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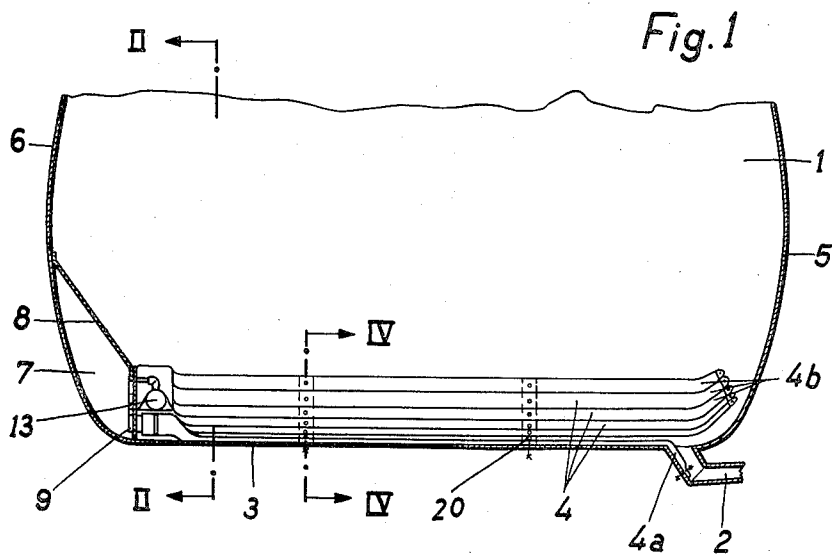
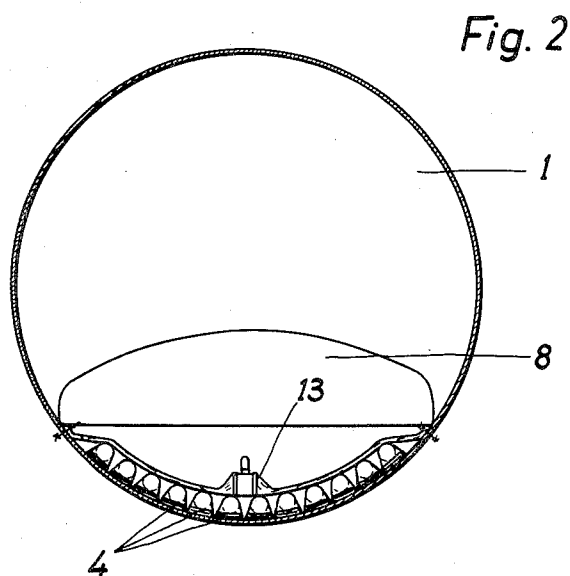
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3,024,072

EMPTYING MEANS FOR CONTAINERS OF POWDERED MATERIAL

Filed Nov. 23, 1959

2 Sheets-Sheet 1



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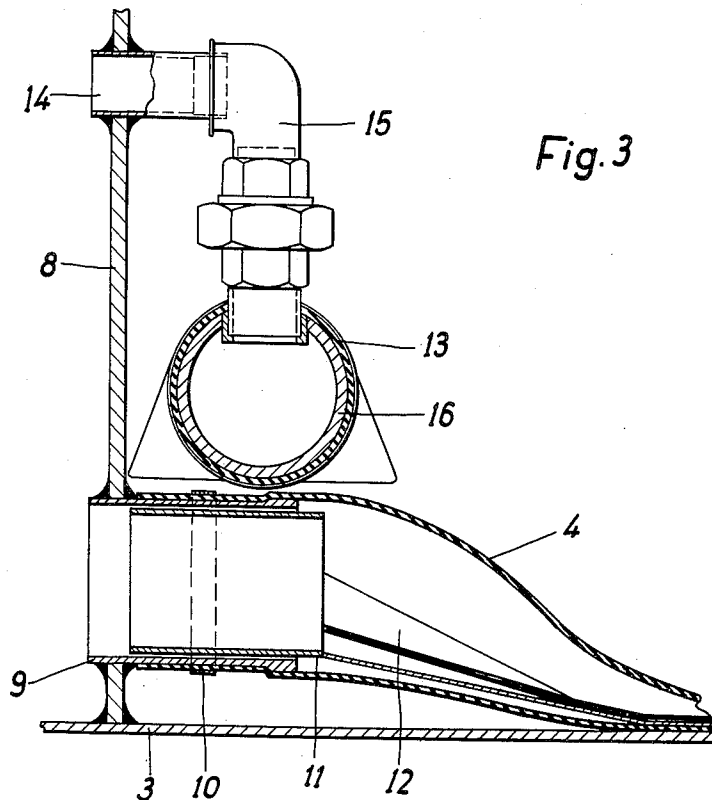
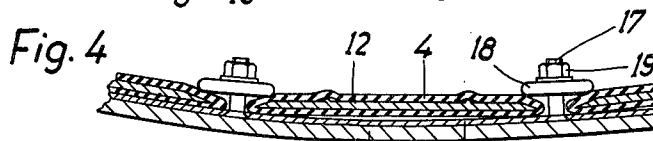
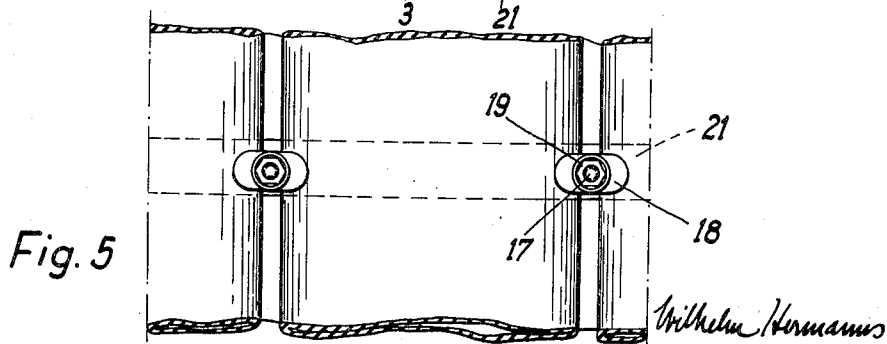
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EMPTYING MEANS FOR CONTAINERS OF POWDERED MATERIAL

