

April 15, 1952

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2,593,328

PERFORATED MULTIPLE PLY BAG

Filed July 13, 1948

2 SHEETS—SHEET 1

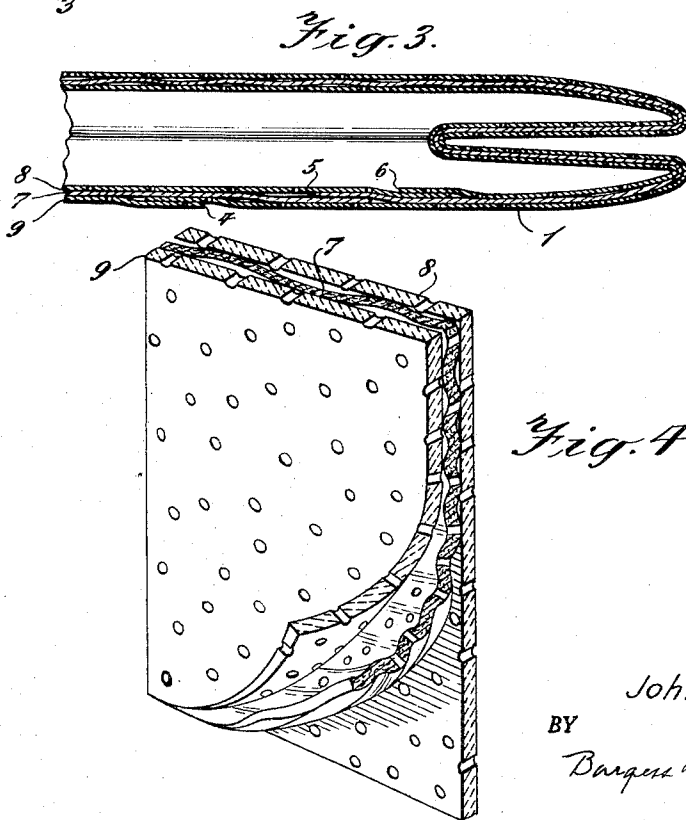
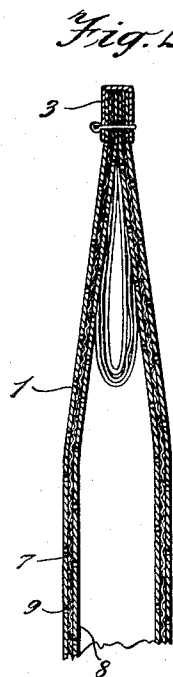
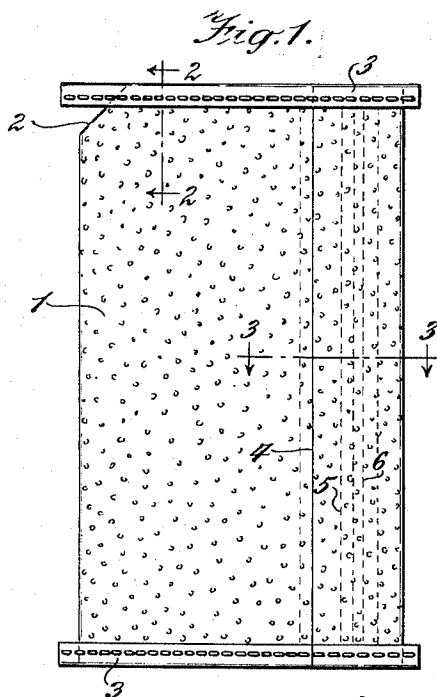


Fig. 4.

