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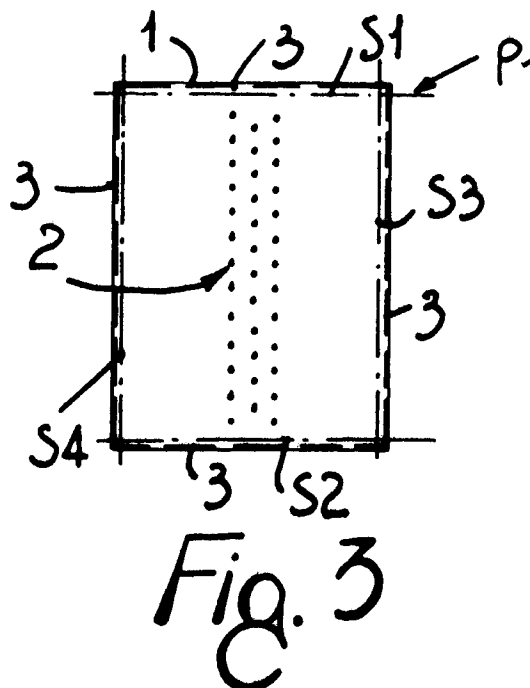
(71) Applicant: **B.L. MACCHINE AUTOMATICHE S.p.A.**
Via Larga Castello 15
I-40061 Minerbio (Bologna)(IT)

(72) Inventor: **Zamboni, Pier Francesco**
75, Via D'Azeglio
I-40123 Bologna(IT)

(74) Representative: **Porsia, Dino, Dr. et al**
c/o Succ. Ing. Fischetti & Weber Via Caffaro
3/2
I-16124 Genova(IT)

(54) **Bag made of thermoplastic material capable of permitting the outflow of air.**

(57) At least one of the walls (S1-S2) of the bag consists of at least one ordinary sheet (1) of thermoplastic material, for example polyethylene, provided in a predetermined region with small holes (2) closed by at least one filtering sheet (3) which is permeable by air but not by the product contained in the bag, and which is made of any suitable material weldable to the aforesaid sheet and is preferably located on the inner face of the said sheet and is welded to it on two or more its sides.



The invention relates to a bag made of thermo-plastic material, for example polyethylene, which if necessary may easily be produced on a bag-filling machine by making small modifications to the latter, and which is capable of permitting the outflow of air incorporated in the product contained in the bag. This necessity is particularly present in the packaging of products in the form of very fine powder, which tend to incorporate air. The stacking of bags containing such products mixed with air is extremely difficult.

According to the invention, at least one wall of the bag is formed by at least one outer sheet of polyethylene or other suitable weldable plastic material, provided with small holes in a region which is covered, on the face towards the interior of the bag, with a filtering sheet which is compatible with polyethylene and weldable, characterised by high permeability by air, by high mechanical strength, and by high resistance to water, corrosive chemical products, moulds and rot. An example of a material with such characteristics is that marketed by Du Pont de Nemours E.I. and Company under the trade mark "Tyvek".

The sheet of Tyvek may have the same dimensions as the polyethylene sheet or may have different, smaller, dimensions, and may be fixed to the said sheet partly by one or more of the bag-defining and -sealing welds on the perimeter, and partly by its own welds. In order to improve the mechanical characteristics adversely affected by the welds used to fix the Tyvek sheet to the polyethylene sheet, it is possible to use another polyethylene sheet, also provided with small holes in the same region as the polyethylene sheet to which is fixed the Tyvek sheet, which may be in contact with the product contained in the bag or may be interposed between the two polyethylene sheets. If the Tyvek sheet is located between the two polyethylene sheets and is fixed to these on at least two opposite sides by the bag-defining and -sealing welds on the perimeters, further specific fixing welds for the said Tyvek sheet may be dispensed with, since the pressure of the product contained in the bag will ensure a close contact of the said sheet with the polyethylene sheets and permit the sealing of the air removal holes of these sheets to prevent any leakage of the product.

Further characteristics of the invention and the advantages derived therefrom will appear from the following description of some preferred embodiments, illustrated non-restrictively and purely by way of example in the figures on the single attached sheet of drawings, in which

- Figures 1 and 2 are schematic illustrations of a vertical section through the bag; and
- Figures 3, 4, 5, 6, 7, and 8 are front views of one of the walls of the bag improved accord-

ing to the invention.

