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(54) **AIR PRESSURE DISSIPATOR FOR AIR SEED DELIVERY SYSTEM**

LUFTDRUCKABSCHWÄCHER FÜR EIN LUFTSTREUSYSTEM

DISSIPATEUR DE PRESSION D'AIR POUR SYSTÈME DE DISTRIBUTION DE GRAINE À AIR

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## Description

### Field of the Invention

**[0001]** This invention relates generally to pressurized air systems for delivering seeds from a main hopper to one or more remote bins each associated with a planter row unit, and is particularly directed to an air pressure dissipator for regulating the flow of air and the amount of seed delivered to a planter row unit.

### Background of the Invention

**[0002]** Early agricultural planters for simultaneously planting plural spaced rows of crops using seed metering apparatus for dispensing seeds at a controlled rate provided each seed metering unit with its own seed hopper. The limited space available along the length of the planter's tool bar restricted the size of the individual row unit hoppers and led to the use of a central seed hopper for supplying plural smaller remote hoppers, or bins, each associated with a respective row unit. Plural hoses, or tubes, connect the central seed hopper to each remote bin of an individual seed metering unit. The seed bin of a seed metering device is typically integrated in the housing of the seed meter.

**[0003]** Air under pressure is used to move the seeds from the central seed hopper via the aforementioned tubes extending to the individual remote seed meters. Seeds in the main hopper are agitated by and entrained within an air stream and are delivered under pressure to the individual seed meters. In this type of distribution system, it is difficult to provide uniform seed agitation and transport via airstream entrainment to all individual remote seed meters to ensure uniform seed deposit in all of the crop rows. Inline air current which is too low will result in a reduced number of seeds being transported to the seed meters, while too high an air current may result in excess seed accumulation causing more than one seed to be discharged at a given time or interruptions in seed flow preventing deposit of seeds at regular intervals. Attempts to address this problem have led to the introduction of large remote hoppers having sufficient seed capacity to compensate for any reduction or interruption in the flow of seeds to any of the remote seed meters. But this approach has met with only limited success because of the limited space on the toolbar and the close spacings of the crop rows as discussed above.

**[0004]** US5392722 relates to an air separation tube for an agricultural planter. The air separation tube comprises a hollow tube having an inlet and outlet that is mounted to the side wall of a mini-hopper. The tube is provided with a downwardly curving bend having a screen through which air is allowed to pass. The screen prevents the seed carried by the air stream from leaving the tube. The outlet of the tube is located above the seed puddle of the seed meter which is coupled to the mini-hopper.

**[0005]** The present invention addresses the aforementioned limitations of the prior art by providing a means of variable air dissipation in a compressed air system for distributing seeds from one or more central hoppers to plural remote seed meters for timed deposit of individual seeds in the soil.

**[0006]** According to an aspect of the invention there is provided a particulate matter transport and discharge arrangement according to claim 1.

### Brief Description of the Drawings

**[0007]**

FIG. 1 is an exploded perspective view of a planter row unit incorporating an air pressure dissipater for an air seed delivery system in accordance with the present invention;

FIG. 2 is a side elevation view of the inventive air pressure dissipater;

FIG. 3 is an upper perspective view of an air dissipator tube incorporated in the air pressure dissipator of the present invention;

FIG. 4 is a longitudinal sectional view of the air dissipator tube shown in FIG. 2, with a portion shown in enlarged detail;

FIG. 5 is a bottom plan view of the air dissipator tube shown in FIG. 2, with a portion thereof shown in enlarged detail;

FIG. 6 is a perspective view of a perforated tube assembly used in the air pressure dissipator of the present invention; and

FIGS. 7 and 8 are side elevation views illustrating additional details of the perforated tube assembly shown in FIG. 6.

### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

**[0008]** Referring to FIG. 1, there is shown an exploded perspective view of an agricultural planter unit 10 connected to an air seed delivery system incorporating an air pressure dissipater 24 in accordance with the principles of the present invention. While the inventive air pressure dissipater 24 is described herein for use in a seed delivery system, this invention is not limited to one particular embodiment or to that type of environment and has application in virtually any particle, or particulate matter, delivery system using an airstream, or air (or other type of gas) under pressure, to move the particles.

**[0009]** Planter row unit 10 includes a support frame 12 having attached to a lower portion thereof plural ground engaging tools 14 (only one of which is shown for sim-

plicity) and wheels 16. Also coupled to a lower portion of support frame 12 is an attachment mechanism 18 for connecting the planter row unit 10 to a toolbar (not shown) of an agricultural planter. Plural planter row units 10 are disposed in a spaced manner along the length of the toolbar. Disposed on and mounted to support frame 12 is a seed meter 20 which dispenses seeds in a timed manner as determined by the speed of the planter row unit 10 traversing a field. A lower portion of seed meter 20 is connected to a seed discharge tube 15 for discharging the seeds into a furrow formed by the aforementioned ground engaging tools 14. The seed meter 20 shown in FIG. 1 is of the vacuum type and includes an opening 20a to a seed reservoir within the seed meter. Attached to an upper portion of support frame 12 as well as to seed meter 20 is a seed meter mount 22 having an aperture 22a aligned with the aperture 20a in the seed meter. While the present invention is described herein as used in combination with a vacuum type seed meter, this invention could equally as well be used with a positive air pressure seed meter or a mechanical seed meter.

**[0010]** Attached to an upper portion of seed meter mount 22 and aligned with the aperture 22a therein is an air pressure dissipator 24 in accordance with the present invention. A side elevation view of the inventive air pressure dissipator 24 is shown in FIG. 2. Air pressure dissipator 24 includes an upper air dissipator tube 26 or dissipater chamber and a lower air dissipator screen 28. FIG. 3 is an upper perspective view of the air dissipator tube 26. FIGS. 4 and 5 are respectively longitudinal sectional and bottom plan views of the air dissipator tube 26, with each of these figures including enlarged portions of the air dissipator tube to illustrate additional details thereof. FIGS. 6, 7 and 8 are respectively perspective and side elevation views of the air dissipater screen 28 of the inventive air pressure dissipater 24.

