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R. A. KRAUSS

3,277,798

METHOD OF PRODUCING A SQUARE BOTTOM CONTAINER

Filed Sept. 21, 1964

3 Sheets-Sheet 1

Fig.1

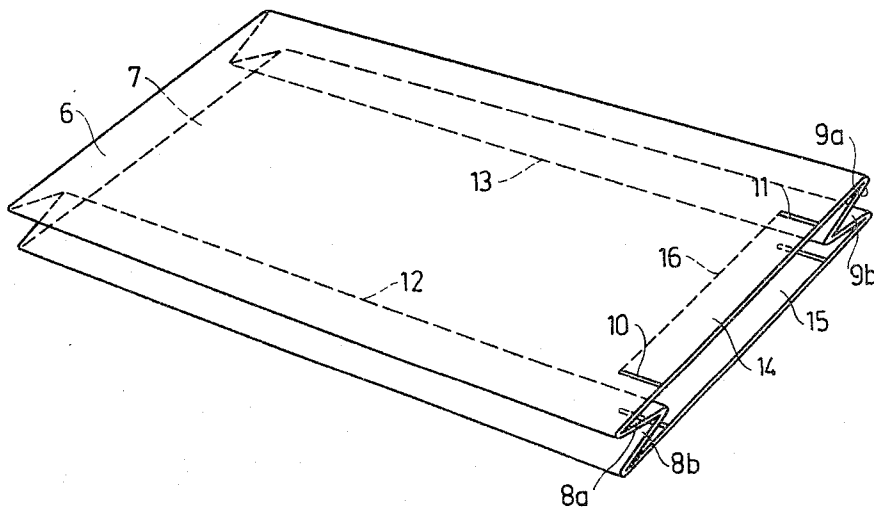


Fig.1A

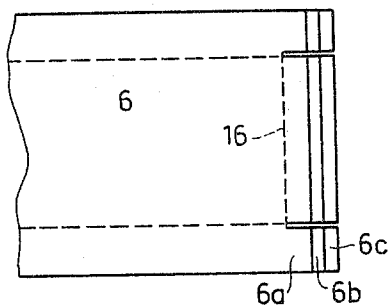
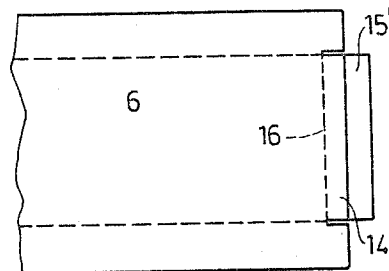


Fig.1B



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Fig. 2

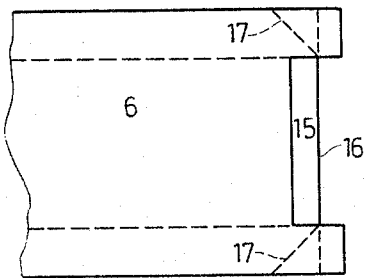


Fig. 2A

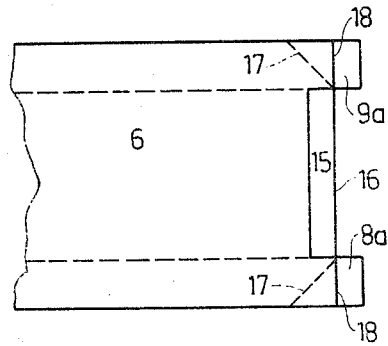


Fig. 2B

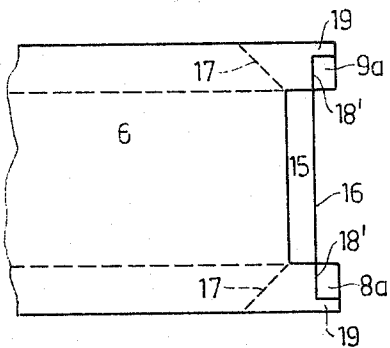
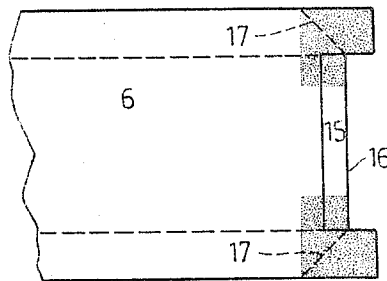