With reference initially to Figures 1, 3, 4, 5, 6, 7, and 8, it will be seen that at least one of the principal walls P1-P2 of the bag, made in any way with a sheet of weldable material, normally polyethylene, with or without bellows, comprises a polyethylene sheet 1 provided with small holes 2 covered by a filtering sheet 3 located preferably on the inner face of the said sheet 1 and made of Tyvek or equivalent material. The filtering sheet 3 acts as a filter to seal the holes 2 provided in sheet 1. Sheet 1 imparts to the wall of the bag the necessary mechanical strength, which is difficult to obtain with sheet 3 alone which, being located inside the bag, is protected and may be of limited thickness, to improve the compatibility with the sheet 1 at the welding stage.

The wall P2 of the bag consists of a single sheet of polyethylene, for example with the same structural characteristics as those of the aforesaid sheet 1.

Since the sheet 3 is rather expensive, there will be a tendency to use it in the smallest possible quantity. If the bag is of small dimensions, the sheet 3 may have the same extension as the sheet 1 and will be fixed to it as in Figure 3, with the bag-defining and -sealing welds S1-S2-S3-S4 on the perimeter. In bags of large dimensions, the sheet 3 may be of dimensions smaller than those of the sheet 1, as illustrated in the examples in Figures 4, 5 and 6. In Figure 4, sheet 3 contacts sheet 1 over the whole of its length but only over a part of its width, and is fixed to this sheet by the transverse bag-defining and -sealing welds S1-S2 and preferably also with its own longitudinal welds S5-S6 of the spot or, preferably, continuous type. The position of the sheet 3 may be displaced with respect to the centre axis of the bag, as illustrated in the example in Figure 5 which has one of the longitudinal welds S5 replaced by one of the perimeter welds S4 of the bag. This variant enables one weld to be dispensed with and also has the advantage of locating the air-permeable region on one side of the bag, in a region where the bag is normally unobstructed when stacked with other bags, so that the flow of air from the interior of the bag is facilitated.

In order to provide the same advantages, it is possible to use the variant in Figure 6, in which the sheet 3 has a width equal to that of sheet 1 but has a smaller length, and may be located next to any or both of the edges of the said sheet, in such a way as to be fixed on three sides by the bag-defining and -sealing welds. The fourth side of the sheet 3 will be fixed with its own weld S7.

According to the variant in Figure 7, the sheet 3 has dimensions smaller than the length and width of sheet 1 and may be located at any point of the

perimeter of the latter sheet, for example in a corner region, in such a way as to be fixed to the latter sheet with one or more of the bag-defining and -sealing welds on the perimeter and with its own welds S8-S9. Conversely, the variant in Figure 8 has the Tyvek sheet 3 with the same dimensions as in the solution in Figure 7, but located at an intermediate point of the sheet 1 to which it is fixed with its own welds S8-S9-S10-S11.

In order to improve the mechanical strength of the composite wall P1, adversely affected by the welds fixing sheet 3 to sheet 1, this composite wall P1 may be formed by two polyethylene sheets 1-101 both provided with holes 2 in the same region sealed by the filter sheet 3, which last may be disposed in any way and fixed to either of the said sheets 1-101. If the sheet 3 is located between the sheets 1-101 as illustrated in Figure 2, in the solutions in Figures 4, 5, 6 and 7 it is possible to avoid the making of the welds S5-S6-S7-S8-S9, with consequent simplification of the production of the bag, since the pressure of the material contained in the bag will keep the sandwich formed by parts 1-3-101 in the region of the holes 2 compact, avoiding the formation of labyrinthine passages for the material contained in the bag and leaks of this material, even without the presence of the said welds S5-S6-S7-S8-S9.

The outflow of air from the bag according to the invention may take place in a natural way by the effect of the pressure to which the bag is subjected when stacked with other bags, or may be caused by the temporary placing of the bag or of the portion of the bag provided with the holes 2, immediately after leaving the bag-filling machine, in an air removal device.

It is to be understood that the description refers to certain preferred embodiments of the invention, to which numerous variations and modifications, particularly as regard construction, may be made, in all cases without departing from the guiding principle of the invention as described above, as illustrated, and as claimed below.

Claims

1. Bag made of thermoplastic material, capable of permitting the outflow of air incorporated in the product contained in the bag, characterised in that at least one of the walls (P1-P2) of the bag consists of at least one ordinary sheet (1) of thermoplastic material, for example polyethylene, provided in a predetermined region with small holes (2) closed by at least one filtering sheet (3) which is permeable by air but not by the product contained in the bag, and which is made of any suitable material weldable to the aforesaid sheet and is preferably located on

the inner face of the said sheet and is welded to it on two or more of its sides, the said filter sheet being made, for example, from a material of the type known commercially under the trade mark "Tyvek", made by Du Pont de Nemours E.I. and Company, or from equivalent material.

