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PNEUMATIC BLENDER  
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FIG. 1.

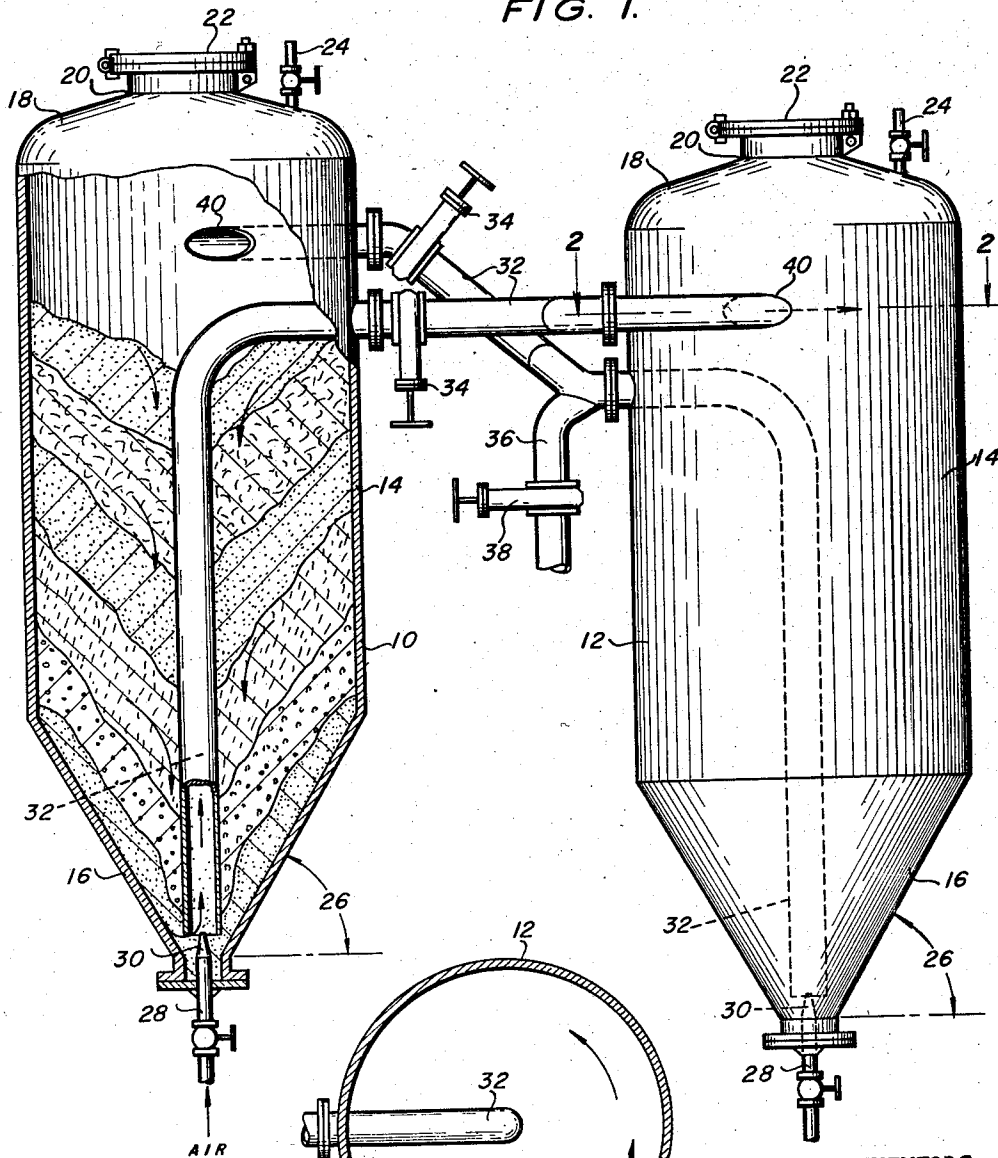


FIG. 2.

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**PNEUMATIC BLENDER**

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1 Claim. (Cl. 259—4)

This invention relates to an apparatus employed in the pneumatic blending of pulverulent materials of different characteristics and densities in order to effect a complete and homogeneous mixture of such pulverulent materials.

In many operations and more especially in oil well servicing, complete, uniform, and homogeneous mixtures of pulverulent materials are required to meet very close and exacting tolerances, so that the resulting mixtures will have the desired characteristics for the particular operation.

Therefore, it is an object of this invention to provide an improved apparatus for use in the pneumatic blending of pulverulent materials, which is simple in construction, and which in operation is efficient in obtaining homogeneous mixtures that meet the requirements of any particular employment of such materials.

Other objects and advantages of the invention will become apparent from the following description, when taken in connection with the accompanying drawing, in which—

Figure 1 is a sectional view in elevation of the apparatus for intimately mixing dry pulverulent material and embodying the present invention.

Figure 2 is a sectional view taken on line 2—2 of Figure 1.

