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A PARTICULATE MATTER STORAGE CONTAINER
AND METHOD AND FILTER

Field of Art

The invention relates to storage containers used for storing particulate matter and relates particularly, but not exclusively, to containers such as silos, storage vessels or containers which are used for storing dry bulk particulate matter. The invention also relates to a method and apparatus for filtering the particulate matter from the exhaust air that exits the storage container. The invention also relates to a filter used for filtering airborne particulate matter.

Prior Art

Containers such as silos are used to store dry bulk particulate matter usually in the form of dry material which may be in powder, granular and/or pellet form. These include materials such as cement, sand, mortar, flour, rice, beans, wheat, grains and even hay, for example.

A common characteristic is that either the material, or wear particles from the material, can become airborne. Consequently, a problem with the interiors of containers used to store the dry particulate matter is that the air inside the container tends to be laden with matter. The particulate matter may become airborne in any step that involves moving quantities of the particulate matter, for example, when transporting the particulate matter from the bulk carrier, such as a truck or ship, to the silo. This airborne particulate matter may cause pollution if it escapes into the atmosphere.

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The problem is particularly exacerbated when the particulate matter is transported by air currents, in a process called pneumatic conveying. Pneumatic conveying is a particularly cost effective method of conveying dry bulk particulate matter. This process involves the movement of huge quantities of pressurised air through a duct system. The air current carries the particulate matter from the bulk carrier to the bulk storage container or area. However, when particulate matter is conveyed pneumatically, the air currents stir up the particulate matter, which creates a significant problem of particulate-laden air. This means that the exhaust air leaving the storage container will tend to be laden with particulate matter.

Therefore, containers and silos that are used for storing particulate matter often have filters outside the silo or container to trap or intercept the particulate matter that is borne in the exhaust air leaving the silo. An example of such an external filter is illustrated in Figure 1. A silo 10 is used to store bulk particulate matter or particulate-bearing matter. Particulate matter enters the silo 10 through an inlet opening 20, and then settles to the bottom of the silo although some of the particulate matter may remain airborne. The path of the settling particulate matter is shown in Figure 1 with dotted lines. However, the particulate matter forms a cloud of particulate-laden air. As exhaust air from the container leaves the silo through outlet opening 4, the particulate-laden exhaust air moves towards the outlet opening 4, and this is shown in Figure 1 by the solid arrows. The particulate-laden exhaust air leaves the container through an outlet pipe 40. In this prior art example, the end of the outlet pipe 40 is sealed by a porous filter bag 50. The filter bag entraps the particulate matter from the exhaust air leaving the extreme end of the outlet pipe. While the use of such external filters outside the silo solves the problem by minimising atmospheric pollution, the use of filters in this manner introduce a fresh set of problems.

The prior art external filter, as illustrated in Figure 1, consists of a bag which over time fills up with particulate matter. Consequently, the level of the contents of

the bag has to be monitored regularly so that the bag may be emptied once it is full. This constant need for inspection, and the time taken to replace the bag, is labour intensive and leads to inefficiency and added expense. Furthermore, the particulate matter caught in the filter is considered as waste matter which, over time, adds up to a considerable loss of the matter stored in the silo. And there is the problem of having each time to dispose of the waste particulate matter from the filter, which is labour intensive.

Another problem is that, as the filter gradually fills up with waste particulate matter, it becomes progressively more difficult for exhaust air to pass through the filter. In pneumatic conveying systems in particular, this leads to an increase in the power needed to move the air through the system, since the clogged filter acts as a resistance to the flow of air. This resistance to air flow results in a slower rate of air current passing through the overall system. It is also found that a clogging of the external filter results in an increase in air pressure within the silo which eventually reaches a pressure level sufficient to force the particulate matter through the filter, which escapes to pollute the atmosphere and thus negates the usefulness of the filter. This also tends to shorten the working life-span of the filter because the pores of the filter become larger as a result of particulate matter being forced through the holes. When the filter is being emptied or changed, usually the pneumatic process must be stopped, leading to extended downtime of the pneumatic transportation process, which leads to loss of efficiency. In the event that the filter bag bursts, the particulate matter becomes strewn around the outside of the silo. It is possible that the bursting of the external filter bag can act as a source of danger to a bystander.

