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[54] CONTAINER FOR HOLDING FINE MATERIAL

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[51] **Int. Cl.** **B65g 3/12**, B65g 69/06

[58] **Field of Search** 222/195, 193; 302/25, 53

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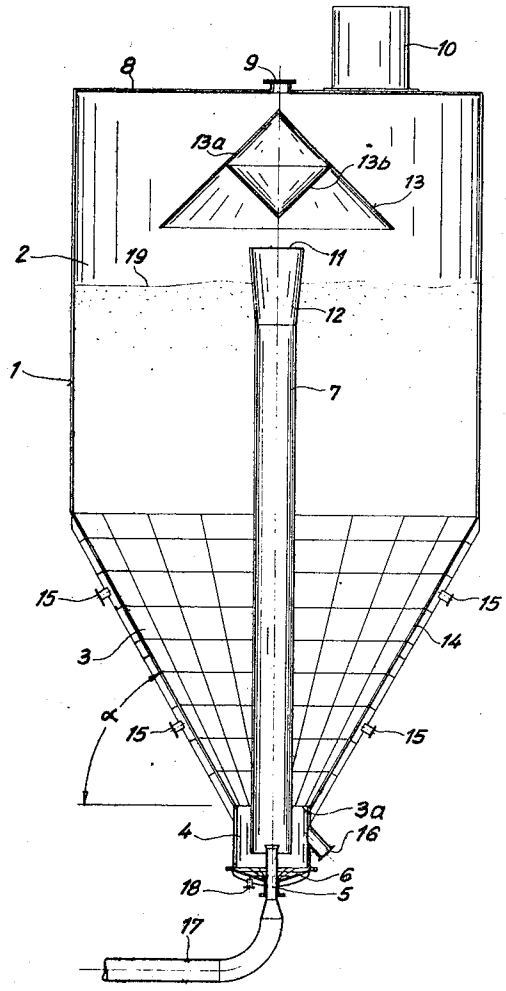
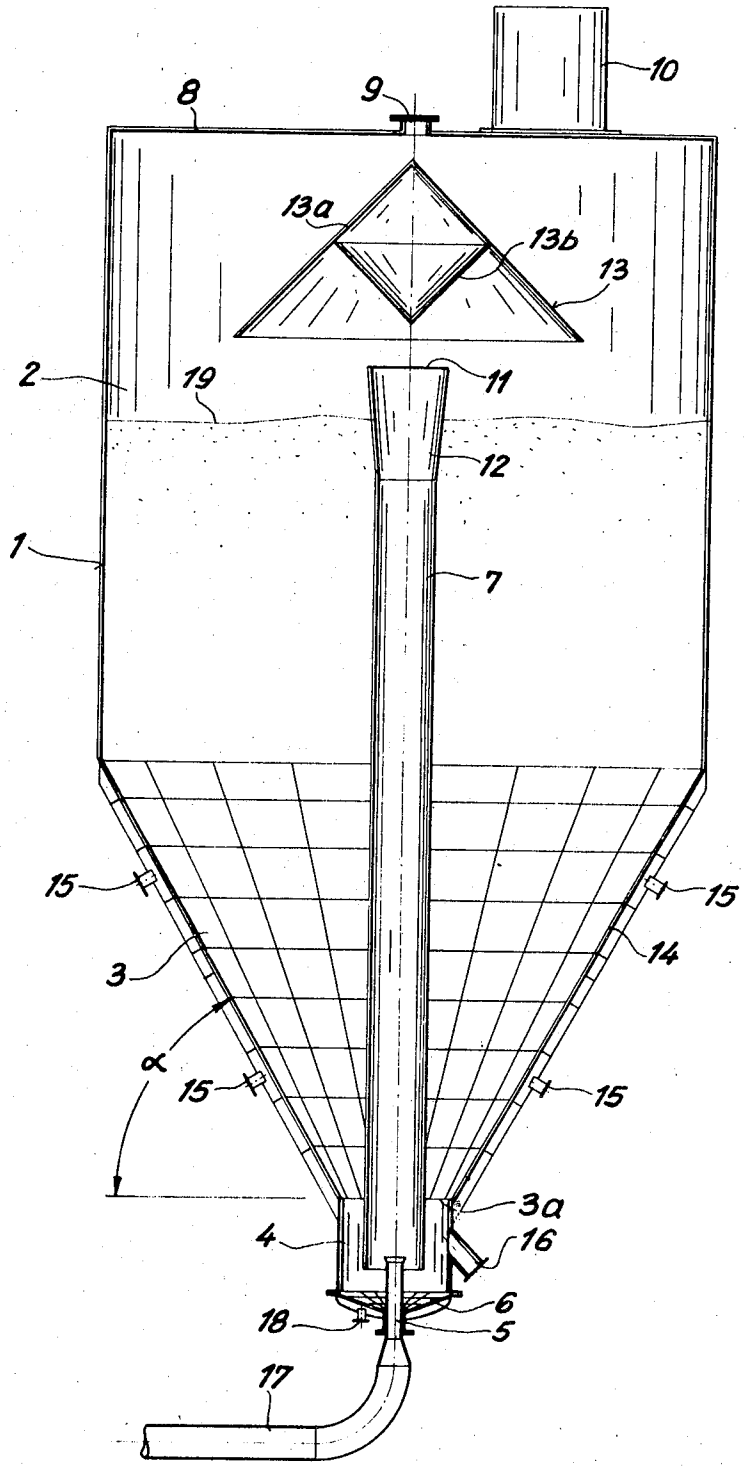
[57] **ABSTRACT**

