June 5, 1956 A. BERKE 2,749,018

COLLAPSIBLE TRAYS

Filed Aug. 16, 1952

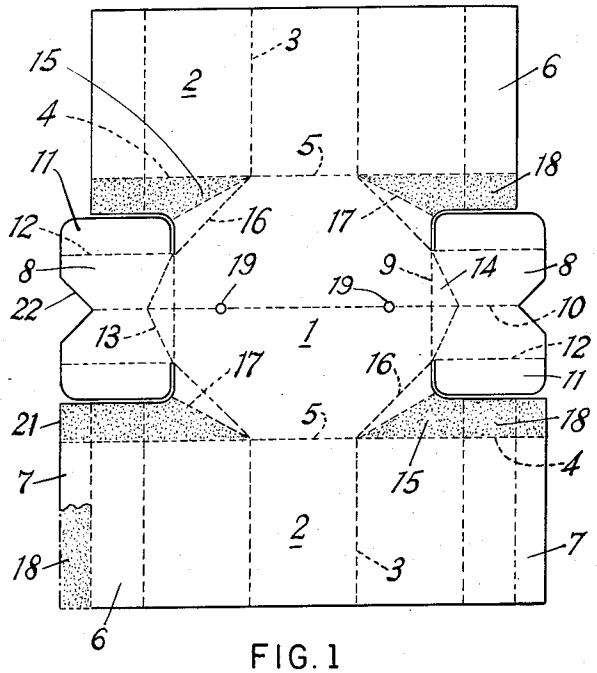


FIG. 1

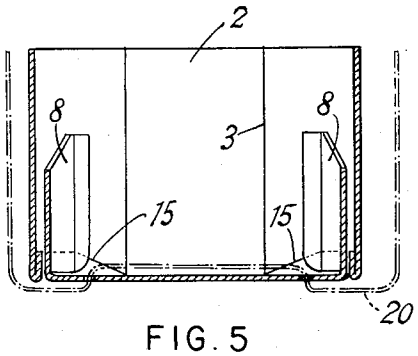


FIG. 5

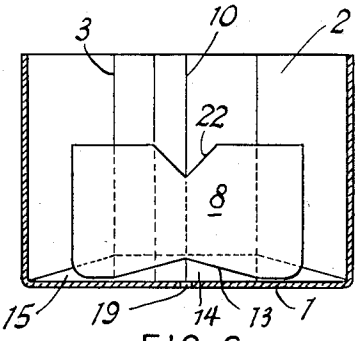


FIG. 6

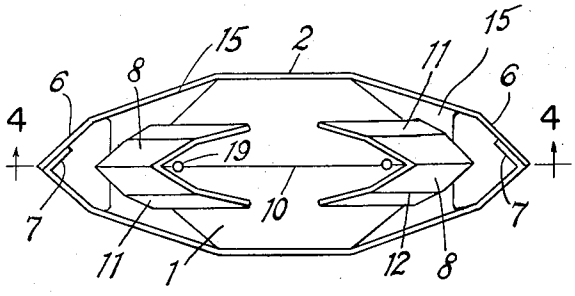


FIG. 2

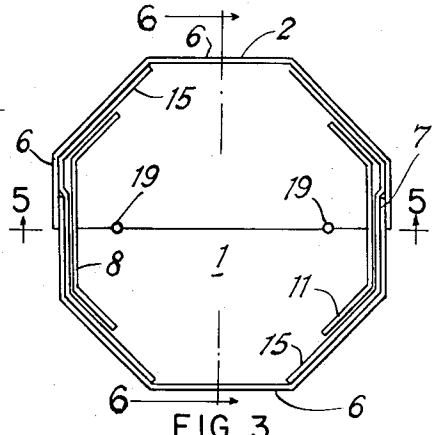


FIG. 3

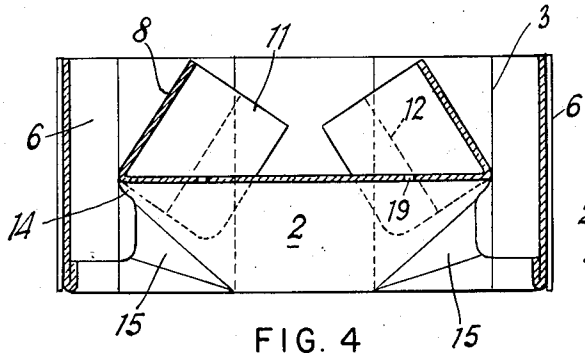


FIG. 4

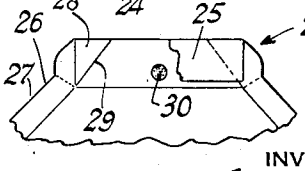


FIG. 7

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COLLAPSIBLE TRAYS

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My invention is an improved tray, particularly a tray of sheet material adapted to serve as a storage receptacle.