Fig. 2C



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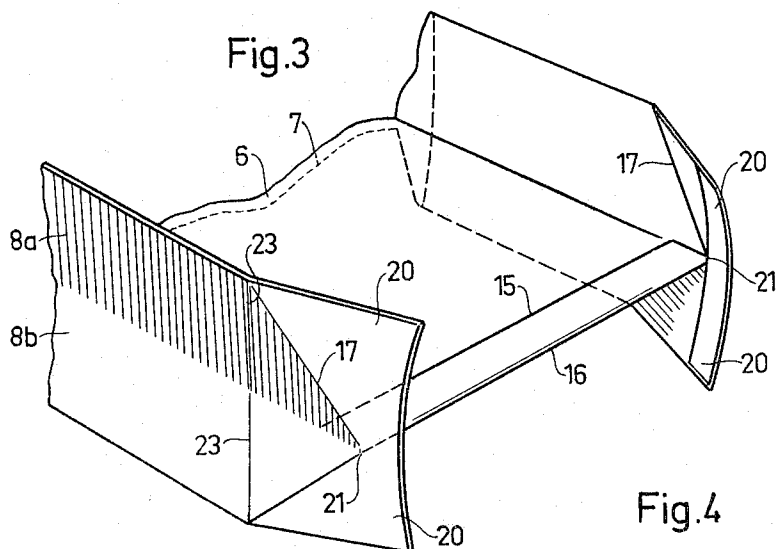


Fig.4

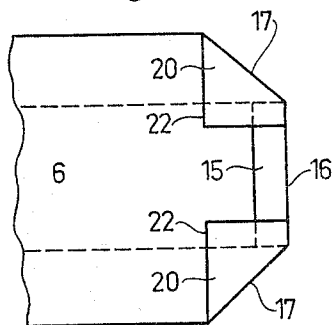
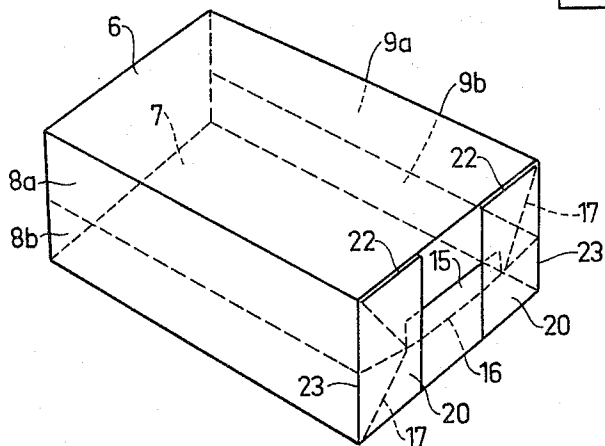


Fig.5



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METHOD OF PRODUCING A SQUARE BOTTOM CONTAINER

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K 50,931

6 Claims. (Cl. 93—35)

The invention relates to a method of producing a square bottom sack, bag, box or similar container of paper, cardboard, cloth, plastic or similar material, and the object of the invention is primarily to provide, in a simple manner, entirely tight container bottom having a very good strength. In the customary manner the flexible sheet material is folded and cemented to form a flat tube having two opposite side walls connected by intermediate bellows-folds. According to the invention, one of the side walls is formed with a flap extending a short distance in the longitudinal direction of the tube between the end portions of the bellows-folds, said flap having a width substantially corresponding to the space between the bottoms of the folds in the flattened state of the tube. The end portion of the other side wall opposite to said flap is formed correspondingly shorter, and the flap is folded and fixed to said shorter end of the other side wall so as to close the central part of the tube end. Then the bellows-folds are opened into planes substantially perpendicular to the plane of the central portions of the side walls, and the four corners are folded onto adjacent side walls along lines extending at an angle of about 45° from the ends of the line where the closure flap is folded onto the longitudinal edges of the side walls so as to cause the projecting portions of the corners to overlap the central closure flap at least partly. Finally, said folded corners are fixed to the surfaces of the flap and of the side walls, so that a closed bottom is obtained.

