

April 27, 1965

E. J. BARRETT

3,180,555

EXPANDABLE AND COLLAPSIBLE CONTAINER

Filed March 10, 1964

3 Sheets-Sheet 1

Fig. 1

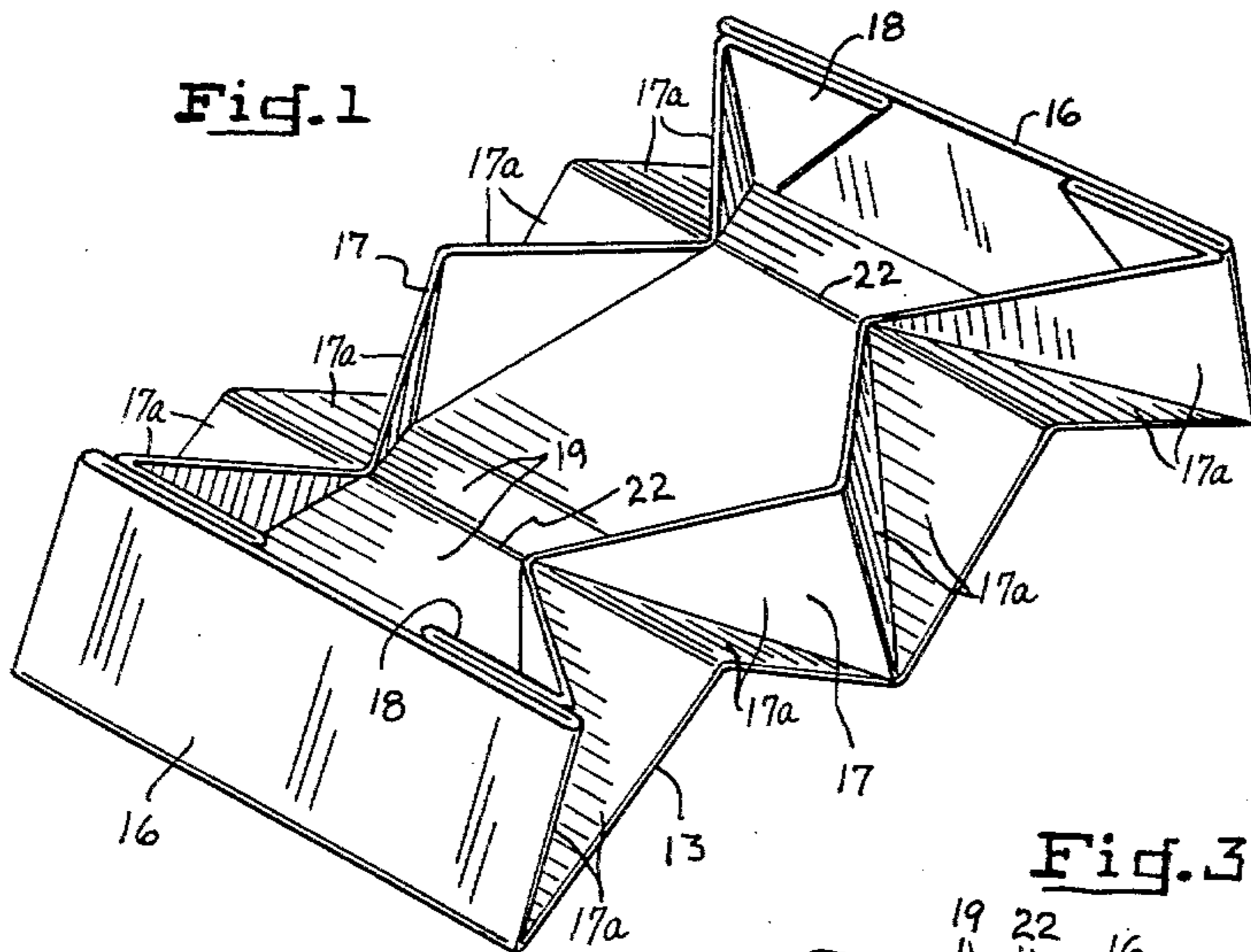


Fig. 2

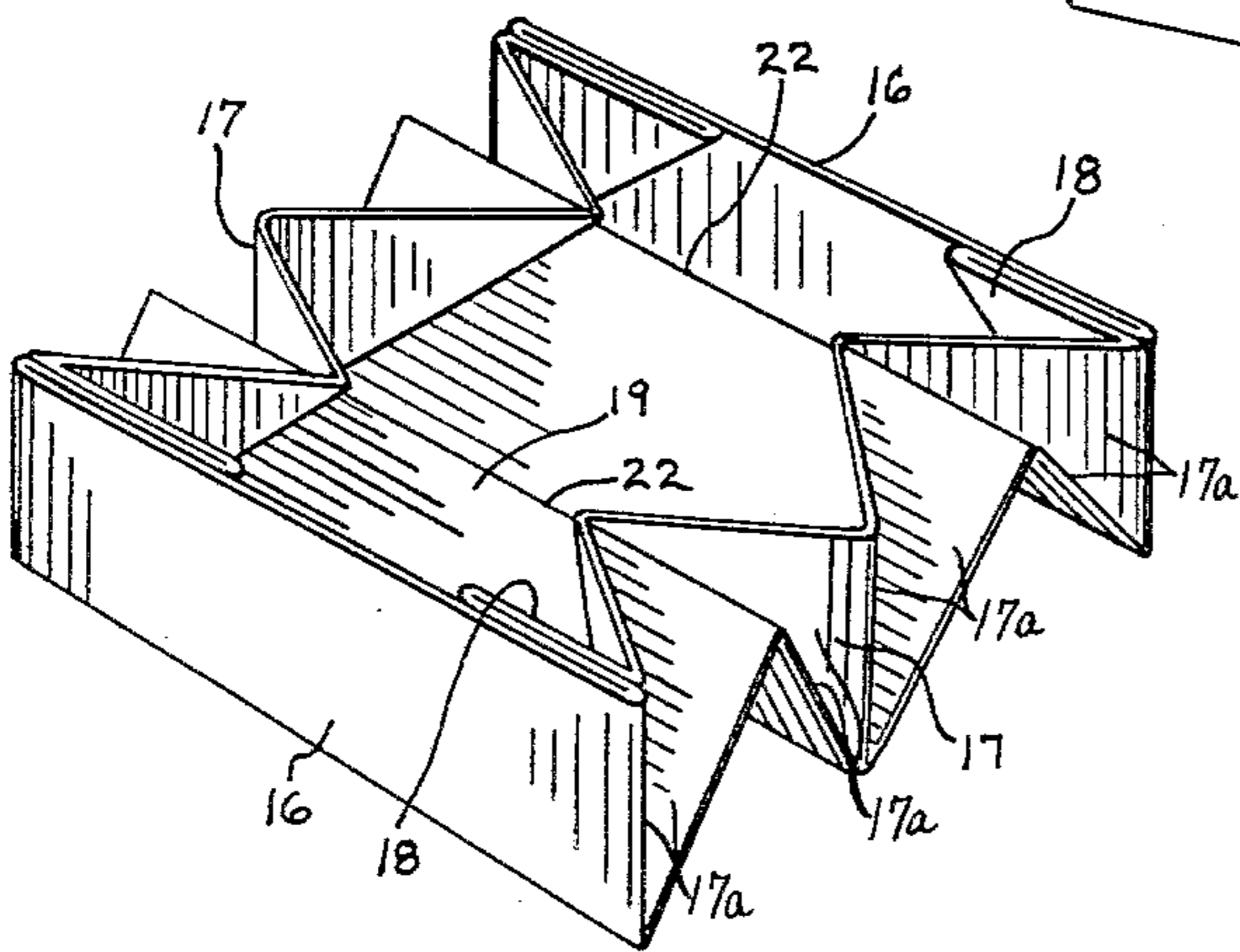
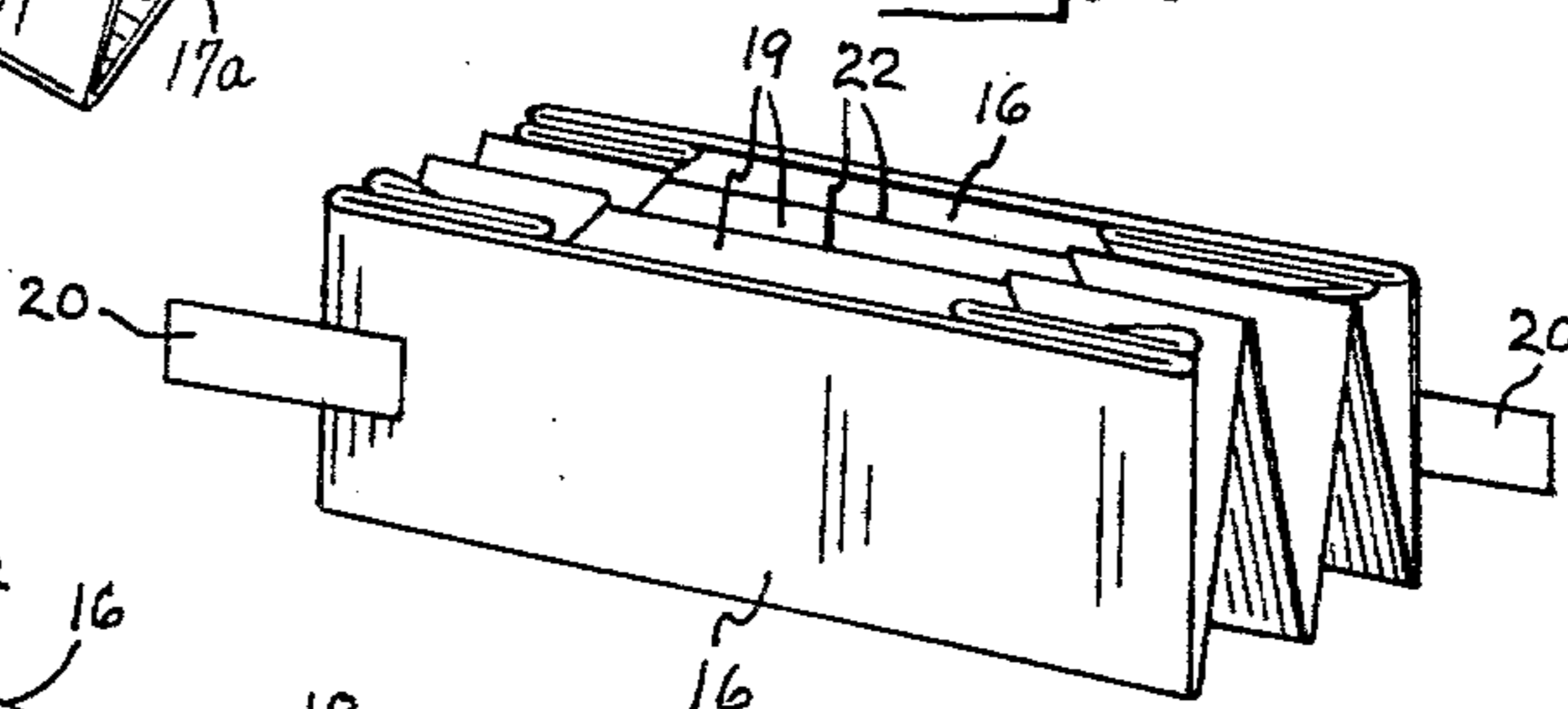