An important object is to provide a tray of sheet material which has a foldable bottom and sides hinged thereto, and retaining members movably attached to the bottom and adapted to move automatically to operative position when the box is manipulated to set it up and maintain all parts in their final positions.

Other objects and advantages are clearly described herein, and a preferred embodiment of the invention is illustrated in the accompanying drawings. But the disclosure is explanatory only and I may vary the construction shown in minor respects without omission or material alteration of any of the essential characteristics of the invention.

On the drawings:

Figure 1 is a plan view of sheet material of which the tray is made.

Figure 2 is a top view of the tray partly set up.

Figure 3 is a top view of the tray fully set up.

Figure 4 is a longitudinal section along line 4—4 on Figure 2.

Figure 5 is a similar longitudinal section along line 5—5 on Figure 3.

Figure 6 is a section on line 6—6 in Figure 3; and

Figure 7 shows a detail of the cover for the tray.

The blank of sheet material of which the tray is made has a central portion 1 with the outline of a regular octagon; and a portion at each end; each terminal portion containing three rectangular sections 2, lying side by side and marked off from one another by score lines 3. Along the sections 2 in each terminal portion adjacent the central part runs a score line 4, these lines 4 coinciding with opposite edges 5 of the central section 1. The terminal portions also comprise sections 6, flanking each group of sections 2 and marked off therefrom by other score lines 3, parallel to the first-named score lines 3. The sections 2 are each as wide as the length of an edge 5 of the portion 1, but the sections 6 are only half as wide as the sections 2, and two half sections 6 each have a flap 7, hinge-connected along another score line 3, parallel to the other lines 3. The inner ends of the middle section 2 in each group or row thereof coincides with one of the aforesaid opposite edges 5 of the central section 1.

At opposite sides of the central section 1 between the portions 2 are retaining members 8, each of which is hinged along a score line to one of another pair of opposite edges 9 of the octagonal portion 1. Fully across both members 8 and the central portion 1, which serves as the bottom of the box when completed, runs a centrally located score line 10 parallel to the lines 4. The retaining members 8 are wider than the length of either edge 9; and at the ends of these edges 9 the sections or members 8 are cut free from the blank. At each side of the members 8 is a flap 11, with rounded outer corners, these flaps being joined to the members 8 along score lines 12, parallel to the lines 4 and 10, beginning at the

opposite ends of the edges 9, running to the outer edges of the members 8.

The members 8 also bear converging score lines 13, which begin at the opposite ends of the edges 9 and run to the score lines 10. These lines 13, together with the lines 9 and 10 mark off triangular parts 14.

The corners of the blank between each of the remaining edges 16, that join the edges 9 to the edges 5, are filled with flaps or webs 15 hinge-connected along the score lines 4 to the adjacent sections 2 and half-sections 6 of one terminal portion, and to the sections 2, parts 6 and flaps of the other terminal portion, and scored along their junctions with the adjacent edges 16. The flaps 15 have the shape of an arrow, cut in half lengthwise with the lateral corner of the barb or point coinciding with the adjacent edge 16 of the octagon 1. The angle between each edge 16 and the adjacent score line 4 is approximated bisected in each flap or web 15 by a score line 17, running towards the inner round corner of the adjacent member 8.

The score lines 3 between the half sections 6 and adjacent sections 2 extend across the flaps 15, and these flaps except the area between the lines 17 and sides 16 of the octagon are covered with dried glue 18. Glue is also spread on one face of the flaps 7. The glue is attached to the under face of the flaps 7 as the blank appears on Figure 1, and on the upper faces of the webs 15. The octagon 1 also has openings 19 at separated points on the line 10 and through these openings is passed a length of cord 20.

Along one of the score lines 4 at one end of the blank the webs 15 terminate adjacent the middle of the ends of the sections 6. Along the other score line the webs 15 are longer and extend beyond the lines 3 between the sections 6 and flaps 7, to the long outer free edges of the flaps 7, and are crossed by the score lines 3 between the flaps 7 and adjacent sections 6. The parts which make two of the webs longer are indicated at 21.

The tray is given its final shape by bending the two halves of the section 1 or bottom upward about the score or hinge line 10. First the flaps 8 are turned up, but the portions 14 between the lines 13 and the edges 9 of the bottom are not. These portions then go with the bottom when the latter is bent and each portion 14 remains in the plane of the adjacent half of the bottom. The flaps 8 are bent up along the score lines 13 and the halves of each flap are folded towards each other about the ends of the line 10. Also the webs 15 remain in the planes of the halves of the bottom 1. See Figures 2 and 4.