2. Bag according to Claim 1, in which the sheet (3) of Tyvek or equivalent material has the same dimensions as the polyethylene sheet (1) and is fixed to it by the bag-defining and -sealing welds (S1-S2-S3-S4) on the perimeter.

3. Bag according to Claim 1, in which the filtering sheet (3) has only its width or its length smaller than that of the polyethylene sheet (1) and is fixed to the latter sheet partly by the bag-defining and -sealing welds (S1-S2-S3-S4) on the perimeter and partly by its own welds (S5-S6-S7).

4. Bag according to Claim 3, in which the filtering sheet (3) has a width and length respectively smaller than and equal to those of the polyethylene sheet (1) and is located in an intermediate part of the latter sheet or next to at least one of the longitudinal sides of the latter sheet.

5. Bag according to Claim 3, in which the filtering sheet (3) has a width and length respectively equal to and smaller than those of the polyethylene sheet (1) and is located in an intermediate part of the latter sheet or next to at least one of the transverse sides of the latter sheet.

6. Bag according to Claim 1, in which the filtering sheet (3) has a length and width different from the corresponding dimensions of the polyethylene sheet (1), is located in any region of the perimeter of the latter sheet and is fixed to it partly by one or two of the bag-defining and -sealing welds (S1-S2-S3-S4) on the perimeter, and partly by its own welds (S8-S9).

7. Bag according to Claim 1, in which the filtering sheet (3) has a length and width different from the corresponding dimensions of the polyethylene sheet (1), and is located in the intermediate part of the latter sheet, to which it is fixed by its own welds (S8-S9-S10-S11).

8. Bag according to any one or more of the preceding claims, characterised in that in order to improve the mechanical strength of the polyethylene sheet (1), adversely affected by the welds (S5-S6-S7-S8-S9-S10-S11) fixing the filtering to it, it is provided that the composite

wall (P1) of the bag is formed by two superimposed polyethylene sheets (1-101), both provided with small holes (2) in the same region, and formed by the filtering sheet (3) which may be in contact with the product contained in the bag or may be located between the two polyethylene sheets. 5

9. Bag according to any one or more of the preceding claims 1 to 6, characterised in that, 10
the filtering sheet (3) is located between two polyethylene sheet (1-101) in such a way as to seal the small holes (2) with which the latter sheets are provided, the said filtering sheet being fixed to the latter sheets solely by one or 15
more of the bag-defining and -sealing welds (S1-S2-S3-S4) on the perimeter and not by its own welds, this being done to simplify the manufacture of the bag, since the pressure of the product contained in the bag will ensure 20
the close contact of the polyethylene sheets with the filtering sheet and prevent the formation of labyrinthine passages for the leakage of the product contained in the bag.

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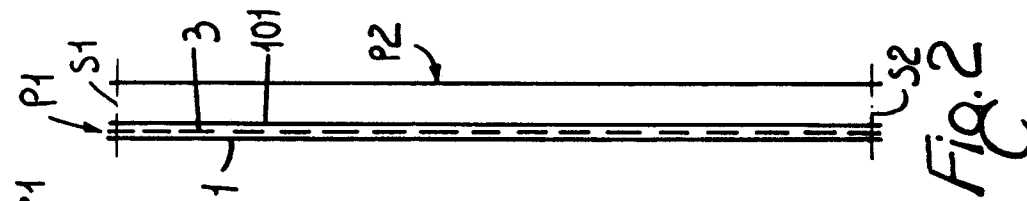