The container has a lower portion in the form of a hopper with an aerated porous wall. A pot extends centrally below the hopper, forms a continuation of the hopper and has a porous aerated base and a lateral material outlet. A central vertical standpipe in the container is provided with a nozzle for discharging compressed air into the lower end of the standpipe.

6 Claims, 1 Drawing Figure

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CONTAINER FOR HOLDING FINE MATERIAL

BACKGROUND OF THE INVENTION

This invention relates to a container for holding fine granular material, having in its lower part a hopper with an aerated porous wall, and a similarly aerated porous central base, and also provided with a centrally disposed standpipe with its lower aperture lying above the central base, with a compressed air nozzle passing through the base, and openings for feeding material into and out of the container.

A container for mixing fine material is known which comprises a cylindrical portion, a lower hopper portion and a standpipe passing upwardly through the container from the hopper. At the upper and lower edges of the container are annular pipes with inwardly directed slot nozzles. A centrifugal dust separator is disposed on the container above the inlet aperture. The annular pipes are connected directly or through the separator to a blower. Mixing is effected by blowing compressed air through the lower annular pipe, which constantly forces part of the fine material through the standpipe, so causing circulation and mixing. A disadvantage of this container is the relatively great height due to the superimposed separator. A further disadvantage is that the simple hopper construction only enables readily flowing material to be mixed. Less readily flowable material rapidly leads to the formation of bridges, which cannot be fully prevented by installing vibrators.

A container for the mixing of ground and pulverulent material is also known, containing several standpipes passing in very varied arrangements and directions from the base area of the container (or possibly its hopper) through to the top part of the container. Compressed air is fed from below into the container either through individual nozzles or through a porous air-permeable base. The material fed into the top of the container is mixed in similar manner to that in the previously described container, and is then fed into the container base area. The chief disadvantage of this mixing container is the complicated and costly structure due to the plurality of standpipes.

A container for holding fine-grained material is also known, having in its lower portion a hopper with an aerated porous wall and a similarly aerated porous central base, also having a centrally disposed standpipe with its lower aperture lying above the central base, with a compressed air nozzle passing through the base and openings for feeding material into and out of the container. This container is a feed container whose standpipe passes as a feed conduit through the container cover, and whose porous central base is directly adjacent the lower edge of the hopper. The mouth cross section of the downwardly widening standpipe is approximately that of the central base, above which the lower end of the standpipe is disposed at some distance. If this feed container had to be converted into a mixing container, an outlet for material would have to be provided in the lower hopper portion. But this would involve difficulties due to the relative position of the lower part of the standpipe and the central base, and to the shape of the lower part of the hopper. Since part of the column of material would constantly press onto the hopper outlet, and no loosening of the material would occur there, undesirable agglomerations of material would occur in that area of the hopper.

SUMMARY OF THE INVENTION

The object of the invention is thus to provide a container of the type described which eliminates the defects found in known constructions, and permits effective homogenization even of material difficult to fluidize.

According to the invention, this object is achieved in that in the container, whose standpipe ends in a known manner in the upper part of the container, there is provided between the lower edge of the hopper and the central base a pot whose narrowest cross section may lie in the area of the lower edge of the hopper, and whose sidewall contains the material outlet.