Another problem with the external filter shown in Figure 1 is that the bag does not work well as a filter if it is wet, for instance when raining. In practice, when it rains, the overall process in the silo has to be stopped to ensure that the bag does not become wet or soaked. The operator can only connect the filter bag once the rain stops.

It is an object of the present invention to overcome or substantially ameliorate at least one of the problems mentioned in relation to the prior art, and it is not necessary for the present invention, in its broadest aspect, to address and/or overcome each and every one of the problems.

Summary of Invention

According to the present invention, there is provided a storage container adapted for storing particulate matter, the container including:

an inlet point through which the particulate matter enters the container; and

an outlet point through which exhaust air leaves the container;

wherein the container is provided with an airborne particulate filter positioned such that the particulate matter filtered by the airborne particulate filter is able to be contained in the container.

The airborne particulate filter may be positioned between the inlet point and the outlet point to filter particulate matter from the exhaust air leaving the container.

The filtered particulate matter coming from the airborne particulate filter may leave the filter under the influence of gravity. Another alternative is that the filtered particulate matter coming from the airborne particulate filter may leave the filter by being displaced by air turbulence. A further alternative is that a vibrating or sweeping mechanism may be used to substantially clear the airborne particulate filter.

Preferably, the airborne particulate filter may be generally positioned within the container.

Preferably, there is provided an inlet duct at the inlet point and an outlet duct at the outlet point, the airborne particulate filter being generally positioned between the ducts.

Alternatively, the airborne particulate filter may be generally positioned outside the container, the filter being connected to the container by a return duct through which particulate matter from the filter returns to the container in order to be contained therein.

The particulate matter may enter the container through the inlet point in an airborne state.

Preferably, the airborne particulate filter is positioned at a level above which the settled particulate matter in the container will not exceed.

A deflector may be positioned proximate the air inlet point to deflect the airborne particulate matter downwards.

The container may be provided with a reverse air current generating mechanism that generates a reverse air current which enters the container through the outlet point and leaves the container through the inlet point, the reverse air current serving to substantially dislodge particulate matter on the airborne particulate filter.

According to another aspect of the invention, there is provided a method of filtering particulate matter, including the steps of:

- filling a container with particulate matter through an inlet point,
- allowing exhaust air to exit the container through an outlet point, and
- filtering the particulate matter from the exhaust air and containing the filtered particulate matter from the airborne particulate filter in the container.

The particulate matter may be filtered from the exhaust air intermediate the inlet and outlet points.

The method may include the further step of generating a reverse air current which enters the container through the outlet point and leaves the container through the inlet point, the reverse air current serving to substantially dislodge particulate matter on the airborne particulate filter.

According to a further aspect of the invention, there is provided a storage container adapted for storing particulate matter, the container including:

- an inlet point through which the particulate matter enters the container; and
- an outlet point through which exhaust air leaves the container;

wherein the container is provided with an airborne particulate filter positioned between the inlet point and the outlet point to filter particulate matter from the exhaust air leaving the container.

According to yet another aspect of the invention, there is provided an airborne particulate filter adapted to be positioned in or proximate a storage container that is used for storing particulate matter, the filter being adapted to be positioned such that the particulate matter filtered by the airborne particulate filter is able to be contained in the container.

Preferably, the filter is adapted to be positioned between an inlet point and an outlet point to filter particulate matter from exhaust air leaving the container.

The invention may be used to address the problem of particulate-laden air that is created by particles created by wear and tear of materials which would otherwise be incapable of being airborne. For example, gravel is obviously too heavy to become airborne, but the transport and storage of gravel is often associated with a degree of particulate-laden air. Embodiments of the invention are

therefore suitable for minimising and/or eliminating the problem of particulate-laden air wherever particulate-laden exhaust or air is created in the course of storing matter that contains particulate matter. In the example of gravel, the particulate matter would be the dust that is found on the gravel material. Therefore, in this specification and the claims, the term "particulate matter" is understood to also include particulate-bearing, particulate-laden or particulate-containing matter. In such cases, the filtering process would be directed to filtering the particulate that is contained or borne on or associated with the matter.