**[0011]** The air dissipator tube 26 of the air pressure dissipator 24 is preferably comprised of a high strength plastic and includes an upper angled portion 42 having an aperture 40 in the upper end thereof and a lower outwardly tapered portion 44 having a lower aperture 46 therein. The upper end of the angled portion 42 of the air dissipater tube 26 is adapted for coupling by means of plural spaced projections 52 on the outer surface thereof to a connector 30. Connector 30 is adapted for coupling to a seed hopper by means of an elongated tube, which are not shown in the figures for simplicity. It is in this manner that seeds are provided from the hopper via the air pressure dissipater tube 26 to the seed meter 20 for deposit in the soil. A gasket 32 is provided between the upper end of air dissipator tube 26 and connector 30 for providing an airtight, sealed connection therebetween. The angle in the air pressure dissipator tube 26 is selected so as to facilitate seed/air flow through the air pressure dissipator 24 and to facilitate connection of the air pressure dissipator to a planter row unit disposed either forward or aft of the planter's tool bar by mounting the air pressure dissipator so as to extend either in a forward or an aft direction relative to the toolbar to accommodate the position of the planter row unit. In a preferred embodiment, the angle of the air pressure dissipater tube 26 is on the order of 45° to facilitate coupling the air pressure dissipater tube to a seed hopper typically via the combination of a flexible hose and a seed air entrainment device which are not shown for simplicity. While the present invention is described herein as being mounted to the top of the seed meter hopper and bent 45 degrees to accommodate hose attachment, this invention could work equally as well with other configurations, combinations and arrangements of its [principle] components.

**[0012]** Extending downward from the angled portion 42 is the outwardly tapered portion 44 of the air dissipator tube 26. Disposed on outer, opposed portions of the outwardly tapered portion 44 of the air pressure dissipator tube 26 are first and second mounting flanges 48a and 48b. Each of the first and second mounting flanges 48a, 48b includes a respective aperture 50a and 50b therein. Each of apertures 50a, 50b is adapted to receive a respective connector 51a, 51b as shown in FIG. 2 for securely connecting air dissipator screen 28 to a lower end of air dissipator tube 26. In FIG. 2, first and second connectors 51a, 51b are shown as nut and bolt combinations, although various conventional types of coupling arrangements could be used to connect air dissipator tube 26 and air dissipator screen 28. First and second connectors 51a, 51b may also be used to connect air pressure dissipator 24 to seed meter mount 22 such that air dissipator screen 28 is disposed within the seed meter mount's aperture 22a aligned with aperture 20a in seed meter 20. Also disposed on the lower end of the outwardly tapered portion 44 of air dissipator tube 26 are plural spaced recesses 58a - 58d, where two of these recesses 58a and 58b are shown in FIGS. 2 and 4 and all four are identified in FIG. 5. In addition, disposed about the inner surface of the air pressure dissipator 24 where its angled portion 42 meets its outwardly tapered portion 44 is a circular lip extension 54 extending in a downward direction as shown in the sectional view of FIG. 4.

**[0013]** The air dissipator screen 28 attached to the lower end of the air dissipater tube 26 includes an elongated, linear perforated tube 72 preferably comprised of a non-corrosive metal, plastic or other suitable material. Perforated tube has an upper opening 72a and a lower opening 72b in its tapered lower end 72c. Disposed about and attached to perforated tube 72 is a mounting plate 74. Mounting plate 74 includes first and second opposed mounting flanges 74a and 74b each having a respective aperture 76a and 76b therein. Mounting flanges 74a, 74b and apertures 76a, 76b are aligned with the mounting flanges 48a, 48b and apertures 50a, 50b in air pressure dissipator tube 26 for connecting these two components together by means of the aforementioned first and second connectors 51a and 51b. Formed integrally with mounting plate 74 and extending about the large aperture in the mounting plate is an upraised lip portion 74c which is

crimped, bonded, welded otherwise attached to the outer surface of perforated tube 72 to securely connect these two components in a fixed manner. The openings along the length of perforated tube 72 allow air to pass through the tube, while maintaining seed entrained in the air flow from the main seed hopper confined within the air pressure dissipator 24 for delivery to seed meter 20.

**[0014]** While the lower tapered end 72c of the air pressure dissipator's perforated tube 72 is disposed within the seed reservoir in seed meter 20, the upper end of the perforated tube extends into the outwardly tapered portion 44 in the lower end of the air dissipator tube 26. The upper end of the perforated tube 72 defining aperture 72a therein is inserted in an annular slot 56 disposed between the above described inner lip extension 54 on the inner surface of air dissipator tube 26 and its outwardly tapered portion 44 as shown in FIG. 4. Contact is established between the upper edge of the perforated tube 72, the inner surface of the outwardly tapered portion 44 and inner lip extension 54 of air dissipater tube 26 to ensure that none of the seeds escape the air delivery system and are directed through the perforated tube. As additional seed is deposited in the seed reservoir of seed meter 20, the seed level approaches the lower end of the air pressure dissipator's perforated tube 72. As the deposited seed fills the lower end of perforated tube 72 in an increasing manner, an increase in blockage of the openings in the perforated tube results thereby decreasing the amount of air that is discharged through the perforations in the tube, as well as through the plural recesses 58a - 58d in the lower edge of the air dissipater tube's outwardly tapered portion 44. This decrease in air discharged from a lateral portion of air pressure dissipater 24 reduces the air flow velocity in the seed delivery hose, thus preventing seeds from being entrained into the airstream and delivered to the seed meter until the seed level in the perforated tube 72 is lowered to permit additional air and seed to flow into the seed meter. Thus, as seeds are discharged to the soil, the seed level in the seed meter 20 drops allowing an increase in the air flow being dissipated to the atmosphere which in turn increases the air current in the seed delivery hose allowing additional seed to be entrained into the air stream and delivered to the seed meter for discharge onto the soil. It is in this manner that the inventive air pressure dissipator 24 operates to maintain the seed level in seed meter 20 at a more or less constant level to prevent the deposit of excessive amounts of seed in the seed meter, while ensuring a steady flow of seed to the seed meter for optimum seed discharge. While the present invention is described herein as having a straight perforated tube 72 used in conjunction with an outwardly tapered and angled dissipater tube 26, other tube and screen shapes and combinations thereof could equally as well be used to create a variable air discharge area thereby controlling air current-dependent seed entrainment as seed levels rise and fall.