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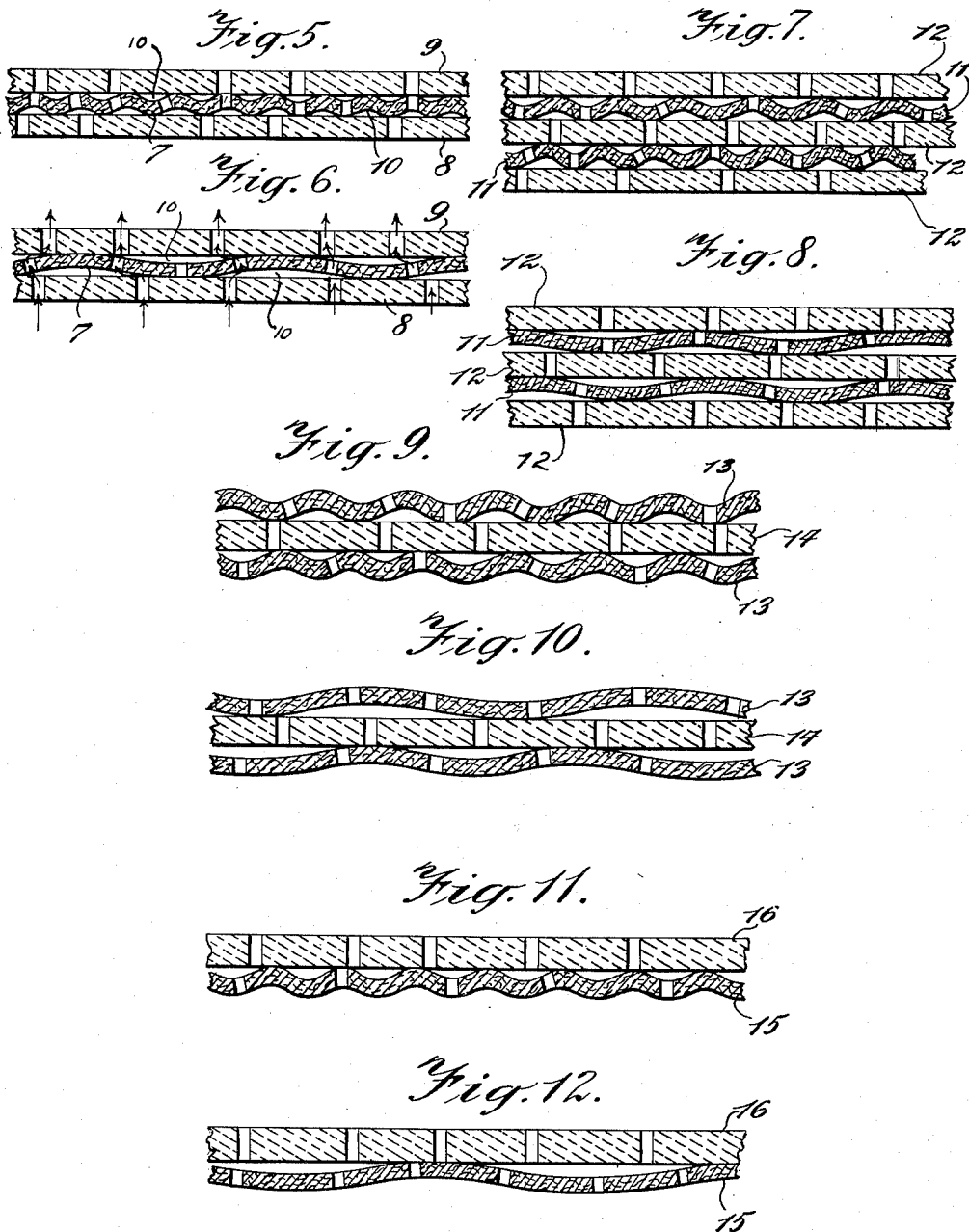
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2 SHEETS—SHEET 2



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PERFORATED MULTIPLE PLY BAG

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4 Claims. (Cl. 229—55)

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The present invention relates to improvements in perforated, multiple ply bags and relates more particularly to a bag made of multiple plies of paper or like thin, flexible, substantially air impervious sheet material that have been electrically perforated to permit entrapped air to escape therethrough as the bag is being filled.

It will be understood that the term "paper" as used herein refers to material of the character indicated as distinguished from woven materials. An object of the present invention is to provide for the more rapid escape of air through the plies that have been electrically perforated and form the body of a bag such as shown in my United States Patent No. 2,340,546, dated February 1, 1944. By increasing the rate at which entrapped air may pass through the body of a bag as the bag is being filled, the speed at which the bag is filled may be increased and thus, the production of the filling machines may be correspondingly increased.

Other objects and advantages of my invention will be apparent and best understood from the following description and the accompanying drawings in which:

Fig. 1 is a side view of a valved type of multiple ply bag embodying my invention;

Figs. 2 and 3 are section views on an enlarged scale taken along the lines 2—2 and 3—3 of Fig. 1;

Fig. 4 is a perspective view on a greatly enlarged scale of a portion of the bag shown in Fig. 1 and illustrating the arrangement of the plies therein;

Figs. 5 and 6 are end views taken from the side and top, respectively, of Fig. 4;

Figs. 7 and 8 are end views taken from the side and top, respectively, of a modified form of a multiple ply bag structure embodying my invention;

Figs. 9 and 10 are end views taken from the side and top, respectively, of another form of multiple ply bag structure embodying my invention; and

Figs. 11 and 12 are end views taken from the side and top, respectively, of another form of multiple ply bag structure embodying my invention.

Referring to the drawings in detail, a multiple ply bag 1 of the valved type is shown in Fig. 1. This type of bag is shown for the purposes of illustrations only and it will be understood that the present invention may be utilized in other types of multiple ply bags as well. Bags of the valved type are well known and are commonly

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used for packaging commodities such as cement or the like. The bag 1 is provided with a valved opening 2 at one corner thereof through which the bag may be filled from a suitable filling device and it has sewn end closures 3.

