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APPARATUS FOR CONVEYING MATERIAL

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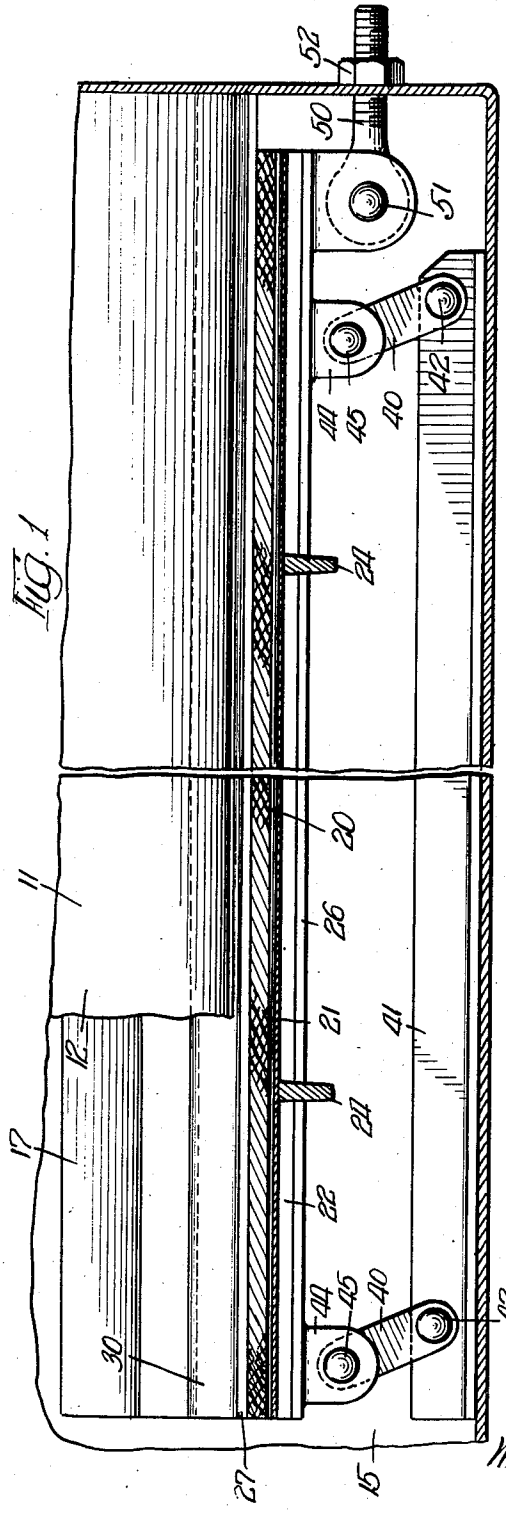


Fig. 1

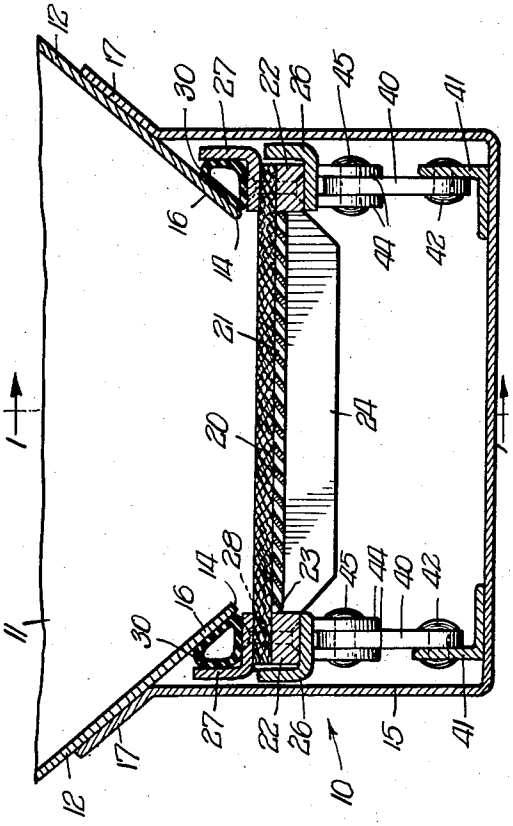


Fig. 2

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APPARATUS FOR CONVEYING MATERIAL

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9 Claims. (Cl. 302—29)

This invention relates to a self-unloading hopper for finely divided materials, and more particularly to a device for supporting and permitting easy removal and replacement of porous walls.

In the usual instance, the self-unloading apparatus conveys the pulverulent materials along the surface of a gas-permeable, rigid, porous medium through which air is introduced. The porous medium is mounted at a slope greater than the angle of repose of the pulverulent material when aerated. As the air is introduced into the material, it flows downwardly along the inclined surface of the porous medium and is discharged.