Fig. 3



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Fig. 4.

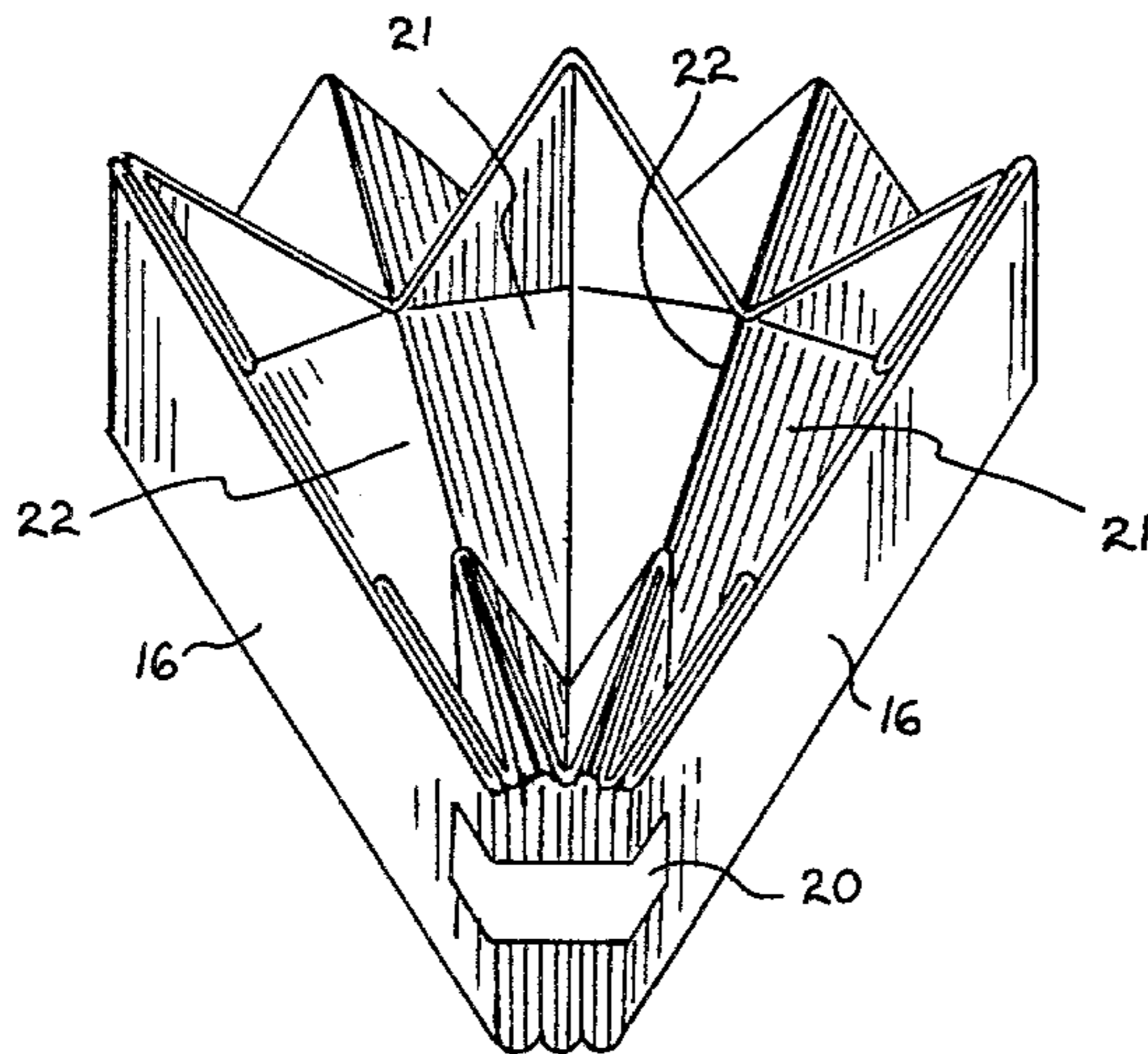
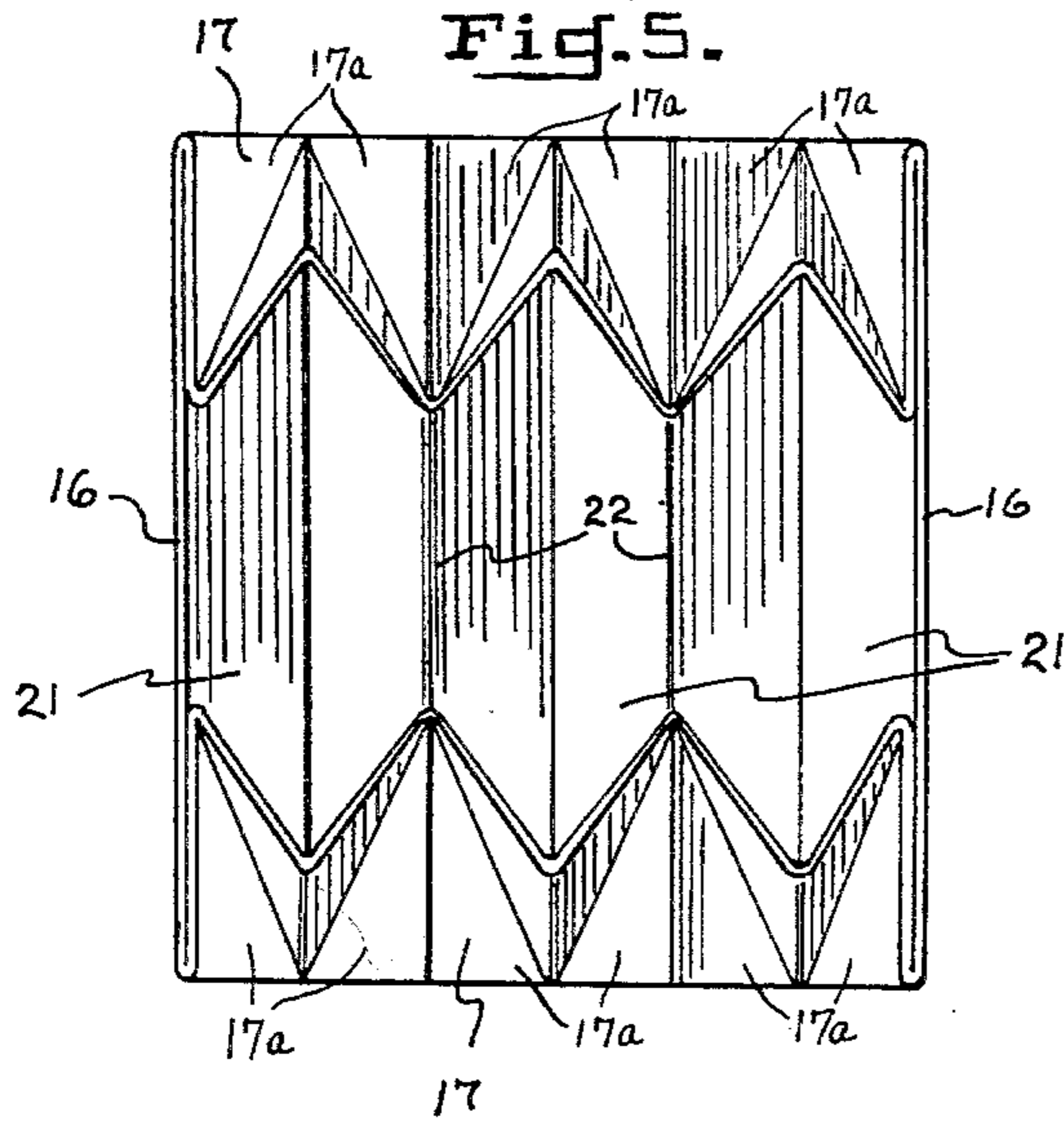