For the purposes of strengthening the bag and to obtain other desired properties such as water-proofed outer surface, the body of the bag 1 is formed from a number of superimposed plies of paper. Each of the plies are in the form of a tube with its vertical edges overlapped and pasted together as indicated at 4, 5 and 6 in Figs. 1 and 2.

As shown and described in my United States Patent No. 2,340,546 of February 1, 1944, each of the plies that form the body of the bag 1 may be electrically perforated to provide minute, burrless perforations through which the air entrapped in the bag during filling may escape, but which are small enough to prevent the commodity with which the bag is filled from passing through such perforations or water from entering such perforations. As shown, for example, in my patent referred to above, the electrically perforated plies that have previously been used to form the bag body are smooth surfaced and under the pressure due to filling of the bag, there is a tendency for the contacting smooth surfaces of adjoining plies to be forced into such close contact that the flow of the air that is escaping through the plies is restricted in passing from one ply to the next.

I have discovered that by interposing a ply 7 of electrically perforated paper having crinkled surfaces such as a creped or ribbed paper between plies 8 and 9 of electrically perforated, smooth surfaced paper so as to provide passageways 10 for the air passing between the plies that the rate at which the air entrapped in the bag may flow through the plies is greatly increased and thus, the rate at which the bag can be filled is also increased. The irregularities in the surface of the creped or ribbed paper forming the ply 7 form a multitude of small passageways as indicated at 10 in Figs. 5 and 6 through which the escaping air may pass to an opening in the next ply. The movement of the air in this manner is indicated diagrammatically by the arrows in Fig. 6.

If desired, the paper forming the creped or ribbed ply 7 may be creped or ribbed at practically no additional expense by subjecting the sheet of paper to the action of a creping or ribbing roll immediately after electric perforation of the sheet. As is well known, the use of a creped or ribbed paper for the ply 7 also adds strength

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and elasticity to the bag due to the ability of such paper to stretch considerably before rupturing. In electro-perforated bags of this type air entrapped in the bag during filling will escape but the material being placed in the bag does not pass through such perforations.

In the embodiment of the invention illustrated in Figs. 7 and 8, five plies are shown with plies 11 of creped or ribbed paper interposed between plies 12 of smooth surfaced paper. In the embodiment of the invention illustrated in Figs. 9 and 10, plies 13 of crinkled or ribbed paper are placed on either side of a ply 14 of smooth surfaced paper. And in the embodiment of the invention illustrated in Figs. 11 and 12 a single ply 15 of creped or ribbed paper is positioned next to a single ply 16 of smooth surfaced paper.

The illustrated embodiments of the invention demonstrate the essential feature of placing a sheet or ply of perforated, creped or ribbed paper next to a sheet or ply of perforated, smooth surfaced paper to provide passageways through which the air passing through perforations in one of the plies may move without being blocked in any way until it reaches a perforation in the adjacent ply. It will be understood that various changes and modifications may be made in the illustrated embodiments of the invention without departing from the scope of the invention as defined by the claims appended hereto.

I claim:

1. In a multiple ply bag, a bag body consisting of a plurality of plies of paper, said plies being superimposed on each other and at least one of the plies of each pair of adjoining plies having an irregular surface, said surface irregularities forming passageways between the opposed surfaces of said adjoining plies, and each of said plies having random electrical perforations extending through said plies with the perforations in one ply being connected with the perforations in the adjoining ply through the passageways formed by said surface irregularities.

2. In a bag consisting of a plurality of plies of sheet material forming a body of the bag, the combination of a ply of sheet material having a plurality of perforations distributed throughout the surface area thereof, and a ply of sheet material having a crinkled surface and a plurality of perforations distributed throughout the sur-

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face area thereof, said crinkled surface contacting with one surface of the first-mentioned ply and forming passageways between the plies communicating with perforations in each of the plies.

3. In a bag consisting of a plurality of plies of sheet material, the combination of a ply of electrically perforatable sheet material having a substantially smooth surface and a plurality of electrical perforations distributed throughout the surface area thereof, and a ply of electrically perforatable sheet material having a crinkled surface and a plurality of electrical perforations distributed throughout the surface area thereof, said crinkled surface contacting with the smooth surface of the first-mentioned ply and forming passageways between the plies communicating with perforations in each of the plies.

4. In a bag consisting of a plurality of plies forming a body portion of the bag, the combination of a pair of plies of electrically perforatable sheet material, each of said plies having substantial smooth opposing surfaces and a plurality of electrical perforations distributed throughout the surface areas thereof, and a ply of electrically perforatable sheet material having crinkled surfaces interposed between the smooth surfaces of the first-mentioned pair of plies and a plurality of electrical perforations distributed throughout the surface area thereof, said crinkled surfaces contacting with the smooth surfaces of the first-mentioned plies and defining passageways communicating with perforations in the pair of plies and in the crinkled surface ply.

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