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2 Sheets-Sheet 2



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EMPTYING MEANS FOR CONTAINERS OF POWDERED MATERIAL

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This invention relates to an emptying means for containers for powdered material, with aerating hoses which extend along the bottom of the container and through the porous walls of which compressed air is blown into the container.

For the discharge of material that has not been aerated it is necessary to tilt the container to an angle greater than the angle of repose of the particular powdered material, that is to say of the order of 40°, but with emptying devices operating with aerating hoses the supply of compressed air from the bottom of the container achieves the effect that the powdered material flows off even when the container bottom is inclined only a few degrees.

With such emptying devices, however, there are difficulties in emptying the end of the container remote from the outlet, because here there is generally a dead angle in which the powdered material lodges and cannot be covered, aerated and discharged by the current of air.

The object of the invention is to obviate this disadvantage. To this end, according to the invention, at the end of the container remote from the outlet a partition carrying the connections for the hoses forms a pressure distribution chamber, of which the part of the partition lying above the hoses has at least an inclination corresponding to the angle of repose of the material.

If the hoses are connected to the pressure distribution chamber by drawing the hose ends over sleeves carried by the partition, the aerating air first emerges from the hose walls at the end of these sleeves, so that despite the pressure distribution chamber partition inclined at least at the angle of repose a residue of material remains on the hose parts situated above the sleeves. For this case the invention proposes to dispose above the sleeves a hose which extends over all the sleeves and which likewise is connected to the pressure distribution chamber and is provided with an air-permeable wall. The hose ends which are impermeable to the air in consequence of being drawn over the connecting sleeves are thus covered by another hose, which is permeable to air, so that the part of the powdered material sliding off the inclined partition and passing into the vicinity of the connecting sleeves, which are impermeable to the air, is aerated by the compressed air emerging from the covering hose and is thus likewise prevented from clogging and is discharged along the porous part of the aerating hoses towards the outlet.

A particularly uniform discharge of air from the covering hose is achieved if the air is fed from the pressure distribution chamber to the covering hose in the middle. To this end, and in order to enable the covering hose to be brought closely against the partition, the invention further provides a tube bend, which is taken through the partition and which at its free end carries two tube connections directed in opposition to one another for the connection each of one half of the covering hose.

The perfect flowing off of the material further depends on the fact that the hoses extending along the container for the material should retain their parallel position to one another, in which they cover the container bottom as completely as possible. To this end, according to the invention, bolts are provided, which project between the hoses and are carried by the container bottom and on which are disposed clamping elements, which press on the

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edges of solid hose inlays of two adjacent hoses and thus fix the latter so that they cannot be displaced.

One exemplified embodiment of an emptying device according to the invention is illustrated in the drawing, in which:

FIG. 1 is a longitudinal vertical section through a container for material in dust form,

FIG. 2 is a section through the container for powdered material on the line II—II in FIG. 1,

FIG. 3 is a partial section through the hose connections on an enlarged scale,

FIG. 4 is a partial section on the line IV—IV in FIG. 1 on an enlarged scale, and

FIG. 5 is a plan view of the parts shown in FIG. 4.

In FIG. 1, the container 1 for powdered material is provided with an outlet 2 at one end. Along the bottom 3 of the container 1 extend aerating hoses 4 with porous walls, through which compressed air is blown into the powdered material, so that it flows off through the outlet 2 even when the container 1 is inclined by only a few degrees. The compressed air supply to the aerating hoses 4 is situated at the end of the container 1 remote from the outlet 2. From there the air flows through the hoses 4, which cover the bottom 3 of the container 1 and are secured in their mutual position thereon. The ends 4a of the middle hoses are drawn into the outlet 2, where they are fastened on the wall of the outlet branch. The hoses lying adjacent thereto are taken past the outlet 2 as far as the side wall 5, which closes the container 1 at the outlet end. There the hose ends 4b are fastened side by side in the lower part of the side wall 5.