**[0015]** While particular embodiments of the present invention have been shown and described, it will be obvious to those skilled in the relevant arts that changes and modifications may be made without departing from the invention. The matter set forth in the foregoing description and accompanying drawings is offered by way of illustration only and not as a limitation.

## Claims

1. A particulate matter transport and discharge arrangement (24, 10) comprising:

   a reservoir containing particulate matter and having a discharge tube attached thereto, wherein air under pressure is provided to said reservoir for entraining the particulate matter in an air stream for removing the particulate matter from said reservoir via said discharge tube; a hollow elongated member (72) having a lateral wall, with at least a portion of the lateral wall of said hollow elongated member (72) having plural apertures therein, said hollow elongated member (72) further including a first open end (72a) coupled to said discharge tube for receiving air-stream entrained particulate matter from said reservoir, and a second opposed open end (72b); and

   a discharge mechanism (20) coupled to the second open end (72b) of said hollow elongated member (72) for receiving and discharging the particulate material;

   wherein when the particulate material at least partially fills the hollow elongate member (72), reduced air flow passes through the apertures thereof and said hollow elongated member (72) thereby regulates the flow of particulate matter to said discharge mechanism (20) to prevent over feeding of said discharge mechanism (20) of the particulate matter;

   wherein said hollow elongated member (72) is in the form of a tube;

   wherein said hollow elongated member (72) connects to an upper air tube (26) coupled to said reservoir and includes a lower apertured tubular screen (28) coupled to said discharge mechanism (20), **characterised in that** said upper air tube (26) is connected to said lower apertured tubular screen (28) in a semi-sealed manner;

   wherein said upper air tube (26) includes an outwardly tapered lower end portion (44) adapted for semi-sealed connection to said lower apertured tubular screen (28), wherein said lower end portion (44) of said upper air tube (26) is outwardly tapered in the direction of particulate matter flow; and

   wherein said upper air tube (26) further includes

an inner lip extension (54) disposed in a spaced manner inwardly from said outwardly tapered lower end portion (44), and wherein said lower apertured tubular screen (28) includes an upper edge portion disposed between and engaging the outwardly tapered lower portion (44) and the inner lip extension (54) of said upper air tube (26).

**2.** The arrangement of claim 1, wherein the particulate matter is seed, fertilizer or a herbicide.

**3.** The arrangement of claim 1, wherein the particulate matter is seed and the arrangement is used in an air seed delivery system, and optionally said discharge mechanism (20) is a seed meter.

**4.** The arrangement of claim 1, wherein said upper air tube (26) and said lower apertured tubular screen (28) respectively include first and second coupling flanges (48a, 48b) for connecting said upper air tube (26) and said lower apertured tubular screen (28) together.

**5.** The arrangement of claim 4, further comprising a plurality of mated sets of air tubes (26) and tubular screens (28) to facilitate multiple distribution points from a single central reservoir, optionally wherein said plural connectors are nut and bolt combinations, said first and second coupling flanges (48a, 48b) and said plural connectors optionally being adapted for attaching said hollow elongated member (72) to a support structure (12), and further optionally wherein a lower end portion (44) of said upper air tube (26) includes one or more openings for facilitating air flow through the apertures in said tubular screen (28) in controlling air flow to said discharge mechanism (20).

**6.** The arrangement of claim 1, wherein said upper air tube (26) is comprised of plastic and said tubular screen (28) is comprised of a non-corrosion metal, or wherein said upper air tube (26) includes a 45° bend and said tubular screen (28) is linear in configuration, or wherein said tubular screen (28) includes an angled lower edge portion (72c), or wherein an upper end portion (72a) of said lower apertured tubular screen (28) extends up into and is inwardly displaced from an adjacent lower end portion (44) of said upper air tube (26).

**7.** The arrangement of claim 4, wherein said second coupling flange (48a, 48b) is disposed on an intermediate portion of said lower apertured tubular screen (28), with said lower apertured tubular screen (28) extending above and below a lower end (44) of said upper air tube (26).

**8.** The arrangement of claim 1, wherein:

the discharge tube is connected in a sealed manner to the reservoir; and
the discharge mechanism (20) is coupled to the elongated member (72) by means of a second tube having first and second opposed open ends, said second end being connected in a semi-sealed manner to the discharge mechanism (20) and said first end being connected to the hollow elongated member (72) in a sealed manner.

**9.** A particulate matter transport and discharge arrangement comprising plural arrangements (24, 10) according to claim 1.