The special cutting of the material required for the bottom folding according to the invention may be carried out either before or after the material is formed into a tube. According to a preferred embodiment, which is applicable in both cases, rather short slits are cut into the side walls from one end of the tube in parallel and close to the bottoms of the bellows-folds, whereby each side wall is provided with a flap. One of these flaps may then be cut off or folded into the tube, while the other one is used as closure flap.

The container may be made of one or more plies of material, and when using several plies they may in the known way be staggered at the ends of the tube so that unnecessary bulks are avoided in the bottom area.

The method according to the invention is described in more detail with reference to the accompanying drawings, wherein

FIGURE 1 shows a perspective view of a sack tube provided with bellows-folds;

FIGURES 1A and 1B show side views of modified embodiments of one tube end;

FIGURE 2 shows a side view of a flattened tube with the bottom flap folded over;

FIGURES 2A and 2B show modified embodiments;

FIGURE 2C illustrates a special method in connection with FIG. 2;

FIGURE 3 shows a perspective view of the tube with the bellows-folds opened and the corners partly folded;

FIGURE 4 shows the finished sack in flattened condition; and

FIGURE 5 shows the sack in opened condition.

To simplify matters, the longitudinal overlapping seam of the tube has been omitted in all the figures. The same

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reference numerals have been used for corresponding parts in the various figures.

In FIGURE 1, the flattened sack tube has two side walls 6 and 7 connected by walls 8a, b and 9a, b forming bellows-folds. From one end of the tube two slits 10, 11 are cut in either side wall 6 or 7 in parallel and close to the bottom edges 12, 13 of the bellows-folds, said slits forming two end flaps 14, 15, one in each side wall 6 and 7, respectively. The total length of the two slits 10, 11 should be at most equal to the distance between the bellows-bottoms 12, 13 and is preferably less.

In case the tube blank consists of several plies of material, the plies may in the known way be staggered at the tube end, as indicated in FIG. 1A, where the upper side wall is shown as composed of three staggered or stepped plies 6a, 6b, 6c. FIGURE 1B shows a modified embodiment in which one end flap 15' projects slightly from the tube end. Of course, staggering is possible also in this case, if several plies of material are used.

In the next step, one end flap 14 is folded inwards along the dashed line 16 in FIG. 1 and is pasted to the inside of either side wall 6 or 7. In many cases, however, it would be more simple and quite as advantageous to cut off the flap 14 along the line 16. Then the other flap 15 is folded over the opposite side wall 6 along the same line 16 and is pasted to the exterior of said side wall 6, as shown in FIG. 2, thus closing the central portion of the tube end. If the extended end flap 15' shown in FIG. 1B is used, the closure will be further reinforced, but as a rule it should not be necessary.

To facilitate the following folding operations described below, the tube may be stamped with folding lines 17 (FIG. 2) which extend from the inner ends of the slits 10, 11, i.e. from the ends of the folding line 16, diagonally outwards to the longitudinal edges of the tube.

FIGURE 2A shows a special staggering which may be suitable to avoid unnecessary bulks at the following bottom folding. The areas of the side walls 6, 7 located on both sides of the flaps 14, 15 have been cut away (at 18) in alignment with the folding line 16 of the closure flap 15 so that only the bellows-forming walls 8a, b and 9a, b project at the tube end. This cutting operation may be carried out at any time during the operations described above, but is preferably done in connection with the cutting of the flaps 14, 15. FIGURE 2B indicates a slightly modified staggering in that the cuts 18' do not reach the longitudinal edges of the tube but leave narrow strips 19 of the side walls 6, 7 close to the bellows folds.