In the past, the apparatus has been constructed of a web of canvas and a metal channel air duct. The web of canvas has been clamped between the bottom edge of the bin and the metal channel air duct by bolts. One of the disadvantages of the previous construction is that it is difficult to remove the canvas porous medium when it is in need of repair or replacement. Another problem is the fact that in the past the aerator unit has reduced the structural strength of the bin.

It is an object of the present invention to provide a porous medium that can be removed from the apparatus as a unit independent of the bin and the air duct.

It is another object of the invention to provide a removable porous medium in an apparatus for conveying materials, which will have a seal between the bin and the edges of the porous medium.

It is a further object of the invention to provide a porous medium which is supported so that it can be removed from the apparatus in the form of a compact unit.

It is a still further object of the invention to provide the bin with an aerator in a construction in which the bin will be structurally strong.

It is yet another object of the invention to provide the porous medium in an aerator with a support so as to permit it to be walked upon.

Further objects and advantages of this invention will become evident as the description proceeds and from an examination of the accompanying drawing which illustrates one embodiment of the invention and in which similar numerals refer to similar parts throughout the several views.

In the drawing:

Figure 1 is a fragmentary view taken along lines 1—1 of Figure 2.

Figure 2 is a view in cross section of the apparatus embodying the invention.

Referring now to the drawing, the numeral **10** indicates generally the apparatus embodying the invention, in which a container or bin **11** having inclined walls **12** tapering downwardly to a bottom opening **14**, has an aerator located at the bottom opening for removing materials contained therein. The air duct for aerating the material in the bin is a channel or trough **15** located below and of a width greater than the bottom opening **14** of the bin. The air duct **15** engages the side walls **11** of the bin at a

point spaced from the bottom opening so that the side walls **12** have an overhanging lower extremity **16**.

The upper portions of the air duct are flared outwardly at **17** and fastened to the side wall by suitable means, such as welding, above the overhang **16**. By this construction the air duct contributes to the structural strength of the bin.

The material in the bin is supported at the bottom opening **14** on a porous medium **20**, such as a two- to eight-ply canvas belting. The porous medium **20** in turn is supported on a web **21** which is a foraminous sheet, preferably expanded metal. The web is connected between a pair of longitudinal side supports **22**, as by welding at **23**. Braces **24** maintain the web in expanded position and impart rigidity thereto.

The side supports **22** are adapted to be supported on a trackway formed by a pair of angle irons **26**. The angle irons open inwardly with the supports **22** riding on the lower faces.

The canvas belting is drawn taut and clamped along its edges between angle irons **27** and longitudinal supports **22** by any suitable means, such as rivets **28**. It will be seen that the porous medium is supported on a rigid frame unit which may be slidably removed or inserted in trackway **26** independently of air duct **15** or bin **11**.

The angle irons **27** open inwardly so that a resilient sealing member **30**, for example of rubber tubing, may be mounted between the angle iron and the lower portion of the side wall **11**. The sealing member **30** provides an airtight seal between the walls **12** of the bin and the edges of the porous medium, in order that the air passing through the air duct **15** must pass through the porous medium **20**.

A blower (not shown) supplies air under pressure to duct **15**. This low pressure air flows uniformly through the canvas **20** throughout its entire area and aerates the material contained in the bin to cause it to flow along the canvas when the latter is sufficiently inclined to effect discharge.

Trackways **26** are each supported by a plurality of links **40**. The links **40** are pivotally mounted on a pin **42** in brackets **41** on the bottom wall of the air duct and on pin **45** between a pair of ears **44** depending from trackways **26**. Links **40** are designed so that the trackways, when in uppermost position, firmly hold the sealing members in abutting association against the outer face of the overhangs **16**. By supporting the angle irons on the links, the frame member with the porous medium thereon may be raised and lowered to and from the bottom opening **14** of the bin. When it is raised the aerator may be operated since the sealing members form an effective seal. In lowered position the frame and porous medium thereon may be removed.

The device for raising and lowering the trackways **26** may be any suitable mechanism. As shown in Figure 1 in the drawing, a threaded eye bolt **50** is pivotally mounted to the trackway **26** on pin **51** and has a threaded extremity passing through the end wall of air duct **15**. A nut **52** is mounted on the threaded extremity of the bolt outside the end wall at an accessible location. As said bolt is loosened and tightened, the trackways are raised and lowered on links **40**.

From the foregoing, it should be apparent how the porous medium is removed so that it may be repaired. The frame on which the porous medium is mounted is supported by trackways **26** beneath the bottom opening **12** of the hopper in air duct **15**. A pair of sealing members **30** on angle irons **27** is held against walls **12** as the entire assembly is raised against the bin by tightening nut **52** threaded on bolt **50**.

