

PATENT SPECIFICATION

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(54) IMPROVEMENTS RELATING TO BULK
 MATERIAL CONTAINERS

(71) We, FRANK NATTRASS, of "Fallows End," Brearton, Nr. Harrogate, in the County of York, and PETER JOHNSON NATTRASS, of "Tresco," Chain Lane, Knaresborough, in the County of York, both British Subjects, do hereby declare the invention, for which we pray that a Patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to containers for bulk material, particularly comminuted material.

The use of large bags for transporting bulk quantities of powdered or granular material is known, and it is known to use bags of a disposable form. Such bags are loaded through an open mouth, and to empty the bags they are suspended over a receiving area and the bottom of the bag is cut away to allow the material to fall out. The bag is then discarded.

According to the present invention a container for bulk material comprises a bag having sides and a base, said base having a substantially centrally located discharge hole of substantially invariable size; and a separate, removable, continuous sheet of material laid over the hole in the base of the bag, the area of the sheet in contact with the material of the bag being such that when the bag is filled with material, the pressure of the material cannot push the sheet through the discharge hole.

When such a bag is filled the pressure of the material on the floor of the bag surrounding the hole maintains sufficient tension in the sheet to prevent it being pushed out of the hole. To empty the bag the sheet is cut in the region exposed by the hole so that the material falls from the bag. After emptying, the cut sheet is removed and a new sheet is placed in the bottom of the bag before re-use.

Obviously the relative sizes of the hole and the sheet will depend on the bag size and the weight, and to some extent, the type of material being carried. As a general guide it

is thought that at least 50% of the area of the sheet must be in contact with the material of the bag, and preferably the area of the hole is about 20% of the area of the sheet, so that 80% of the sheet area lies in contact with the bag material.

Apart from the relative areas of the sheet that are in contact with the bag and overlying the hole, a further factor that will affect retention of the sheet in the bag is the coefficient of friction between the sheet and the bag material. Obviously a very slippery material for the sheet would not be suitable and as a general guide it is thought preferable that the coefficient of friction should not be below 0.05.

The material of the sheet must itself have sufficient strength to support the weight of at least part of the material directly above the hole. A number of different materials are suitable for the sheet and amongst these there may be mentioned continuous sheets or woven fabrics of polyethylene, polyethylene terephthalate (such as "Terylene," Registered Trade Mark) and polypropylene, and canvas. The preferred material is polyethylene sheeting having a thickness of at least 0.0075 inch and preferably a thickness of 0.01 inch.

In order that the invention may be better understood a specific embodiment of a bag made in accordance therewith will now be described in more detail with reference to the accompanying drawings, in which:—

Figure 1 is a schematic perspective view of such a bag; and

Figure 2 is a cross-section through the base of the bag.

The bag is formed with a body 1 having a substantially square base, the preferred fabric for the body and base being polypropylene of 2000 denier woven at 15×15 per sq. inch, i.e. with 15 warp tapes and 15 weft tapes to the inch. Towards the top of the body the fabric is gathered in and four lifting loops 2 to 5 are secured to the fabric as described and claimed in our co-pending application No. 15798/73 (Serial No. 1431581. The material used for the loops is

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preferably woven "Terylene" webbing as used for vehicle seat belts. A cover 6 is stitched to the fabric around the mouth of the upper end thereof and the cover has a drawstring 7 surrounding a central opening

The base of the bag has a hole 8 cut therein and the cut edges of the hole are hemmed (not shown) to prevent tearing of the bag material. A sheet 9 of 1000 gauge polyethylene (having a thickness of 0.01 inch) is laid over the base of the bag to cover the hole. The sheet is cut to overlie substantially the whole of the base of the bag and the size of the sheet and the hole are such that 20% of the total area of the sheet overlies the hole 8. The coefficient of friction between the polyethylene sheet and the woven polypropylene material of the bag is about 0.07.

The bag is filled through the opening in the cover 6 and after filling, the drawstring 7 is closed to tighten the cover. The bag can be lifted by engaging the lifting loops 2 to 5. When suspended in this way it is found that the pressure of the material on the floor of the bag surrounding the hole maintains sufficient tension in the sheet 9 to prevent the sheet from being pushed out of the hole. The material is retained in the bag just as safely as if the base material of the bag were continuous and the bag can be handled in exactly the same ways as a bag with a continuous base. The thickness of the polyethylene sheet is sufficient to withstand puncture due to abrasion and other forces during normal handling. To empty the bag a hole is cut in the polyethylene sheet in the region of the hole 8 whereupon the material may flow through the sheet and the hole out of the bag. After emptying, the cut sheet is removed from the bag and a new sheet placed in the base of the bag so that the bag may be refilled and used once again.

The materials described above are perfectly suitable for use in a bag for one tonne of powdered material. Such a bag would have a base approximately 35 inches square and a height of approximately 50 inches. The hole 8 in the base of the bag would have an area of approximately 78 sq. in. and would preferably be in the form of a circle of 10 inch diameter, although holes of square, rectangular or other shape could be used. Obviously the invention may also be used in bags of different capacities.

If required an inner liner of impervious

material, e.g. sheet polyethylene having a thickness of about 0.0035 inch, can be used within the bag to prevent powder migrating through the woven fabric of the bag.

WHAT WE CLAIM IS:—

1. A container for bulk material comprising a bag having sides and a base, said base having a substantially centrally located discharge hole of substantially invariable size; and a separate, removable, continuous sheet of material laid over the hole in the base of the bag, the area of the sheet in contact with the material of the bag and the coefficient of friction between the sheet material and the material of the bag being such that when the bag is filled with material, the pressure of the material cannot push the sheet through the discharge hole.

2. A container according to claim 1 in which at least 50% of the area of the sheet is in contact with the material of the bag.

3. A container according to claim 2 in which about 80% of the area of the sheet is in contact with the material of the bag.

4. A container according to any one of the preceding claims in which the coefficient of friction between the sheet material and the material of the bag is not less than 0.05.

5. A container according to any one of the preceding claims in which the sheet is of polyethylene having a thickness of at least 0.0075 inch.

6. A container according to claim 5 in which the thickness of the sheet is 0.01 inch.

7. A container according to any one of the preceding claims in which the material of the bag is 15×15 per sq. inch woven polypropylene of 2000 denier.

8. A container according to any one of the preceding claims in which the edges of the hole are hemmed.

9. A container for bulk material as claimed in claim 1, substantially as herein described and as shown in the accompanying drawing.

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10 over the base of the bag to cover the hole. The sheet is cut to overlie substantially the whole of the base of the bag and the size of the sheet and the hole are such that 20% of the total area of the sheet overlies the hole 8.

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