Drawings

In order that the invention might be more fully understood, embodiments of the invention will be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is an illustration of a prior art storage container which uses an external filter member to intercept particulate matter from the exhaust air exiting the container;

Figure 2 shows a cross-sectional view of an embodiment of a storage container;

Figure 3 shows a cross-sectional view of another embodiment of a storage container having modifications in the filter and the inlet pipe;

Figure 4 shows examples of various embodiments of inlet ducts;

Figure 5 shows a cross-sectional view of further embodiment of a storage container having other modifications in the filter and the inlet pipe;

Figure 6 shows a cross-sectional view of yet another embodiment of a storage container having some modifications particularly in the filter which uses a ring filter;

Figure 7 is a perspective detailed view of the ring filter used in the embodiment of Figure 6;

Figure 8 shows a cross-sectional view of yet another embodiment of a storage container having other modifications in the filter;

Figure 9 is a perspective detailed view of the filter used in the embodiment of Figure 8;

Figure 10 shows various other examples of embodiments of reinforcing structures for the airborne particulate filter; and

Figure 11 shows a cross-sectional view of yet a further embodiment of a storage container in which the airborne particulate filter is positioned generally outside the container.

In the drawings of the various different embodiments, like parts are designated with like numerals throughout, wherever possible, only for the sake of ease of understanding the specification.

Embodiments

Referring to the drawings from Figure 2 onwards, Figure 2 is a cross-sectional view of an embodiment of a storage container in the form of silo 100. The silo 100 is adapted for storing particulate matter, which includes particulate-bearing matter, particulate-laden or particulate-containing matter, which may be in the form

of powder, granules and/or pellets. These include materials such as cement, sand, mortar, flour, rice, beans, wheat, grains and even hay, for example.

The silo 100 is provided with an inlet duct in the form of inlet pipe 200. The inlet pipe 200 has an inlet point 210 through which the particulate matter enters the silo. The silo 100 is also provided with an outlet duct in the form of outlet pipe 400 which has an outlet point 410 through which exhaust air leaves the silo. The silo has a discharge outlet 600 through which the particulate matter is designed to exit the container. The materials from which the silo 100 and pipes are made are not critical to the invention, and these items may be constructed from conventional building materials and according to any appropriate known methods.

An airborne particulate filter in the form of internal filter 500 is generally positioned between the ducts, and, in this embodiment, specifically between the inlet point 210 and the outlet point 410 to filter particulate matter from the exhaust air leaving the silo. This ensures that the particulate matter is intercepted before it leaves the silo. In this embodiment, the internal filter 500 is generally positioned within the container.

In use, the silo is filled as particulate matter enters through the inlet point 210. The particulate matter has a tendency to remain airborne for a period, and so forms a particulate-laden atmosphere within the interior of the silo 100. The incoming air causes air already in the silo to be displaced, which causes the internal air to leave the silo through the outlet point 410 as exhaust air. Since the air inside of the silo tends to be filled with particulate-laden air, the exhaust air entering the outlet point 410 tends to be laden with particulate matter. The particulate matter is filtered from the exhaust air by the internal filter 500, which is located intermediate the inlet and outlet points. In Figure 2, the particulate matter is filtered just before it leaves the silo chamber. In the present embodiment, the particulate matter that is filtered and intercepted by the filter 500 leaves the filter under the influence of

gravity and is contained in the container and may ultimately settle towards the bottom of the silo.

In the embodiment of Figure 2, the particulate matter enters the container through the inlet point in an airborne state since the process of pneumatic conveying systems is used in this embodiment to convey the particulate matter. However, it is appreciated that there may be just as much of a problem when the particulate matter is simply poured into the silo. Such pouring may also displace exhaust air and tend to cause particulate-laden air to leave the silo. Therefore, embodiments of the present invention may also be applicable in non-pneumatic conveying systems. Furthermore, the air currents and turbulence in the silo, caused by the air current entering the silo at the inlet point 210 further contributes to the action of displacing the filtered particulate matter from the filter surface. In this embodiment, the particulate matter filtered by the airborne particulate filter is displaced from the filter by air turbulence, although in other embodiments the particulate matter may simply fall off the filter. In other embodiments, the air currents or turbulence that displaces the particulate may be created by an appropriate air current generating mechanism positioned so as to direct the air current onto the filter.

In the embodiment, the internal filter 500 is constructed from a fine flat mesh which has apertures that are appropriately smaller than the size of the particulate matter to be filtered, so that the mesh can intercept and prevent the particulate matter from passing through the filter. The mesh is held in position by a reinforcement and mounting structure 510. The purpose of the reinforcing and mounting structure 510 is to provide structural stability to the fine mesh material, and numerous modifications may be proposed to achieve the same effect of providing the required structural stability.