**Patentansprüche**

**1.** Feststoffteilchen-Beförderungs- und -Abgabeanordnung (24, 10), die Folgendes umfasst:

ein Reservoir, das Feststoffteilchen enthält und eine Abgaberöhre hat, die an demselben befestigt ist, wobei Luft unter Druck für das Reservoir bereitgestellt wird, um die Feststoffteilchen in einem Luftstrom mitzunehmen, um die Feststoffteilchen über die Abgaberöhre aus dem Reservoir zu entfernen,
ein hohles längliches Element (72), das eine Seitenwand hat, wobei wenigstens ein Abschnitt der Seitenwand des hohlen länglichen Elements (72) mehrere Öffnungen in derselben hat, wobei das hohle längliche Element (72) ferner ein erstes offenes Ende (72a), das zum Aufnehmen vom Luftstrom mitgenommener Feststoffteilchen aus dem Reservoir mit der Abgaberöhre verbunden ist, und ein zweites entgegengesetztes offenes Ende (72b) einschließt, und
einen Abgabemechanismus (20), der zum Aufnehmen und Abgeben des teilchenförmigen Materials mit dem zweiten offenen Ende (72b) des hohlen länglichen Elements (72) verbunden ist, wobei, wenn das teilchenförmige Material das hohle längliche Element (72) wenigstens teilweise füllt, ein verringerter Luftstrom durch die Öffnungen desselben hindurchgeht und das hohle längliche Element (72) dadurch den Strom von Feststoffteilchen zu dem Abgabemechanismus (20) reguliert, um ein übermäßiges Beschicken des Abgabemechanismus (20) mit den Feststoffteilchen zu verhindern,
wobei das hohle längliche Element (72) die Form einer Röhre hat,
wobei das hohle längliche Element (72) mit einer oberen Luftröhre (26) verbunden ist, die mit dem Reservoir verbunden ist und ein unteres mit Öff-

nungen versehenes röhrenförmiges Sieb (28) einschließt, das mit dem Abgabemechanismus (20) verbunden ist, **dadurch gekennzeichnet, dass** die obere Luftröhre (26) auf eine halb abgedichtete Weise mit dem unteren mit Öffnungen versehenen röhrenförmigen Sieb (28) verbunden ist,
wobei die obere Luftröhre (26) einen nach außen verjüngten unteren Endabschnitt (44) einschließt, der für eine halb abgedichtete Verbindung mit dem unteren mit Öffnungen versehenen röhrenförmigen Sieb (28) eingerichtet ist, wobei der untere Endabschnitt (44) der oberen Luftröhre (26) in der Richtung des Feststoffteilchenstroms nach außen verjüngt ist, und
wobei die obere Luftröhre (26) ferner eine innere Lippenerweiterung (54) einschließt, die auf eine beabstandete Weise von dem nach außen verjüngten unteren Endabschnitt (44) aus nach innen angeordnet ist, und wobei das untere mit Öffnungen versehene röhrenförmige Sieb (28) einen oberen Kantenabschnitt einschließt, der zwischen dem nach außen verjüngten unteren Abschnitt (44) und der inneren Lippenerweiterung (54) der oberen Luftröhre (26) angeordnet ist und dieselben in Eingriff nimmt.

**2.** Anordnung nach Anspruch 1, wobei die Feststoffteilchen Saatgut, Dünger oder ein Herbizid ist.

**3.** Anordnung nach Anspruch 1, wobei die Feststoffteilchen Saatgut ist und die Anordnung als ein Luft-Saatgutabgabesystem verwendet wird und wahlweise der Abgabemechanismus (20) ein Saatgut-Dosierer ist.

**4.** Anordnung nach Anspruch 1, wobei die obere Luftröhre (26) beziehungsweise das untere mit Öffnungen versehene röhrenförmige Sieb (28) jeweils einen ersten und einen zweiten Kupplungsflansch (48a, 48b) zum Verbinden der oberen Luftröhre (26) und des unteren mit Öffnungen versehenen röhrenförmigen Siebes (28) miteinander einschließen.

**5.** Anordnung nach Anspruch 4, die ferner mehrere zusammengepasste Sätze von Luftröhren (26) und röhrenförmigen Sieben (28) umfasst, um mehrfache Verteilungspunkte von einem einzigen zentralen Reservoir zu ermöglichen, wahlweise wobei die mehreren Verbinder Kombinationen von Mutter und Bolzen sind, wobei die ersten und zweiten Kupplungsflansche (48a, 48b) und die mehreren Verbinder wahlweise eingerichtet sind zum Befestigen des hohlen länglichen Elements (72) an einer Stützstruktur (12), und ferner wahlweise wobei ein unterer Endabschnitt (44) der oberen Luftröhre (26) eine oder mehrere Öffnungen zum Ermöglichen eines Luftstroms durch die Öffnungen in dem röhrenförmigen Sieb (28) beim Steuern des Luftstroms zu dem Abgabemechanismus (20) einschließt.

**6.** Anordnung nach Anspruch 1, wobei die obere Luftröhre (26) aus Kunststoff besteht und das röhrenförmige Sieb (28) aus einem korrosionsfreien Metall besteht oder wobei die obere Luftröhre (26) eine 45°-Biegung einschließt und das röhrenförmige Sieb (28) von linearer Konfiguration ist oder wobei das röhrenförmige Sieb (28) einen abgewinkelten unteren Kantenabschnitt (72c) einschließt,
oder wobei sich ein oberer Endabschnitt (72a) des unteren mit Öffnungen versehenen röhrenförmigen Siebes (28) nach oben in einen benachbarten unteren Endabschnitt (44) der oberen Luftröhre (26) erstreckt und nach innen von demselben versetzt ist.

**7.** Anordnung nach Anspruch 4, wobei der zweite Kupplungsflansch (48a, 48b) an einem Zwischenabschnitt des unteren mit Öffnungen versehenen röhrenförmigen Siebes (28) angeordnet ist, wobei sich das untere mit Öffnungen versehene röhrenförmige Sieb (28) oberhalb und unterhalb eines unteren Endes (44) der oberen Luftröhre (26) erstreckt.

**8.** Anordnung nach Anspruch 1, wobei:

die Abgaberöhre auf eine abgedichtete Weise mit dem Reservoir verbunden ist und
der Abgabemechanismus (20) mit Hilfe einer zweiten Röhre, die ein erstes und ein entgegengesetztes zweites offenes Ende hat, mit dem länglichen Element (72) verbunden ist, wobei das zweite Ende auf eine halb abgedichtete Weise mit dem Abgabemechanismus (20) verbunden ist und das erste Ende auf eine abgedichtete Weise mit dem hohlen länglichen Element (72) verbunden ist.