Fig. 5.



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Fig. 6

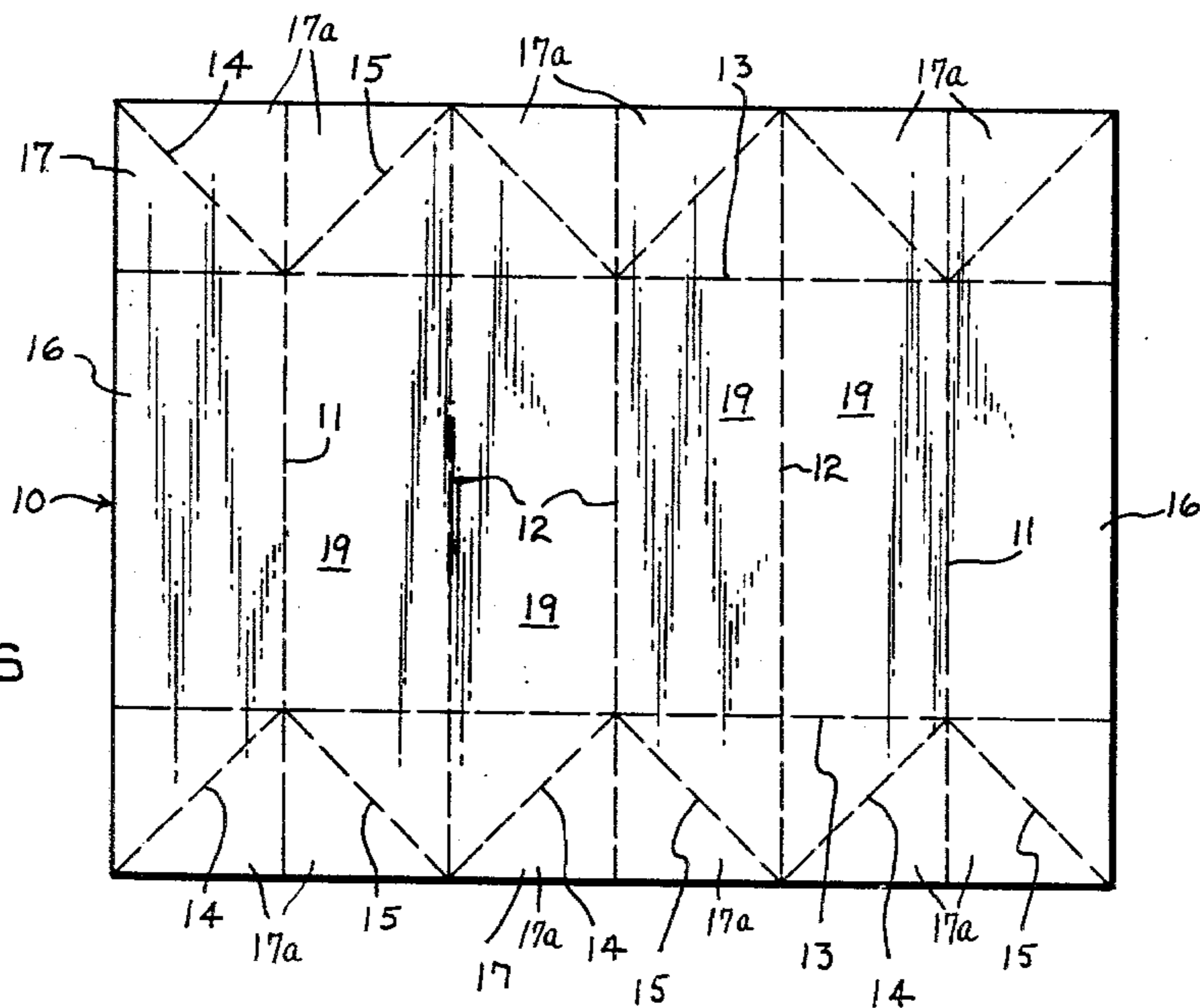
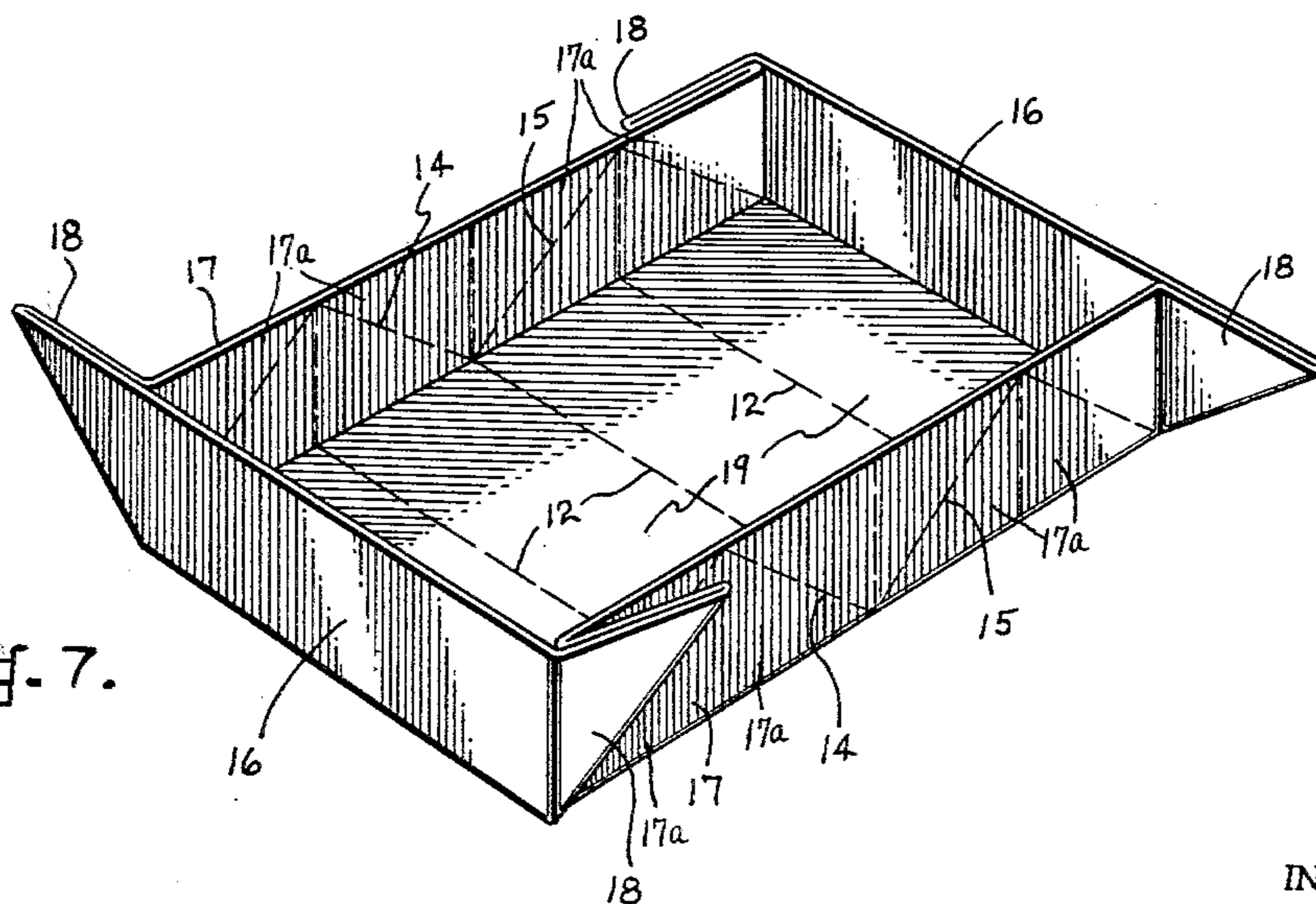


Fig. 7.



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EXPANDABLE AND COLLAPSIBLE CONTAINER

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3 Claims. (Cl. 229-41)

(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention described herein, if patented, may be manufactured and used by and for the Government for governmental purposes without the payment to me of any royalty thereon.

The invention relates to expandable and collapsible containers and more specifically to such containers as are capable of use in a variety of ways for a variety of purposes. The containers according to the invention will normally be disposable or expendable being intended for use but a limited number of times, say once for each variety of use.