On the side wall 6 of the container 1 remote from the outlet 2 a pressure distribution chamber 7 is partitioned off and the compressed air is supplied to it from outside. This pressure distribution chamber is formed by a partition 8, the upper part of which has an inclination corresponding to the angle of repose of the powdered material, so that the dust slides off over this part of the partition. It is sufficient for the inclined part of the partition 8 to terminate beneath the middle of the side wall 6 closing the container at this end to enable all the powdered material lodged at this side wall to slide off. With the curved side wall 6 of the exemplified embodiment, it is sufficient to provide the incline somewhat below the part of the side wall curved the farthest forward.

Above the container bottom sleeves 9 are welded into the partition 8, and are shown on an enlarged scale in FIG. 3. The ends of the aerating hoses 4 are slid over the sleeves 9 and are fastened with clips 10. Tubular parts 11 are inserted internally into the sleeves 9 and to them are welded solid hose inlays 12, which extend over the entire length of the aerating hoses 4 and hold the hoses flat while the upper side of the hose inlays is provided preferably with ribs which extend along said upper side and by means of which air ducts are formed, even when the hoses are loaded by the powdered material.

The ends of the aerating hoses 4 pushed over the air-impermeable fastening sleeves 9 are covered by a hose 13, which is likewise connected to the pressure distribution chamber 7 and which extends transversely over all the sleeves. The compressed air emerging from this cover hose 13, the wall of which, like that of the aerating hoses 4, is porous, mixes with the powdered material sliding off the inclined part of the partition, and prevents the material from clogging over the fastening sleeves 9 on the hose ends.

The connection of the cover hose 13 to the partition 8 is shown on an enlarged scale in FIG. 3. Above the sleeves 9 a threaded tubular connection 14 is welded into the partition 8, and on it is screwed a tube bend 15, which at its free end carries a tubular part 16 parallel to the partition 8. On each side of the tube bend 15 on each

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of the ends of the tubular part 16 is fastened a half of the cover hose 13, which extends over the points of connection of the aerating hoses 4 on the respective side.

The powdered material supplied by way of the partition part 8 and the cover hose 13 to the hoses 4 flows to the container outlet 2 under the influence of the aerating air emerging from the hoses 4, good flow depending substantially on the parallel position of the hoses 4 to one another, the said hoses covering the container bottom. To secure the relative positions of the hoses 4, bolts 17 are provided on the container bottom 3 and project between each two hoses 4. Each of said bolts 17 carries an elongated clamping element 18, which is adapted to be pressed against the hoses 4 by means of a nut 19. The width of the clamping elements 18 is so selected that when the clamping elements are tightened they press on edges of the hose inlays 12, so that simultaneously with the fixing of the hoses 4 the inlays 12 passing therethrough are also clamped fast.

It is advantageous for the aerating hoses 4 to be bedded on underlay strips 21 at the points where the rows 20 (FIGURE 1) of bolts 17 are situated. If a somewhat resilient material is used to make the underlay strips 21, the stressing of the hose walls at the clamping points can be reduced to a minimum.

I claim:

1. In combination with a container for powdered material having an end outlet, a transverse partition at the opposite end having a slope exceeding the angle of repose of the material, said partition forming a compressed air distribution chamber within the container, means for delivering air under pressure to the chamber, and a series of longitudinal parallel air-permeable hose pipes independently connected to the said chamber and extending over the entire bottom of the container.

2. In combination with a container for powdered material having an end outlet, a transverse partition at the opposite end having a slope exceeding the angle of repose of the material, said partition forming a compressed air distribution chamber within the container, means for delivering air under pressure to the chamber, a transverse series of sleeves in the partition, a series of longitudinal air-permeable hose pipes independently connected to the sleeves and a transverse air-permeable hose pipe overlying

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ing the sleeves and connected with the distribution chamber.

3. In combination with a container for powdered material having an end outlet, a transverse partition at the opposite end having a slope exceeding the angle of repose of the material, said partition forming a compressed air distribution chamber within the container, means for delivering air under pressure to the chamber, a transverse series of sleeves in the partition, a series of longitudinal air-permeable hose pipes independently connected to the sleeves, an independent discharge pipe from the distribution chamber, a branched outlet therefrom and a transverse air-permeable hose pipe connected to each branch of the outlet over the longitudinal hose pipes.

4. In combination with a container for powdered material having an end outlet, a transverse partition at the opposite end having a slope exceeding the angle of repose of the material, said partition forming a compressed air distribution chamber within the container, means for delivering air under pressure to the chamber, a series of longitudinally air-permeable hose pipes independently connected to the said chamber and pipe holding means on the container bottom interposed between adjacent pairs of pipes.

5. In combination with a container for powdered material having an end outlet, a transverse partition at the opposite end, said partition forming a compressed air distribution chamber within the container, means for delivering air under pressure to the chamber, a transverse series of collars in the partition, an inner hose inlay projecting from each collar and extending for the full length of the bottom of the container, an air-permeable hose pipe surrounding each inner hose inlay and clamping means overlying each hose and the edge of the contained inlay.

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