**9.** Feststoffteilchen-Beförderungs- und -Abgabeanordnung, die mehrere Anordnungen (24, 10) nach Anspruch 1 umfasst.

**Revendications**

**1.** Agencement de transport et de décharge de matière particulaire (24, 10) comprenant :

un réservoir contenant une matière particulaire et ayant un tube de décharge rattaché à celui-ci, dans lequel de l'air sous pression est fourni dans ledit réservoir en vue d'entraîner la matière particulaire dans un courant d'air en vue d'éliminer la matière particulaire dudit réservoir via ledit tube de décharge ;
un élément allongé creux (72) ayant une paroi latérale, avec au moins une partie de la paroi

latérale dudit élément allongé creux (72) comportant plusieurs ouvertures, ledit élément allongé creux (72) incluant en outre une première extrémité ouverte (72a) couplée audit tube de décharge en vue de recevoir une matière particulaire entraînée par un courant d'air en provenance dudit réservoir, et une deuxième extrémité ouverte opposée (72b) ; et
un mécanisme de décharge (20) couplé à la deuxième extrémité ouverte (72b) dudit élément allongé creux (72) en vue de recevoir et de décharger la matière particulaire ;
dans lequel lorsque la matière particulaire remplit au moins partiellement l'élément allongé creux (72), un flux d'air réduit passe à travers les ouvertures de celui-ci et ledit élément allongé creux (72) régule ainsi le flux de matière particulaire vers ledit mécanisme de décharge (20) pour empêcher une suralimentation dudit mécanisme de décharge (20) avec la matière particulaire ;
dans lequel ledit élément allongé creux (72) se présente sous la forme d'un tube ;
dans lequel ledit élément allongé creux (72) se raccorde à un tube d'air supérieur (26) couplé audit réservoir et inclut un tamis tubulaire à ouvertures inférieur (28) couplé audit mécanisme de décharge (20), **caractérisé en ce que** ledit tube d'air supérieur (26) est raccordé audit tamis tubulaire à ouvertures inférieur (28) d'une manière semi-hermétique ;
dans lequel ledit tube d'air supérieur (26) inclut une partie d'extrémité inférieure rétrécissant progressivement vers l'extérieur (44) adaptée pour un raccordement semi-hermétique audit tamis tubulaire à ouvertures inférieur (28), dans lequel ladite partie d'extrémité inférieure (44) dudit tube d'air supérieur (26) est rétrécie progressivement vers l'extérieur dans la direction du flux de matière particulaire ; et
dans lequel ledit tube d'air supérieur (26) inclut en outre une extension de lèvre interne (54) disposée d'une manière espacée vers l'intérieur à partir de ladite partie d'extrémité inférieure rétrécissant progressivement vers l'extérieur (44), et dans lequel ledit tamis tubulaire à ouvertures inférieur (28) inclut une partie de bord supérieure disposée entre et se mettant en prise avec la partie inférieure rétrécissant progressivement vers l'extérieur (44) et l'extension de lèvre interne (54) dudit tube d'air supérieur (26).

**2.** Agencement selon la revendication 1, dans lequel la matière particulaire est une graine, un fertilisant ou un herbicide.

**3.** Agencement selon la revendication 1, dans lequel la matière particulaire est une graine et l'agencement est utilisé dans un système de distribution de graines à air, et facultativement ledit mécanisme de décharge (20) est un doseur de graines.

**4.** Agencement selon la revendication 1, dans lequel ledit tube d'air supérieur (26) et ledit tamis tubulaire à ouvertures inférieur (28) incluent respectivement des première et deuxième brides de couplage (48a, 48b) en vue de raccorder ledit tube d'air supérieur (26) et ledit tamis tubulaire à ouvertures inférieur (28) ensemble.

**5.** Agencement selon la revendication 4, comprenant en outre une pluralité d'ensembles appariés de tubes d'air (26) et de tamis tubulaires (28) pour faciliter des points de distribution multiples à partir d'un réservoir central unique, facultativement dans lequel lesdits plusieurs connecteurs sont des combinaisons d'écrous et de boulons, lesdites première et deuxième brides de couplage (48a, 48b) et lesdits plusieurs connecteurs étant facultativement adaptés en vue de fixer ledit élément allongé creux (72) à une structure de support (12), et en outre facultativement dans lequel une partie d'extrémité inférieure (44) dudit tube d'air supérieur (26) inclut une ou plusieurs ouvertures en vue de faciliter un flux d'air à travers les ouvertures dans ledit tamis tubulaire (28) lors de la régulation du flux d'air vers ledit mécanisme de décharge (20).

**6.** Agencement selon la revendication 1, dans lequel ledit tube d'air supérieur (26) est composé de plastique et ledit tamis tubulaire (28) est composé d'un métal résistant à la corrosion, ou dans lequel ledit tube d'air supérieur (26) inclut une courbure à 45° et ledit tamis tubulaire (28) est de configuration linéaire, ou dans lequel ledit tamis tubulaire (28) inclut une partie de bord inférieur inclinée (72c),
ou dans lequel une partie d'extrémité supérieure (72a) dudit tamis tubulaire à ouvertures inférieur (28) s'étend jusque dans et est déplacé vers l'intérieur par rapport à une partie d'extrémité inférieure adjacente (44) dudit tube d'air supérieur (26).

**7.** Agencement selon la revendication 4, dans lequel ladite deuxième bride de couplage (48a, 48b) est disposée sur une partie intermédiaire dudit tamis tubulaire à ouvertures inférieur (28), avec ledit tamis tubulaire à ouvertures inférieur (28) qui s'étend au-dessus et en dessous d'une extrémité inférieure (44) dudit tube d'air supérieur (26).