Fig. 1

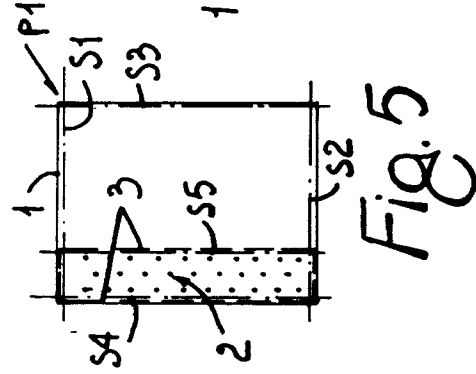


Fig. 2

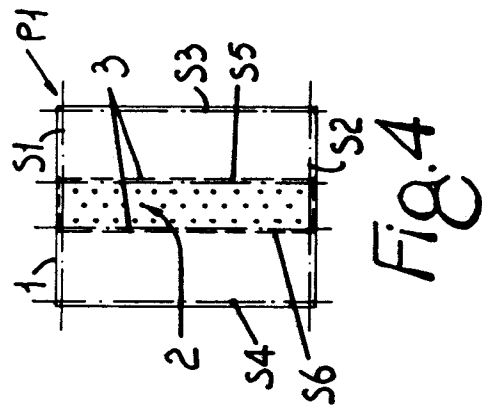


Fig. 3

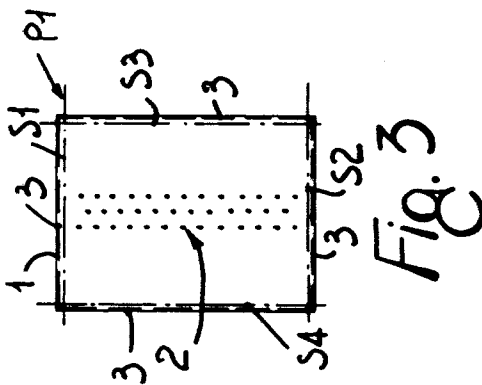


Fig. 4

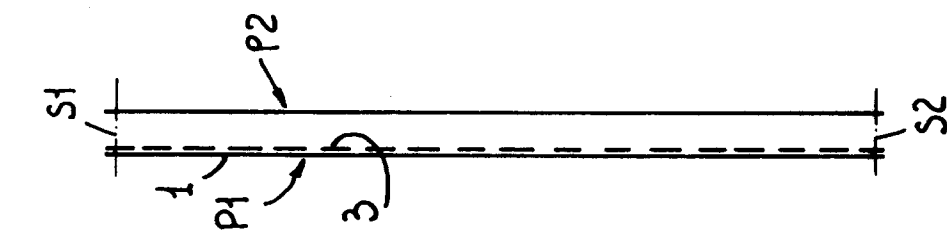


Fig. 5

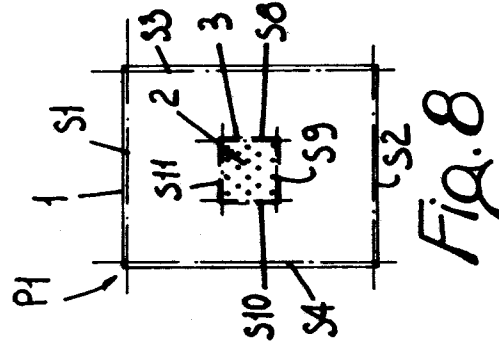


Fig. 6

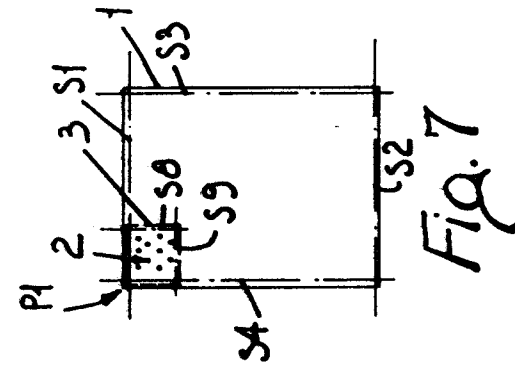


Fig. 7

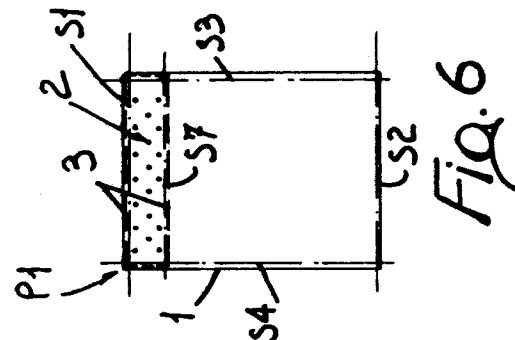


Fig. 8



European Patent
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EUROPEAN SEARCH REPORT

Application Number

EP 92 11 2068

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	EP-A-0 136 859 (C-I-L INC.) * the whole document * ---	1	B65D33/01
A	US-A-4 310 118 (KISIDA ET AL) * abstract; figures 1,2 * ---	1	
A	GB-A-1 169 280 (BRITISH VISQUEEN LIMITED) * the whole document * ---	1	
A	DE-A-1 908 440 (HERZBERGER PAPIERFABRIK LUDWIG OSTHUSHENRICH KG) * the whole document * -----	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B65D
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 07 OCTOBER 1992	Examiner SMITH C.
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