Thus hardly any amount of material loads the material outlet in the container provided by the invention. Instead the entire surface on which the material rests (i.e., the hopper and the central base) can be aerated. In this way the whole column of material is fluidized and moves uniformly down into the pot. The fluidized material is uniformly conveyed to the top part of the container by the effect of the compressed air nozzle in the standpipe, and effective homogenization is achieved by this uninterrupted circulation. The finally mixed material runs smoothly out of the container through the material outlet in the sidewall of the pot, unaffected by the column of material and without tending to form bridges in the hopper.

BRIEF DESCRIPTION OF THE DRAWING

The drawing is a diagrammatic sectional view of a container embodying the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The container **1** shown in the drawing is used to hold fine-grained material which is to be homogenized. It includes a cylindrical part **2**, a conical hopper **3**, a cylindrical pot **4**, a porous central base **6** with a compressed air nozzle **5** passing through it, and a standpipe **7**. A central material inlet pipe **9** and an outlet air filter **10** are fitted on the container cover **8**. An externally conical guide member **13** is centrally disposed in the area beneath the container cover, above the mouth **11** of the conically upwardly expanding upper section **12** of the standpipe.

The wall **14** of the hopper **3** is porous and air-permeable and has several compressed air inlets **15**. The lower edge **3***a* of hopper **3** terminates in the cylindrically shaped pot **4**, whose sidewall has a downwardly directed material outlet pipe **16**. The pot **4** is bounded below by the porous central base **6**, which has the shape of a flat hopper and is provided with a compressed air inlet pipe **18**. The compressed air nozzle **5**, connected to a compressed air conduit **17**, projects into the lower end of standpipe **7** located inside pot **4**.

The homogenizing container provided by the invention operates as follows:

The fine-grained material entering centrally through material inlet pipe **9** falls onto the top of cone **13***a* of guide member **13**, and is uniformly distributed inside container **1**. After the container is filled, compressed air is blown through conduit **17** and compressed air nozzle **5** into standpipe **7**. The column of material is loosened and fluidized by the aeration of hopper **3** from wall **14** and by the introduction of air through the central porous base **6**. The material fed into pot **4** is entrained by the airstream issuing from the nozzle **5** and is conveyed through standpipe **7** into the upper part of the container, where it emerges from the mouth **11** of the standpipe located above the material surface **19**, and is again distributed uniformly into the container by part **13***b* of guide member **13**. The material constantly slips downwards at the rate at which it enters the standpipe from pot **4**. The intensive aeration and the inclination (angle α) of the sidewall of the hopper **3** to the horizontal also contribute to the effective downward movement of material. The angle α is between 35° and 70°, preferably in the narrow range between 45° and 60°.

The continuous circulation of the loosened material within the container leads to a very intimate homogenization of the material, which is then smoothly removed through material outlet **16**. In principle it is also possible for introduction of material into the container, homogenization, and extraction of material from the container to be carried out continuously. In this case, after the initial contents of the container have been homogenized, material is continuously fed in at the rate at which it is extracted through outlet **16**.

Further constructions in accordance with the invention are possible apart from the embodiment shown in the drawing.

Thus, for example, it may be desirable for many purposes if the pot **4** below the hopper has a frustoconical shape which broadens downwardly. The central base **6** need not have the

shape of a flat hopper, but could be made flat, in a plane normal to the container axis.

In many applications of the container of the present invention, it is also advantageous if means for testing the filling level are provided in the container walls.

What is claimed is:

1. A container for homogenizing finely divided material, having a material inlet in its upper portion, a porous frustoconical inner wall in its lower portion, and a vertical standpipe in its central portion, wherein the improvement comprises a cylindrical wall the upper end of which joins the porous frustoconical inner wall of the container at a level above the lower end of the standpipe, and the lower end of which is provided with a porous base, a material outlet formed in the cylindrical wall at a level above the lower end of the standpipe, a nozzle extending into the lower end of the standpipe, apparatus for conducting compressed air beneath the porous base and behind the porous frustoconical inner wall to fluidize the finely divided material, and a connection for supplying compressed air to the nozzle to cause the fluidized material to flow upward in the standpipe and downward past the outlet.

2. A container according to claim 1 wherein a guide element is provided over the upper end of the standpipe.

3. A container according to claim 2 wherein the top of the guide element is shaped to produce uniform distribution of the material, and the material inlet is located above the guide element.

4. A container according to claim 1 wherein the inclination of the frustoconical wall to the horizontal is between 35° and 70°.

5. A container according to claim 1 wherein the porous base is flattened and is substantially normal to the container axis.

6. A container according to claim 5 wherein the porous base has the shape of a flattened hopper.

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