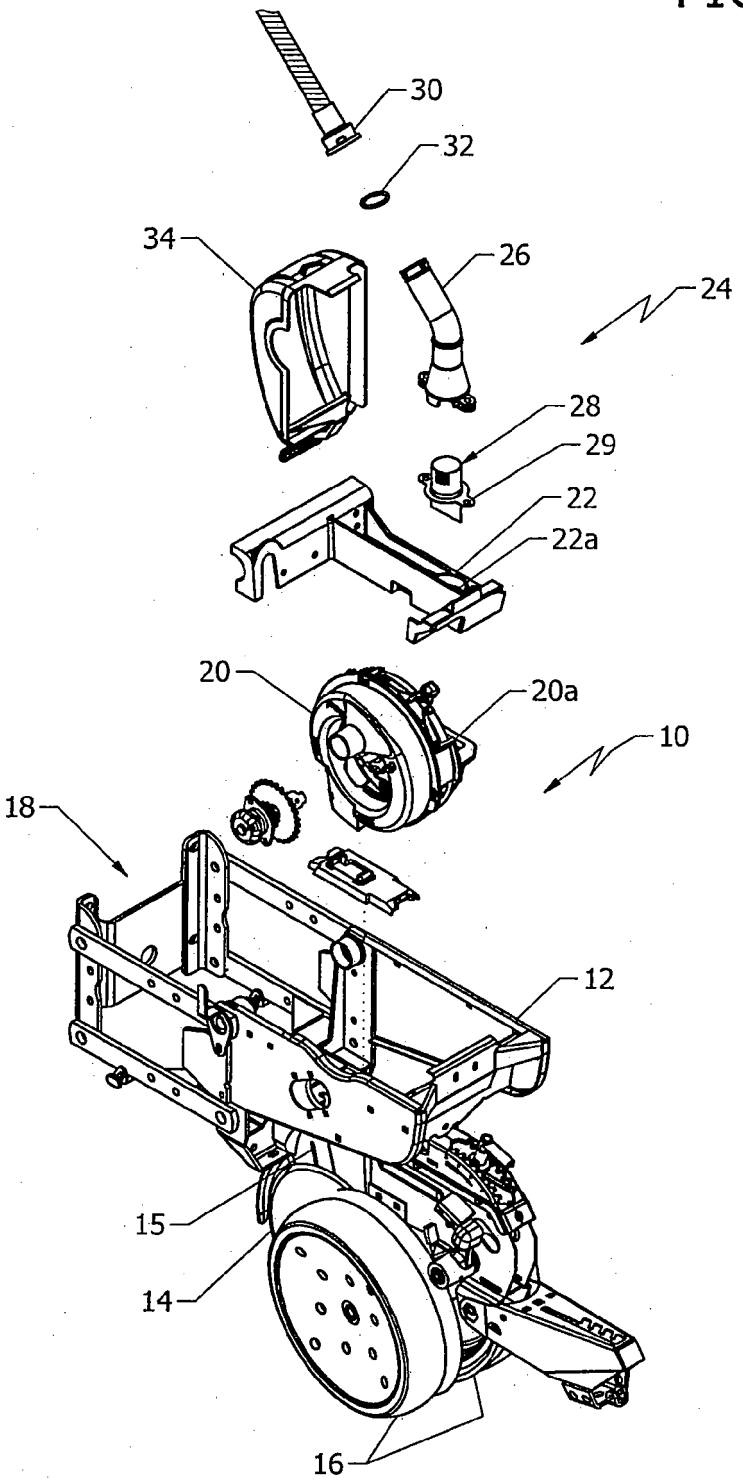
**8.** Agencement selon la revendication 1, dans lequel :

le tube de décharge est raccordé d'une manière hermétique au réservoir ; et
le mécanisme de décharge (20) est couplé à l'élément allongé (72) au moyen d'un second

tube ayant des première et deuxième extrémités ouvertes opposées, ladite deuxième extrémité étant raccordée d'une manière semi-hermétique au mécanisme de décharge (20) et ladite première extrémité étant raccordée à l'élément allongé creux (72) d'une manière hermétique.

**9.** Agencement de transport et de décharge de matière particulaire comprenant plusieurs agencements (24, 10) selon la revendication 1.