In order to remove the porous medium so that it may

be repaired or replaced, bolt **52** is merely loosened, which allows the trackway **26** to be lowered on links **40**. The frame with the porous medium may then be slid outwardly through an access opening (not shown), the porous medium repaired, and the frame replaced.

In the drawing and specification, there has been set forth a preferred embodiment of the invention, and although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation. Changes in form and in the proportion of parts, as well as the substitution of equivalents are contemplated, as circumstances may suggest or render expedient, without departing from the spirit or scope of this invention as further defined in the following claims.

We claim:

1. In an apparatus adapted for conveying finely divided material comprising a container having a bottom opening, an air duct below said bottom opening mounted on said container, a gas-permeable porous medium having a surface along which the material is adapted to flow when aerated, a removable frame member for supporting said porous medium at said bottom opening, a base below said frame member, trackway means in said air duct for supporting said frame member, sealing members between the edges of said porous medium and said container adjacent bottom opening thereof, supporting links pivotally connected to said base member and to said trackway means, and means for holding said frame member on said trackway means adjacent said bottom opening of said container to maintain an airtight seal between said porous medium and said container.

2. In an apparatus adapted for conveying finely divided material comprising a container having a bottom opening, a gas-permeable porous medium having a surface along which the material is adapted to flow when aerated, a removable frame member for supporting said porous medium at said bottom opening, a base member below said frame member, trackway means for supporting said frame member, supporting links pivotally connected to said base and to said trackway means, sealing members between the edges of said frame member and said container adjacent the bottom opening thereof, and means for holding said frame member on said trackway means adjacent said bottom of said container to maintain an airtight seal between said container and said porous medium.

3. In an apparatus adapted for conveying finely divided material comprising a container having a bottom opening, a gas-permeable porous medium having a surface along which the material is adapted to flow when aerated, a removable frame member having a web with a plurality of apertures for supporting said porous medium at said bottom openings, sealing members between the edges of said porous medium and said container adjacent bottom opening thereof, a base member below said frame member, trackway means for supporting said frame member, supporting links pivotally connected to said base and to said trackway means, and means for holding said frame member adjacent said bottom opening of said container to maintain an airtight seal between said porous medium and said container.

4. In an apparatus for conveying finely divided material comprising a bin having inclined side walls with an open bottom, a trackway below said open bottom, a frame member adapted to be inserted in said trackway, a porous medium supported by said frame member, said frame member comprising a pair of side supports and a foraminous web, sealing members between the edges of said porous medium and said side walls adjacent the open bottom of said bin to form an airtight seal therebetween, and means for raising and lowering said trackway to make and break said airtight seal.

5. In an apparatus for conveying finely divided material comprising a bin having inclined side walls with an open bottom, a trackway below said open bottom, a frame member adapted to be inserted in said trackway, a porous medium supported by said frame member, said frame member comprising a pair of side supports and a foraminous web, a sealing member adapted to be held between the edges of said frame member and said side walls of said bin to form an airtight seal therebetween, and means for raising and lowering said trackway to make and break said airtight seal.

6. In an apparatus for conveying finely divided material comprising a bin having inclined side walls with an open bottom, a trackway below said open bottom, a frame member adapted to be inserted in said trackway, a porous medium supported by said frame member, said frame member comprising a pair of side supports and a web of a foraminous metal sheet, sealing members for forming an airtight seal between said side walls and the edges of said porous medium, and means for raising and lowering said trackway to make and break said airtight seal.

7. In an apparatus for conveying finely divided material comprising a bin having inclined side walls with an open bottom, a trackway below said open bottom, a frame member adapted to be inserted in said trackway, a porous medium supported by said frame member, said frame member comprising a pair of side supports and a foraminous web, sealing members between the edges of said frame member and said container adjacent bottom opening thereof, a plurality of links supporting said trackway, and means for raising and lowering said trackway on said links to maintain an airtight seal between said porous medium and said container.

8. In an apparatus for conveying finely divided material comprising a bin having inclined side walls with an open bottom, a trackway below said open bottom, a frame member adapted to be inserted in said trackway supporting a porous medium, a sealing member held between the edges of said frame member and said side walls of said bin for forming an airtight seal therebetween, and means for raising and lowering said trackway to make and break said airtight seal.

9. In an apparatus for conveying finely divided material comprising a bin having inclined side walls with an open bottom, a trackway below said open bottom, a frame member adapted to be inserted in said trackway supporting a porous medium, said frame member comprising a pair of side supports and a web of a foraminous metal sheet, a sealing member adapted to be held between the edges of said frame member and said side walls of said bin for forming an airtight seal between the edges of said porous medium and said bin, links supporting said trackway, and means for raising and lowering said trackway on said links to make and break said airtight seal.

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