With the bottom folded, one half against the other half, and the flaps 8 doubled and folded against the halves of the bottom, the blank is further bent along both score lines 4 at opposite edges of the bottom to bring up the terminal portions containing the sections 2 and 6 and flaps 7. The glued portions of the webs 15 are caused to adhere to the inner faces of the sections 6 and adjacent sections 2, and the flaps 7 of one portion of the blank to adhere to the inner faces of the sections 6 of the opposite end portion. The parts 21 at the ends of the two longer webs are bent with the flaps 7 and adhere to the inner faces of these flaps, so that the flaps 7 are between the end parts 21 of the two long webs and the sections 6 to which the flaps 7 are glued. There are thus three layers of material at the bottom of each flap 7 and the extremities of the two shorter webs 15 then abut the edges of the flaps 7. The webs are all then in adhesive engagement with the inner faces of the sides of the tray over the entire extent of the webs except the portions between the score lines 17 and the edges 16 of the bottom, and these portions stand up between the members 8 and the adjacent sections 2.

The tray is now flattened and the members 8 are in-

clined upward and towards each other with respect to the line **10**. Their upper corners may be bevelled to prevent them projecting beyond the free edges of the blank, and for this purpose notches **22** are cut in the outer ends of the members **8** at the ends of the line **10**. The sections **2** and **6** make the lateral faces of the tray. To set up the tray the bottom is pushed down flat, thus distending the sides of the box, and by the same move lifting the members **8** to upright positions. The lines **10** along the middle of the members **8** then coincide with the lines **3** along the inner edges of the flaps **7** and the lines **12** with the lines 3 between the sections **6** and adjacent sections **2**. The parts **14** become upright also, and lie each in the plane of the portion of the member **8** above it between the lines **10** and **12**. The lower edges of the portions **11** of the members **8** engage the bottom **1** and tend to keep the bottom pressed out and the sides expanded all about the bottom. The tray can also be set up by pressure exerted to move the lines **3** along the flaps **7** towards each other, forcing the sides to spread and the halves of the bottom to go downward.

The tray can therefore be produced with a substantially rectangular blank and there is virtually no waste. It can be set up quickly, and collapsed at any time merely forcing the bottom upward and the sides inward.

The cover for the tray will also have eight sides and a part of the cover is indicated in Figure 7 by the numeral **23**. This cover has four sides **24** with inturned flaps **25** and four sides **26** with recesses **27**; the sides **24** and **26** being in upturned positions as the rim or lid. The sides **26** have recesses **27** and tabs **28** at each end which are hinged along score lines **29**. These tabs **28** are between the sides **24** and the flaps **25**; and the flaps are held in folded position by a bit of glue **30** on the inside faces of the flaps **25** and sides **24**. The tabs **28** are too short to reach in as far as the glue **30**. These tabs taper towards their outer ends and when the sides of the cover are in upright position the lower edges of the tabs extend angularly with respect to the sides **24**. The sides **24** and **26** can be folded down against the top of the cover and then the tabs **28** are in under the flaps **25**, and so are parts of the sides **26** up to the outer corners of the recesses **27**. These corners are rounded to permit the collapse of the sides in this way. To set up the cover, the sides **24** and **26** are pulled into upright position as indicated in Figure 7 and then only the tabs **28** are under the flaps **25**.

The string or tape **20** which passes through the openings **19** as indicated in Figure 5 can be used to secure the cover on the tray and the pressure on the string is exerted against the sections **6**.

Having described my invention, what I believe to be new is:

1. A tray having a polygonal bottom, upstanding portions hinge-connected adjacent their midpoints to two opposite edges of the bottom, said portions being longer than said edges and united end to end and comprising sections forming the sides of the box, retaining members adjacent said ends hinge-connected adjacent their midpoints to other opposite edges of said bottom, said members being longer than said last-named edges, and folded webs flanking said members and hinge-connected to said portions and still other edges of the bottom between said members and adjacent sides, said members being within the tray adjacent the united ends of said sections said bottom having a central score line on its inner face extending between said members, and said members each having a central score line registering with said score line in the bottom, said members also having diagonal score lines joining the central score lines in said members to the extremities of said other opposite edges of the bottom.

2. A hat box having a bottom with the shape of a regular polygon, upstanding portions hinge-connected adjacent their midpoints to two opposite edges of the bottom, said portions being longer than said edges and united end to end and comprising sections forming the sides of the box, retaining members adjacent said ends hinge-connected each adjacent their midpoints to one of two other opposite edges of the bottom, said members being longer than said last-named edges, said bottom having a central score line on its inner face extending between said members, and said members each having a central score line extending from the upper edges of said members to the ends of and in line with the score line in the bottom, said members being within the tray adjacent the united ends of said sections, said members also having diagonal score lines joining the central score lines in said members to the extremities of the said other opposite edges of the bottom.

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