FIG. 1



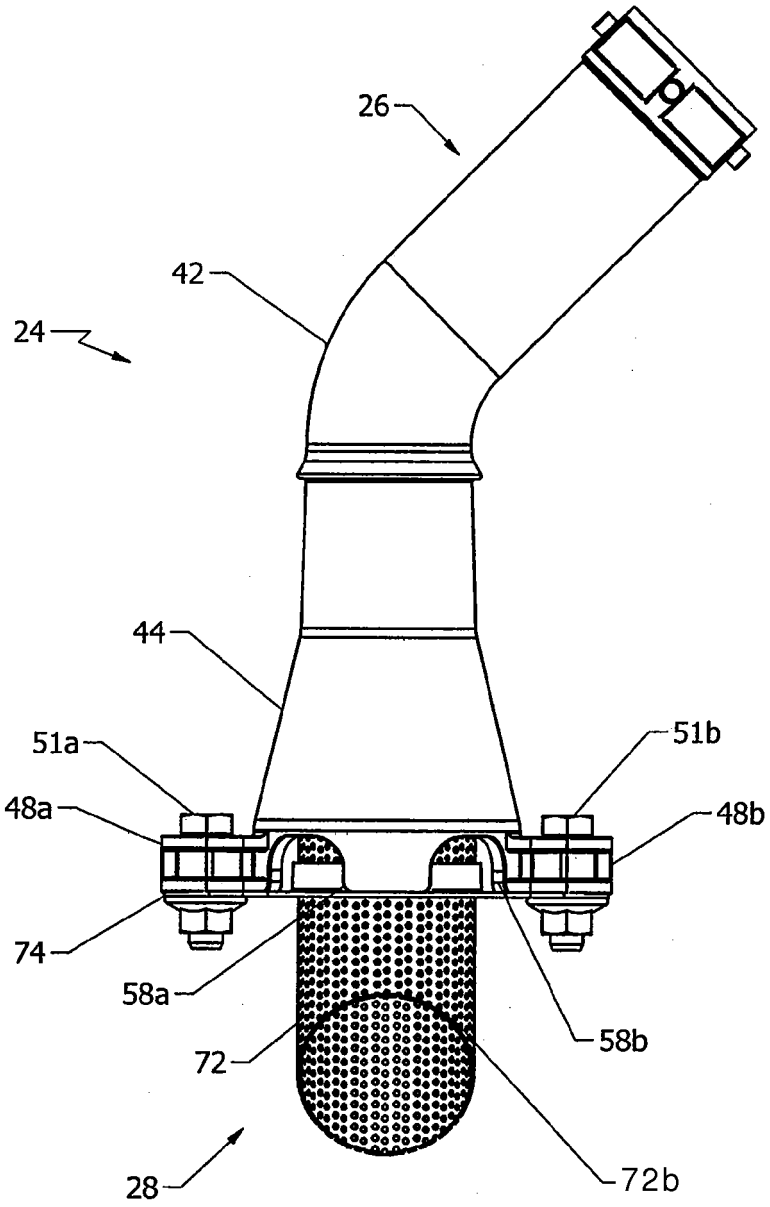



FIG. 2

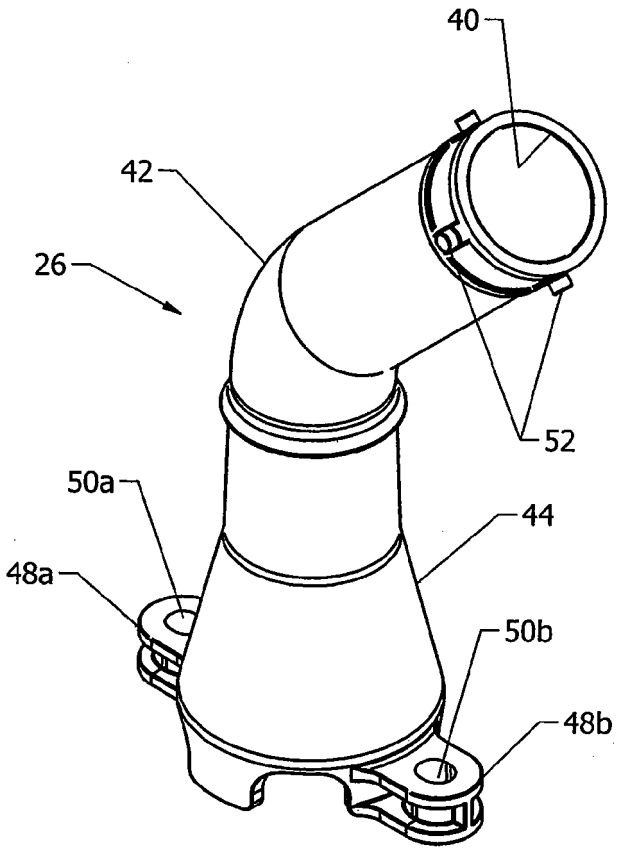
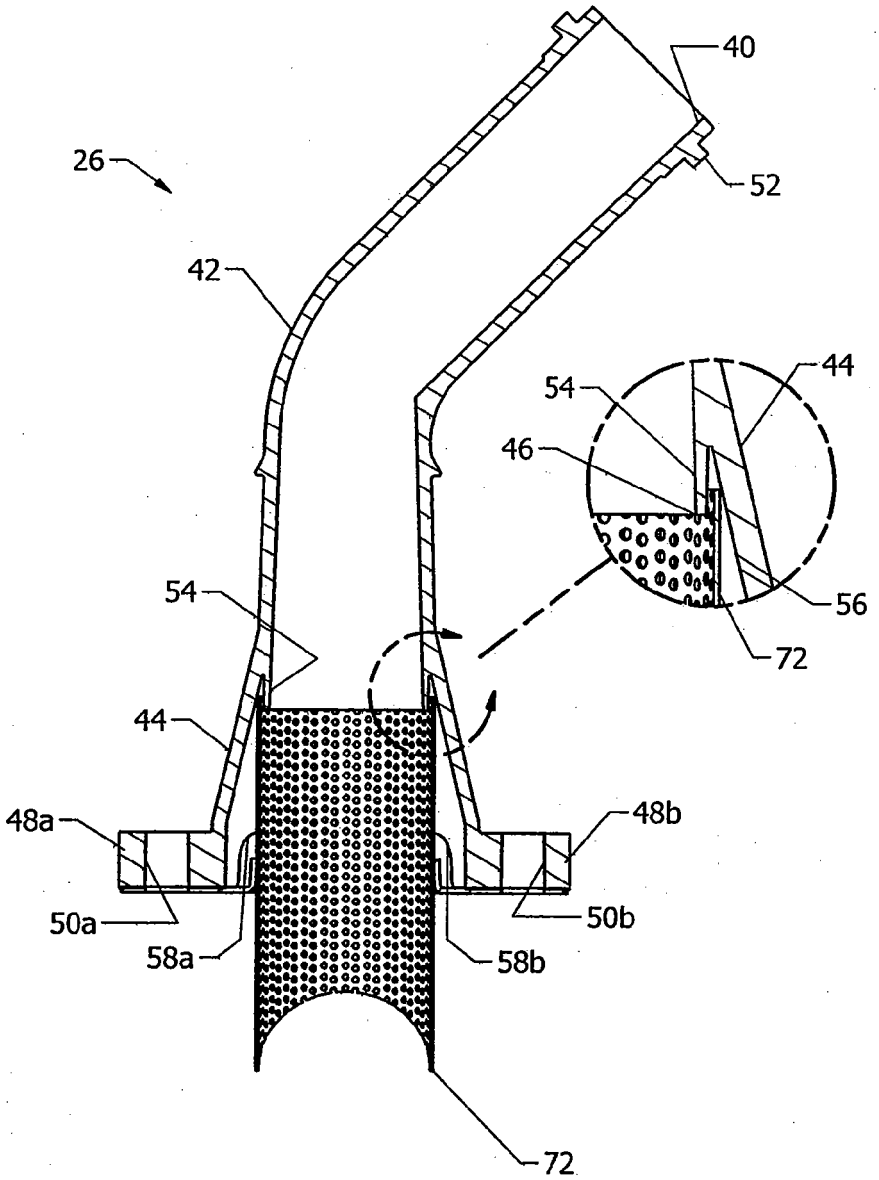