An advantage of the embodiment is that the particulate matter filtered by the airborne particulate filter is able to be contained in the silo 100. The filtered particulate matter coming from the internal filter 500 leaves the filter surface and is contained in the silo. The particulate matter may ultimately settle to the bottom of the silo 100. Thus, there is less likelihood of particulate matter accumulating at the filter, because the particulate matter intercepted by the filter is generally able to drop from the filter and fall back down to the bottom of the silo. The particulate matter leaves the filter either by falling off under the influence of gravity, or is coerced to leave the filter by air turbulence or mechanical agitation. This minimises the problem of particulate matter accumulating and clogging the filter, although the filter may have to be periodically cleaned, but less often than if the particulate matter could not leave the filter. It requires substantially less time to monitor the level of particulate matter in the filter since the degree of clogging is much less than in a prior art external filter that cannot rid itself of entrapped particulate matter. The filter may not need to be emptied periodically, as in the case of an external filter which fills up periodically. There is thus less need for constant inspection, which results in efficiency and less labour costs. Furthermore, the particulate matter that is filtered and intercepted is not considered to be waste matter in the present embodiment, since the particulate matter is able to leave the filter and be contained in the silo. Over time, this avoidance of wasted particulate matter may add up to a considerable savings in the particulate matter stored in the silo. Also, there is no need to dispose of the waste particulate matter from the filter, which saves on labour. In the embodiment, since the filter 500 tends not to clog up with particulate matter to the same degree where the particulate matter cannot leave the filter, the filter tends not to act as an obstacle to the flow of exhaust air passing through the filter. In pneumatic conveying systems in particular, this leads to an increase in the efficiency of the power needed to move the air through the system, since the filter has less of a tendency to resist the flow of air, compared to a filter that periodically clogs. This results in a more even rate of air current passing through the overall system. Since there is less tendency for the filter to clog, there is also less tendency

for pressure to build up in the silo. Hence, the risk of particulate matter being forced through the filter by higher internal pressures is thus minimised, thus reducing the problem of external pollution. Filter working life-span may be increased, and because the filter need not be changed as frequently as one that clogs periodically, there is less down-time for the overall process.

In the embodiments, the airborne particulate filter is preferably positioned at a level above which the settled particulate matter in the silo will not exceed. This is to avoid the situation where the silo fills up to the level of the filter which would hinder the filter from filtering airborne particulate matter.

A number of the above advantages are due primarily due to the appropriate positioning of the airborne particulate filter with respect to the other components of the silo. Hence, in other embodiments, the various structural components of the silo - such as the shape of the silo, pipes and ducts - may be modified to perform substantially the same function, since it is the positioning of the airborne particulate filter that is important in the embodiment.

For instance, Figure 3 shows another embodiment which has modifications to the structure of the inlet point and the airborne particulate filter. In this embodiment, there is provided a plurality of inlet points 210 in the form of an array of holes located along the length of an extended inlet pipe 200. The added number of inlet points allows the incoming air stream to enter the silo 100 at a faster rate, thus increasing the rate of entry of particulate matter into the silo 100. The end of the inlet pipe 200 is provided with a pipe cap 220 which ensures that the stream of particulate-laden air from the air inlet pipe 200 is not directed straight upwards to the ceiling of the silo 100. The shape and configuration of the inlet pipe and inlet points may be modified, and two examples of further embodiments of inlet ducts in the form of inlet pipes 200A and 200B are shown in Figure 4.

The next few embodiments illustrated in Figures 5 to 11 show modifications in the configuration of the inlet pipes, outlet pipes and the filter. The modifications are possible, provided that in each embodiment, the airborne particulate filter is positioned such that the particulate matter that is filtered by the airborne particulate filter is able to be contained in the silo and may ultimately settle in the container.

In the embodiment in Figure 5, the silo is provided with a deflector in the form of deflector shield 230, which is positioned proximate the air flow path emanating from the air inlet point 210. The function of the deflector shield 230 is to deflect the airborne particulate matter downwards towards the bottom of the silo 100. The deflector shield 230 is held in position by support rods 240. In Figure 5, the path of the settling particulate matter is shown with dotted lines. As exhaust air from the container leaves the silo through the outlet opening 410, the particulate-laden exhaust air moves towards the outlet opening 410, and this is shown in Figure 5 by the solid arrows.