As shown, the essential elements of the invention are two containers 10 and 12 with inverted cone shaped lower sections 16. Said containers 10 and 12 are suitably connected by conduit means so that the aerated pulverulent materials may readily flow from one container to the other. Means is also provided for introduction of air under pressure into the system.

Although the invention is adapted for use in connection with various forms of receptacles or containers, it is herein illustrated in connection with containers 10 and 12 which are identical in construction and operation. These containers 10 and 12 are illustrated, Figure 1, as having a cylindrical upper section 14 and an inverted cone shaped lower section 16. The cylindrical upper section 14 has a dome like top 18, provided with a filling opening 20 and a closure 22. Each container is vented through a suitable valved connection 24. In accordance with the invention the construction of each inverted cone 16 is such that its exterior angle 26 in relation to the angle of repose of the materials to be blended, insures that the materials will satisfactorily fall toward its apex. At the apex of inverted cone 16 a suitable air inlet 28 is provided. Said air inlet 28 is so constructed as to provide a jet 30 to introduce air into the system. Mounted in each of the containers 10 and 12 and suitably placed in relation to jet 30 is a conduit 32 having a vertical and horizontal portion which serves as a passageway for air and material. Air discharging from the jet 30 sucks the pulverulent material downwardly through the cone 16 and forces it to flow upwardly through the conduit 32. Each conduit 32 is preferably of tubular construction, is mounted concentric with the axis of its

container, extends outwardly thereof, and enters the wall of the other container at a tangent to such wall. Each conduit 32 is provided with a suitable valve 34 for opening and closing. As illustrated, it is only necessary to provide one discharge means 36 in one of the conduits 32. Discharge means 36 is provided with a suitable valve 38. However, discharge means may be added to each container without departing from the spirit of the invention.

The operation of the invention shown in Figures 1 and 2 is illustrated as follows:

Let it be assumed that container 10 is charged with the pulverulent materials to be blended, such as cement, gel, retarder, and pozzuolana. The material is supplied through opening 20 of container 10. Closure 22 of container 10 is sealed, vent 24 is closed, and both valves 34 are closed in order that container 10 may be under pressure before transferring the materials to container 12. Vent 24 of container 12 is open, so that said container 12 is open to atmospheric pressure, when receiving the materials from container 10.

During the entire blending operation, discharge valve 38 is closed. Air under pressure is now introduced into the system by means of air inlet 28 and jet 30 of container 10. When sufficient pressure is built up in container 10, valve 34 of container 10 is opened. The jetting action of the air draws the pulverulent materials into conduit 32 and discharges them into container 12 at point 40 at a tangent to the wall of cylinder 14. It is known that when pulverulent materials are discharged out of the bottom of a container, the remaining materials assume the shape of an inverted cone, thereby permitting the materials from the interior walls of this cone to fall toward the apex. Thus, even though the materials to be mixed are supplied to the container 10 in layers, as illustrated, they intermingle with this initial falling down into the bottom of the cone 16. The partial blend which results from this fall of the materials toward the apex of the cone is then subjected to the turbulent motion of the air and material in conduit 32, and the swirling motion of the air and material in striking the wall of container 12 at a tangent, thus resulting in a homogeneous blend. In container 12 the pulverulent materials settle out and the air exhausts through vent 24. After container 10 is emptied, the process may be reversed and the materials returned to container 10 in the same manner. Then, if necessary, the materials are again returned to container 12. The blended material may then be discharged through discharge means 36 and valve 38 for use.

Ordinarily, in field practice, it has been found that three transfers of the materials are sufficient to give a homogeneous blend that meets the requirements for certain operations. However, it may be noted that in some instances only one transfer will be sufficient, and in others more than three transfers may be required to obtain the homogeneous blend desired.

The invention should not be considered limited to the two containers described. It can be seen that several containers may be connected in series to obtain the same results of homogeneous blending as the various transfer steps employed in the invention as described.

Having described fully the structure and operation of the invention, it will be understood that various changes may be made without departing from the spirit of the invention or the scope of the annexed claim.

We claim:

Apparatus for blending pulverulent materials of different densities, comprising in combination, a first container and a second container, means for supplying said pulverulent materials of different densities to said first

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 container, each of said containers having a conical shaped bottom, a vertically disposed conduit secured in and associated with each container for transferring said materials from the vicinity of the bottom of that container to the other container, each of said vertically disposed conduits being disposed substantially near the apex of the associated conical bottom, horizontal transfer means connected to each of said conduits and entering said containers tangentially, jetting means secured in and associated with the conical bottom of each of said containers for introducing air into said bottoms and conduits, each of said jetting means being disposed at the apex of the associated conical bottom and immediately below each of said vertical conduits, the arrangement being such that during blending, the pulverulent materials in each container are violently forced upward through the vertical conduit thereof with considerable turbulence, so

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 that the remaining materials in the container tumble toward the apex of the conical bottom thereof and are partially mixed, and so that the materials being blown through the conduit enter the other container tangentially, the materials being intimately mixed as they fall to the bottom of said other container.

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