FIG. 3

FIG 4



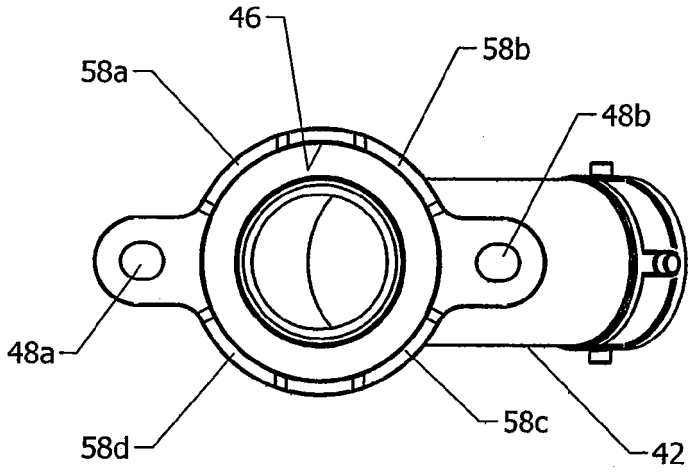
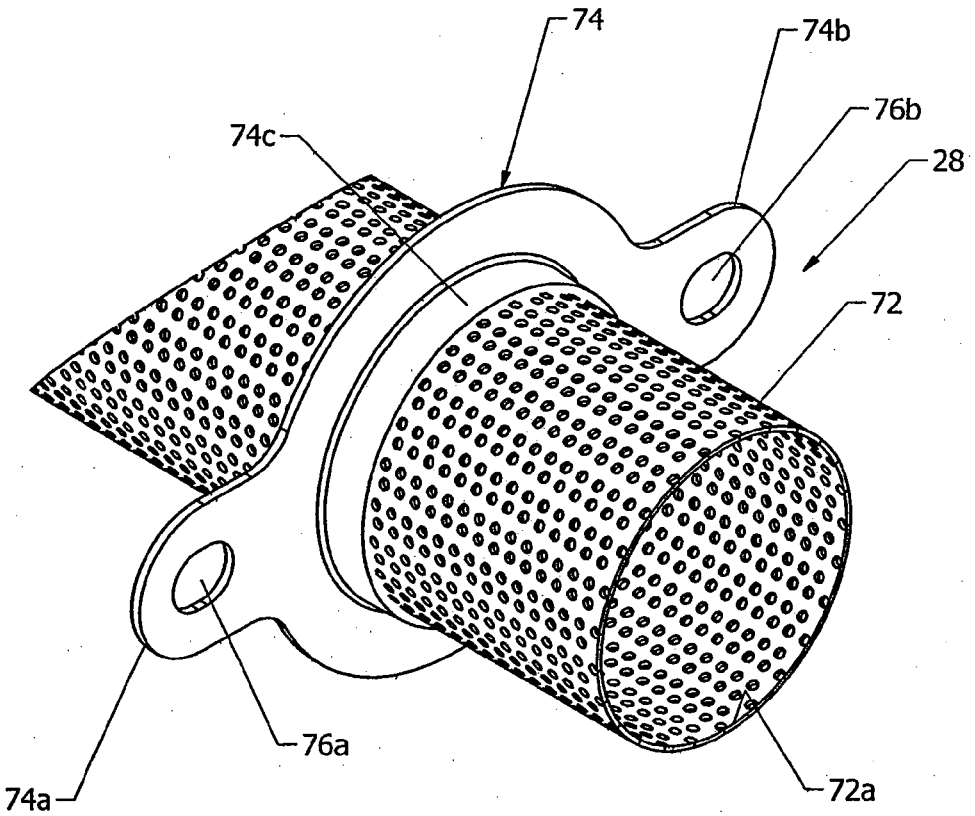



FIG. 5

FIG. 6



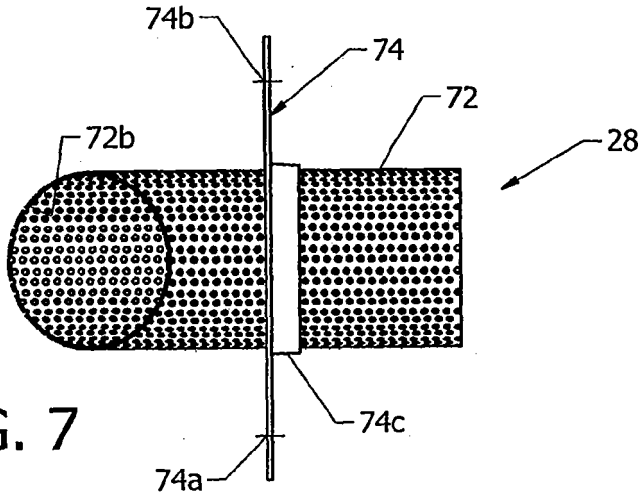



FIG. 7

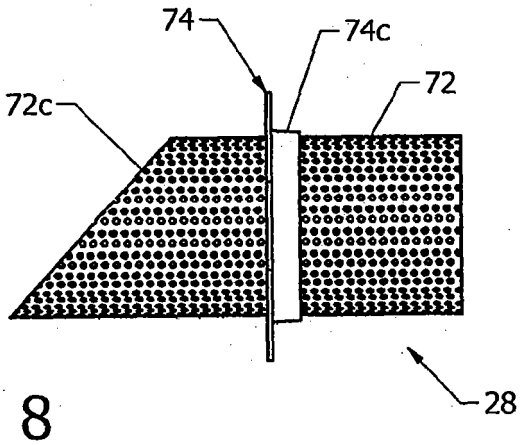



FIG. 8

## REFERENCES CITED IN THE DESCRIPTION

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### Patent documents cited in the description


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