In the embodiment in Figure 6, the silo is provided with a truncated inlet pipe 200C, the end of which is also provided with a deflector shield 230 supported by rods 240. In this embodiment, the filter is mounted on an encircling ring 530. The outlet point 410 of outlet pipe 400 protrudes into the internal space defined by the ring 530. As seen in Figure 7, the ring 530 is constructed from a cylindrical wire frame 540 over which fine mesh 550 is attached. An advantage of such a ring shaped filter is that there is a greater surface area for filtering, as compared to a flat filter used in the embodiments of Figures 2, 3 and 5.

In order to further increase the surface area of the filter, the airborne particulate filter 500, shown in the further embodiment in Figure 8, is provided with filter parts shaped as upright cylinders 560. These upright cylinders are shown in further detail in Figure 9. The reinforced base of the particulate filter in the embodiment of Figures 8 and 9 is provided with a hole 570 through which the pipe

400 passes. The filter 500 may be supported by springs, hooks, rings or other support means. It is advantageous for the support means to allow the filter to be removed so that it may be cleaned occasionally or replaced when worn.

Alternatively, for maintenance purposes, the container may be provided with a reverse air current generating mechanism that generates a reverse air current which enters the container through the outlet point and leaves the container through the inlet point, the reverse air current serving to substantially dislodge particulate matter on the airborne particulate filter. In Figure 8, a reverse air current generating mechanism in the form of propeller 420 is provided at the end of the outlet tube 400. The reverse current of air may be directed through the outlet tube 400 to dislodge particulate matter from the filter. This reverse process may also be used also for maintenance in other embodiments of the invention. The propeller mechanism 420 may be detachable, as illustrated in Figure 8, in order that the reverse current generator need only be attached when maintenance of the filter is required.

Figure 10 shows various other examples of embodiments of reinforcing structure around which mesh can be attached to form different forms of the airborne particulate filter.

A further embodiment in Figure 11 differs from the previous embodiments in that the airborne particulate filter is generally positioned outside the silo 100. The external filter 520 is connected to the silo by a return duct in the form of passage 530. Particulate matter that is filtered by the external filter 520 is coerced to leave the filter by the air stream from outlet tube 400. The particulate matter thus is able to re-enter or return to the silo 100, so as to be contained in the silo, whereupon the particulate matter may settle ultimately to the bottom of the silo. This embodiment in Figure 11 is noteworthy because it demonstrates that the airborne particulate filter, in the invention in its broadest aspect, need not be positioned only inside the silo. In the embodiments, the airborne particulate filter need only be positioned so long as

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the particulate matter filtered by the airborne particulate filter is able ultimately to be contained in the container. When the airborne particulate filter is generally located outside the silo, as in the case of the embodiment in Figure 11, it is preferable to provide the filter with a form of cover 580 to protect the filter material from the rain, as shown in Figure 11.

In the embodiments, the filtered material from the airborne particulate filter either leaves the filter under the influence of gravity or under the influence of air currents and turbulence. Alternatively, the filter may be provided with a vibrating mechanism that is used to substantially clear the airborne particulate filter. This can be in the form of a motorised vibrating mechanism or other means of vibration. Alternatively, there can be some form of mechanism that physically sweeps the filtered particulate matter from the filter surface.

As an alternative to the use of atmospheric air in the silo and other embodiments of containers, other forms of gas, particularly one or more inert gases, may be used as a substitute for atmospheric air.

The embodiments have been advanced by way of example only, and modifications are possible within the spirit and scope of the invention as defined by the appended claims.

**CLAIMS:**

1. A storage container adapted for storing particulate matter, the container including:
 - an inlet point through which the particulate matter enters the container; and
 - an outlet point through which exhaust air leaves the container;
 - wherein the container is provided with an airborne particulate filter positioned such that the particulate matter filtered by the airborne particulate filter is able to be contained in the container.
2. A storage container according to claim 1 wherein the airborne particulate filter is positioned between the inlet point and the outlet point to filter particulate matter from the exhaust air leaving the container.
3. A storage container according to either claim 1 or 2 wherein the filtered particulate matter coming from the airborne particulate filter leaves the filter under the influence of gravity.
4. A storage container according to either claim 1 or 2 wherein the filtered particulate matter coming from the airborne particulate filter leaves the filter by being displaced by air turbulence.
5. A storage container according to any one of the preceding claims wherein the airborne particulate filter is generally positioned within the container.
6. A storage container according to any one of the preceding claims wherein there is provided an inlet duct at the inlet point and an outlet duct at the outlet point, the airborne particulate filter being generally positioned between the ducts.