In providing rations for the armed services wide use has been made of freeze dehydration to provide food which occupies but little space for storage and transport, requires little or no refrigeration for preservation, does not necessarily require hermetic sealing in the packaging, and which can be rehydrated to a form wherein it is ready to cook or to eat solely by the addition of water, milk or the like. As every land based military man in the field carries a canteen, water for the rehydration is hardly a problem. However, a container in which to accomplish the rehydration has presented a problem. For instance, a typical ration might contain three or more separate items which require rehydration and for obvious reasons it is desirable to rehydrate each separately. To do this in a single container requires too much time and to carry three or more separate containers would add too much equipment to the already overloaded individual. The problem of heating the water for rehydrating certain dehydrated foods and heating flexible, hermetically sealed, thermally sterile foods, also presents a problem to the soldier in the field. This may be solved by placing the container over lighted fuel tablets or similar heating devices when heat is desired.

With the foregoing in view, it is an object of the invention to provide an improved collapsible container which may be partially expanded to provide a plurality of separate compartments in which separate dehydrated items may be simultaneously rehydrated, such container being adapted to be thereafter fully expanded to provide a single compartment disposable tray which may be used for eating, further cooking or serving.

A further object is to provide such a container which, when collapsed is in such a compact condition that it can be readily included in the package with the dehydrated rations without adding materially to the bulk or weight of the package.

A further object is to provide such a container which is formed of ductile material whereby the container will retain itself in both the partially expanded or open position and in the fully open position without requiring any separate fasteners.

A further object is to provide such a container which can be used by unskilled personnel with a minimum of instruction and under adverse light or blackout conditions and without the use of special tools or equipment other than the user's two hands.

Other objects and advantages reside in the specific structure of the container, combinations and arrangements of the several parts and in the particular manner of folding the same, all of which will be readily apparent to those skilled in the art upon reference to the attached drawing which illustrates a preferred embodiment of the invention and to the following specification wherein the invention is described and claimed.

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In the drawing:

FIGURE 1 is a perspective view of an almost fully open container;

FIGURE 2 is a perspective view of the container open to a lesser degree than FIGURE 1.

FIGURE 3 is a like view of container in the substantially fully folded stage;

FIGURE 4 is a like view showing the container open to the compartment forming stage;

FIGURE 5 is a plan view of the container in the partially open position of FIGURE 2;

FIGURE 6 is a plan view of a blank for forming the container; and

FIGURE 7 is a perspective view of the container in the fully open position.

Referring specifically to the drawing wherein like reference characters designate like parts in all views, and referring at first to FIGURE 6, the container according to the species illustrated is formed from a blank 10 of any suitable ductile material preferably one which is impervious to liquids and which is at least reasonably fire-proof. A ductile metal foil such as aluminum foil of a suitable gauge or such a foil laminated to other sheet material is satisfactory.

Blank 10 is rectangular in shape and is formed with a plurality of parallel transverse fold lines, there being two end fold lines 11 and a number of intermediate fold lines 12. For reasons which will be apparent, it is preferable that there be an odd number of the lines 12. The length of the blank and intersect lines 11 and 12 to Two longitudinally extending parallel side lines 13 extend divide the areas laterally outwardly of the lines 13 into smaller rectangles or sub-panels which in the species shown are squares 17a. Such sub-panels or squares 17a are in turn formed with diagonally extending fold lines 14 and 15, the lines 14 and 15 alternate and extend in crossing directions from the corners of the squares 17a so as to provide a serrated fold line. End panels 16 are defined by the fold lines 11, 11 and side panels 17 are defined by the fold lines 13, 13. Accordion panels 19 are disposed between end panels 16.

As is obvious from a glance at FIGURE 7, if the side panels 17 are folded to vertical positions and the end panels 16 are then folded to vertical positions with the corner squares folded along their diagonal fold lines 14 or 15, the blank has been formed into a tray. All of the triangular tabs 18 which are formed from the folded corner squares may be folded flatly alongside the side panels 17 as in FIGURE 7 or two diagonally opposite ones may be left projecting to provide finger grips for lifting and carrying the tray when the same is filled. As shown in the other views such tabs 18 may be inwardly folded to lie along the inside of the end panels 16. As aforesaid, the material of the tray is of such a ductile nature that it will sustain its folded position when the folded portions are compressed together by the fingers or otherwise. Also, it should be understood, that the tray may well comprise a molded, one-piece tray formed by stamping, in which case the tabs 18 would be eliminated as well as the fold lines 11, 11, 13, 13 and the corner squares. Otherwise such a tray would function and fold in the same manner as that illustrated.