Except for the case that the tube material or required parts thereof are self-adhering (possibly heat-sealing under pressure), a binding agent is, at a suitable time, applied to the surfaces to be cemented together. Thus, binding agent is introduced between the interior of the walls 8, 9 and the interior of the side walls 6, 7 up to the folding lines 17 and, further, binding agent is applied to the exterior of the side wall portions located outside the folding lines 17. In the embodiments shown in FIGS. 2A and 2B, binding agent is then simultaneously applied to the portions of the bellows-folds exposed by the staggering. If desired, the whole of the shaded portions of the two sides of the tube may be coated with a binding agent, as indicated in FIG. 2C.

In the following step (FIG. 3) the two bellows-folds are opened by bending the walls 8a, b and 9a, b and adjacent parts of the side walls 6, 7 approximately perpendicularly to the still flat middle portions of the side walls, so that the tube gets an H-shaped cross section. Now, at each bellows-fold the two corners 20 located outside the folding lines 17 are folded inwards to adjacent parts of the side walls 6, 7 at the same time as the bellows-folds 8, 9 are again flattened successively, as the folding proceeds. In these combined folding operations, the

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parts of the bellows-folds contained in the corners become turned inside out around points 21 located at the ends of the bottom folding line 16, and the rectangular projecting parts of the corners are thereby caused to fall across and cover adjacent areas of the bottom flap 15. When the corners have been cemented, the flattened container has the appearance shown in FIG. 4. As apparent, the rectangular outer portions of the corners overlap partly the bottom flap 15 while forming transverse reinforcements extending over the whole width of the bottom and thus providing an effectively sealing bottom closure.

FIGURE 5 shows the container in expanded condition. Two opposite edges of the rectangular bottom have been formed along the transverse edges 22 of the corner portions 20 in FIG. 4, and the other two bottom edges have been formed by folding the walls 8, 9 along a dashed line 23 indicated in FIG. 3.

Within the scope of the invention the slits 10, 11 may be made long enough to permit the folded corners 20 to touch each other at the middle of the bottom flap 15 which is then entirely covered. However, such a design is by no means necessary for obtaining a bottom with great strength and probably it is not even to prefer.

The tube shown in FIG. 1A or 1B may be made from an endless web of material in a tube forming machine and, if desired, such a machine may be supplemented by folding mechanisms required for making the bottom closure described. Alternatively, a separate bottom folding machine may be used.

What I claim is:

1. A method of producing square bottom containers, such as sacks, bags or boxes, comprising forming a flexible sheet material into a flat tube having two opposite side walls connected by intermediate longitudinal bellows-folds, forming on one side wall a flap extending a short distance in the longitudinal direction of the tube between the end portions of the bellows-folds and having a width substantially corresponding to the space between the bottoms of said folds in the flattened state of the tube, forming the end portion of the other side wall opposite to the flap correspondingly shorter, folding said flap over and

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securing it to said end of the other side wall so as to close the central part of the tube end, opening the bellows-folds into planes substantially perpendicular to the plane of the central portions of the side walls, folding the four corners onto adjacent side walls along lines extending at an angle of about 45° from the ends of the closure flap folding line onto the longitudinal edges of the side walls so as to cause the projecting portions of the corners to overlap the central closure flap at least partly, and securing said folded corners to the surfaces of the flap and of the side walls, whereby a closed bottom is obtained.

2. A method as claimed in claim 1, in which the closure flap is dimensioned a little longer than the tube end.

3. A method as claimed in claim 1, in which short slits are cut into the side walls from the tube end in parallel and close to the bottoms of the bellows-folds, whereby each side wall is provided with a flap, one of these flaps being removed, while the other one is used as the closure flap.

4. A method as claimed in claim 1, in which short slits are cut into the side walls from the tube end in parallel and close to the bottoms of the bellows-folds, whereby each side wall is provided with a flap, one of these flaps being folded into the tube, while the other one is used as the closure flap.

5. A method as claimed in claim 1, in which the side wall portions flanking each flap are removed at least partly, so that the thickness of the material is reduced at the folded corners.

6. A method as claimed in claim 5, in which narrow strips of the side walls are left next to the bellows-folds along each flap.

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BERNARD STICKNEY, *Primary Examiner*.