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7. A storage container according to any one of claims 1, 2 or 3 wherein the airborne particulate filter is generally positioned outside the container, the filter being connected to the container by a return duct through which particulate matter from the filter returns to the container in order to be contained therein.
8. A storage container according to any one of the preceding claims wherein the particulate matter enters the container through the inlet point in an airborne state.
9. A storage container according to any one of the preceding claims wherein the airborne particulate filter is positioned at a level above which the settled particulate matter in the container will not exceed.
10. A storage container according to any one of the preceding claims wherein a deflector is positioned proximate the air inlet point to deflect the airborne particulate matter downwards.
11. A storage container according to any one of the preceding claims wherein a vibrating or sweeping mechanism is used to substantially clear the airborne particulate filter of particulate matter.
12. A storage container according to any one of the preceding claims wherein the container has a discharge outlet through which the particulate matter exits the container.
13. A storage container according to any one of the preceding claims wherein the container is provided with a reverse air current generating mechanism that generates a reverse air current which enters the container through the outlet point and leaves the container through the inlet point, the reverse air current serving to substantially dislodge particulate matter on the airborne particulate filter.

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14. A method of filtering particulate matter, including the steps of:
filling a container with particulate matter through an inlet point,
allowing exhaust air to exit the container through an outlet point, and
filtering the particulate matter from the exhaust air and containing the filtered
particulate matter from the airborne particulate filter within the container.
15. A method according to claim 14 wherein the particulate matter is filtered from
the exhaust air intermediate the inlet and outlet points.
16. A method according to claim 14 or 15 wherein an airborne particulate filter is
used for the filtering.
17. A method according to any one of claims 14 to 16 wherein the filtered
particulate matter coming from the airborne particulate filter leaves the filter under
the influence of gravity.
18. A method according to any one of claims 14 to 16 wherein the filtered
particulate matter coming from the airborne particulate filter leaves the filter by
being displaced by air turbulence.
19. A method according to any one of claims 14 to 18 wherein the airborne
particulate filter is generally positioned within the container.
20. A method according to any one of claims 14 to 19 wherein there is provided
an inlet duct at the inlet point and an outlet duct at the outlet point, the airborne
particulate filter being generally positioned between the ducts.
21. A method according to any one of claims 14 to 19 wherein the airborne
particulate filter is generally positioned outside the container, the filter being

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connected to the container by a return duct through which particulate matter from the filter returns to the container in order to be contained therein.

22. A method according to any one of claims 14 to 21 wherein the method include the further step of generating a reverse air current which enters the container through the outlet point and leaves the container through the inlet point, the reverse air current serving to substantially dislodge particulate matter on the airborne particulate filter.

23. A storage container adapted for storing particulate matter, the container including:

an inlet point through which the particulate matter enters the container; and
an outlet point through which exhaust air leaves the container;

wherein the container is provided with an airborne particulate filter positioned between the inlet point and the outlet point to filter particulate matter from the exhaust air leaving the container.

24. A storage container according to claim 23 wherein the airborne particulate filter is positioned such that the particulate matter filtered by the airborne particulate filter is able to be contained in the container.

25. An airborne particulate filter adapted to be positioned in or proximate a storage container that is used for storing particulate matter, the filter being adapted to be positioned such that the particulate matter filtered by the airborne particulate filter is able to be contained in the container.

26. An airborne particulate filter according to claim 25 wherein the filter is adapted to be positioned between an inlet point and an outlet point to filter particulate matter from exhaust air leaving the container.

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27. An airborne particulate filter according to either claim 25 or 26 wherein the filter is provided with raised portions that increase the overall surface area of the filter.

28. Use of an airborne particular filter to filter particulate matter from exhaust air leaving a container wherein the filter is arranged and positioned so that the particulate matter filtered by the airborne particulate filter is able to be contained in the container.

29. Use of an airborne particulate filter in a storage container adapted for storing particulate matter wherein the container is in accordance with any one of claims 1 to 13.

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