With reference now to FIGURES 1-5 inclusive in that order, to collapse the tray, the end panels 16 are folded to vertical positions and the corner squares collapsed inwardly and folded to lie along such end panels. The side panels 17 are now elevated and at the same time folded inwardly on the diagonal fold lines 14 and 15 (FIGURES 6 and 7). If the end panels 16 are now moved toward each other, the central panels 19 collapse in the manner of an accordion while the side panels 17 collapse in like manner but in a more or less vertical plane. This col-

lapsing movement continues through the stage of FIGURES 2 and 5 to the substantially fully collapsed position of FIGURE 3. When fully compressed, the ends of the collapsed container may be secured in such position by strips of adhesive tape 20. In the fully collapsed position, the package takes up but little space and may readily be packed in with rations without any substantial increase in the size or weight of the package.

In use when it is desired to rehydrate a number of food items, the user removes the tape 20 from one end of the collapsed container and unfolds such end to the position shown in FIGURE 4. This provides three V-shaped compartments 21 of substantially equal size. Each compartment may be filled with water at which time the container may be placed over a heat source, which, because of the accordion shape of the container provides a maximum exposure of the undersides of the compartments, heats the liquid in a minimum of time. The different dehydrated rations are added and are simultaneously rehydrated. Thereafter, the other tape 20 is removed and the container fully expanded to the position of FIGURE 2 when it may be used as a disposable serving tray or as a container for heating water for dishwashing or even for cooking in the event cooking is required or for any other purpose.

In the partially folded position of FIGURES 2 and 5, three V-shaped compartments 21 of substantially equal size are formed and can be used to rehydrate dehydrated items of the ration which might be slightly larger, too large for use in the smaller compartments formed with the parts in the positions of FIGURE 4. These larger compartments are not as stable as the FIGURE 4 ones but this can be cured by bracing the ends by stones or the like to prevent spreading of the folds under the pressure of the contents.

Because the container, according to the invention, is disposable, it need not be made of expensive materials whereby it may be readily manufactured at low cost. Also, although it might be difficult for a user in the field to fold the container to its compact fully folded shape, this operation will normally be accomplished by automatic machinery at the time of manufacture. Obviously, the fully folded container is readily expanded to the two or more using positions by unskilled personnel. By providing an uneven number of fold lines 12 an uneven number of compartments 21 are formed and this is desirable when a folded blank is used because ridges 22 which divide the container into compartments 21 and which are formed by alternate fold lines 12 permit the compartments to be substantially equal in capacity. If an even number of compartments are formed the two end compartments will necessarily be half the size of the intervening compartments. Of course, more or less compartments than the three shown are contemplated.

While there has been shown and described what are now thought to be the preferred embodiments of the

invention, it should be understood that the same is susceptible of still other forms and expressions. Consequently, the invention is not considered to be limited to the precise structures shown and described hereinabove but only as hereinafter claimed.

I claim:

1. A folding receptacle having a floor comprising a rectangular blank of ductile sheet material, said blank being formed with longitudinal fold lines defining side panels and transverse fold lines defining end portions and dividing the floor into an even number of equi-sized transverse panels and said side panels into an even number of upright sub-panels, each of said sub-panels being further formed with at least one additional fold line extending at an angle to said transverse fold lines, and said receptacle being folded on said fold lines to provide a plurality of compartments with a portion of each sub-panel in an upright wall providing position and the remaining portion in overlying engagement with adjacent upper surface portions of an associated floor panel.

2. The structure of claim 1, wherein the fold lines of said sub-panels defining the ends of said side panels extend diagonally upwardly from the corners defined by the intersections of the floor with said side and end panels to the outer end of the adjacent transverse fold line.

3. A folding receptacle comprising a rectangular blank of foldable ductile sheet material, said blank being formed with an uneven number of transverse fold lines for forming said blank into an arrangement of accordion pleated panels including two end panels adapted to extend upwardly, said blank being formed with two longitudinally extending parallel fold lines defining two side panels, said side panels each being divided by said transverse fold lines into an even number of squares, said squares each being formed with a single diagonal fold line, said fold lines of adjacent squares being oppositely directed, said diagonally extending fold lines of the four squares defining the corners of said blank extend diagonally inwardly from said corners to the intersection of said longitudinally extending fold lines defining said side panels with those transverse fold lines defining said end panels, said arrangement of folded panels being adapted to be partially opened to provide an uneven number of V-shaped compartments of substantially equal size, and one half portion of each of said squares providing an upright side wall portion and the remaining one half portion of each square disposed in overlying engagement with the adjacent upper surface portions of said accordion pleated panels.

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GEORGE O. RALSTON, *Examiner*.