STORAGE APPARATUSES FOR GRANULAR OR PULVERULENT MATERIAL

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This invention relates to an improved storage apparatus for granular or pulverulent material, which is hereinafter referred to as "particulate material." In many branches of industry several grades of particulate material are kept stored separately in containers from which each grade is periodically withdrawn and into which new material is filled at intervals. Where the supply and withdrawal of the material was carried out with gas under pressure it has hitherto proved most economical and advantageous to use entirely separate containers for the different grades of material that will be readily separable from many practical points of view to be able to keep the different grades of material stored entirely separated from each other in individual cells in a single container. It has not been possible hitherto to fulfill this desideratum in an economically advantageous manner as for the requisite containers because the use of gas under pressure for transporting the material to and away from the container and the requirement of making it possible to fill and empty one container cell at a time would necessitate so many small storage cells that would be too expensive. The container illustrated in FIG. 1, which is divided into four radial sections, is provided with a single outlet valve through which the whole of the material can be withdrawn. FIG. 2 shows the sectional view of the apparatus illustrated in FIG. 1. The storage apparatus illustrated in the drawings is especially intended for the storage of four different grades of flour in a bakery. The storage apparatus comprises a closed container 1 in the form of a vertical upright cylinder having semi-spherical end walls. The internal space of the container is divided by four radially disposed walls into four adjacent cells which extend from one end to the other of the container. Each cell at the top has an inlet 3 which is connected to a tube 4 extending downwardly along the container 1 and having at the bottom a shut-off valve 5 and hose coupling means 6 for the connection of a fill hose (not shown). Each cell also at the bottom has an outlet 7 to which is connected a tube 8 having a shut-off valve 9 to which is coupled a transport tube (not shown) for carrying away the flour by means of compressed air blown into the last mentioned tube in the customary manner. For the discharge of a uniform stream of flour through cells and further there is provided close to the outlet an air cushion device which comprises a compressed air pipe 12 having a shut-off valve 10 and a hose coupling means 11, said pipe 12 opening into a chamber close to the outlet 7, which chamber is separated from the remaining container 1 by a perforated metal sheet 13. A filter cloth (not shown) which allows air but not flour to pass there-through, is expanded over the perforated metal sheet 13. The four cells for the four different grades of flour which must not be mixed in the container, are interconnected at the top by four gas passageways which pass through the otherwise tight walls 2 and in the embodiment shown consist of perforated pipes 14 which penetrate into the cells on either side of the respective wall 2. These perforated pipes 14 are fixed by welding in holes in the respective wall 2 and are surrounded in each cell by a filter cloth sleeve 15 which surrounds the respective pipe and which for greater clarity is but partially indicated by schematic cross hatching in the drawings. The filter cloth sleeves constitute gas permeable filter means which, however, are impermeable to the flour so that air but not flour can pass from one cell to every other cell through the gas passageways 14. For the filling of flour into one of the cells, for example from a transport vehicle, the unloading hose of the vehicle is connected to the fill pipe 4 by the intermediary of the hose coupling means 6, and the valve 5 of the pipe 4 is opened. Also the valves 5 of the fill pipe 4 associated with the three other cells are opened so that these three cells will be in communication with the atmosphere through their tubes 4. The flour is transported in a known manner from the vehicle to the connected cell by means of a stream of compressed air and the transportation air entering the cell through the inlet 3 thereof escapes to the atmosphere by flowing through the filter cloths 15 and the perforated pipes 14 from the cell being filled to the three other cells and furthermore through the inlets 3 and fill pipes 4 of these three cells, which pipes as pointed out above are in free communication with the surroundings. Consequently, there is formed practically no pressure above atmospheric in the container during the filling thereof, and in any case no appreciable pressure difference arises between the four cells in the container. The filter cloth sleeves 15 prevent flour from passing over from one cell to another and there is thus no risk whatever that the different flour grades will mix.

When flour is to be withdrawn from one of the cells, the valves 5 of all inlet pipes 4 are closed. Of the outlet valves 9 of the cells, which, of course, are normally closed, the valve of that cell is opened from which flour
is to be taken. The compressed air valve 10 associated with the cell in question is also opened to admit compressed air from a source of such air connected to the hose coupling 11, into the cell through the air cushion device at the bottom of the cell. This will place the entire container under an inner excess pressure because the compressed air from the air cushion device spreads from the cell in question to the three other cells through the perforated pipes 14 and the filter cloth sleeves 15 thereof, while flour is discharged from the cell in question in a known manner through the outlet 7. Due to the compressed air spreading to all cells in the container no differential stressing of the container arises, and the filter cloths 15 on the perforated pipes 14 prevent flour from one cell from being carried by the compressed air to any of the other cells.

What I claim and desire to secure by Letters Patent is:

1. A storage apparatus for particulate material, comprising a closed container, partition means in said container subdividing the interior of said container into a plurality of cells, closable inlet means for each cell at the top of said container for introducing particulate material in a stream of gas under pressure selectively into each cell, closable outlet means for each cell at the bottom of said container for discharging the material by means of gas under pressure selectively from each cell, gas passageway means on said partition means interconnecting said cells adjacent their upper ends, and filter means associated with said gas passageway means and being permeable to gas but impermeable to the particulate material.

2. A storage apparatus according to claim 1, said gas passageways means comprises perforated pipe means, mounted on said partition means, said pipe means penetrating said partition means and projecting into the cells on opposite sides of said partition means for forming said gas passageway means, and filter cloth sleeve means surrounding said pipe means for forming said filter means.

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