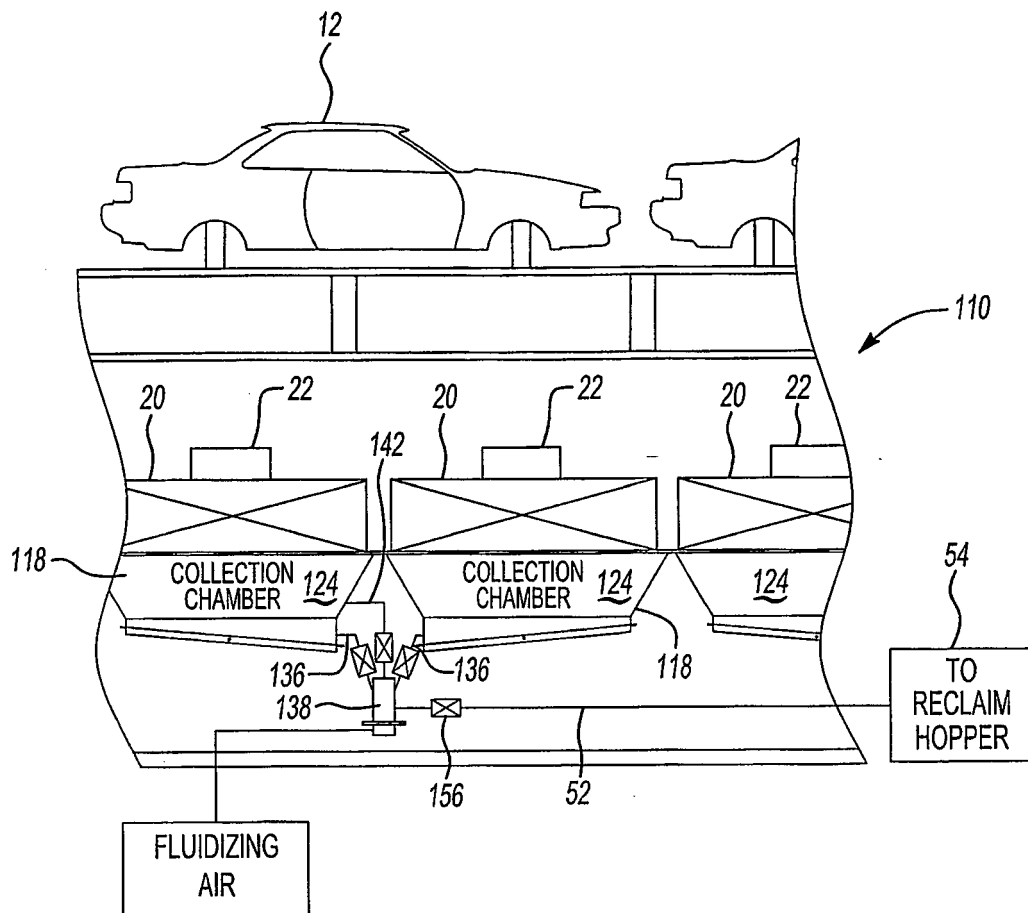


Fig-5

REFERENCES CITED IN THE DESCRIPTION

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