United States Patent

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[54] **METHOD OF MAKING A KITE AND KITE STRUCTURE**
6 Claims, 8 Drawing Figs.

[52] **U.S. Cl.** **244/153**
[51] **Int. Cl.** **B64c 31/06**
[50] **Field of Search** 244/153-
—155; 264/171; 18/4, 13; 156/306, 244

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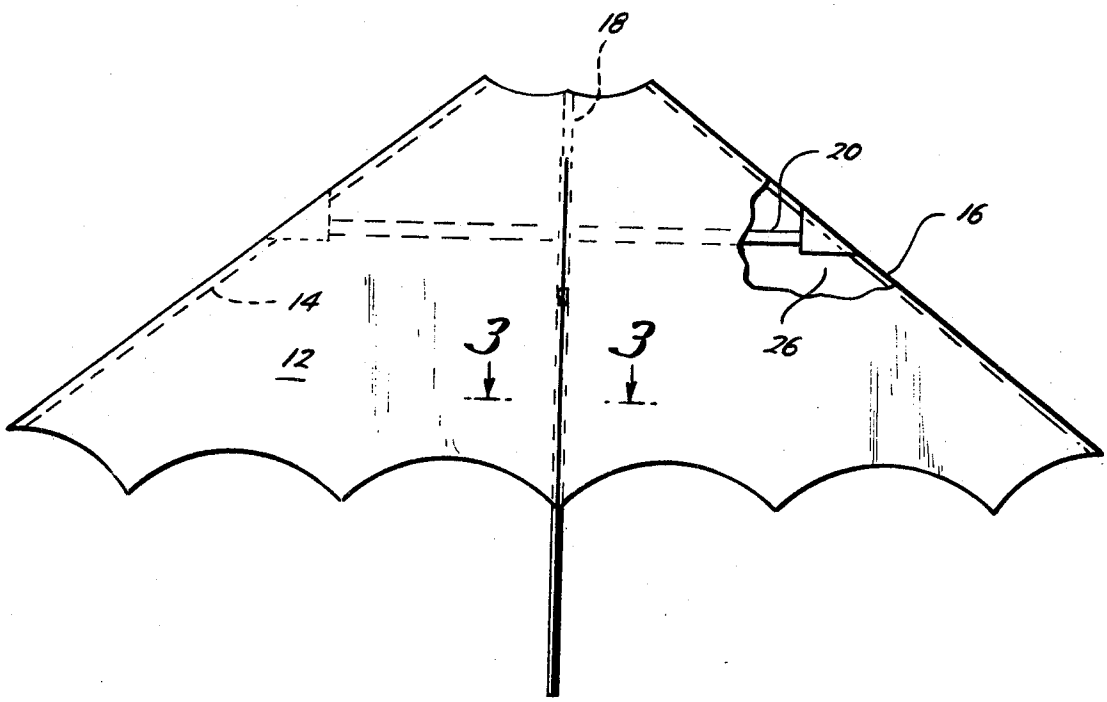
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ABSTRACT: A kite structure having a body and structural members which are integrally bonded to the kite body and the method of making such kite structure.



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SHEET 1 OF 2

Fig. 1

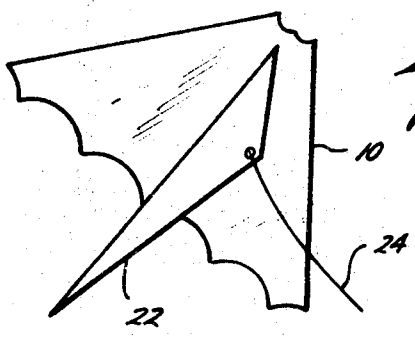


Fig. 2

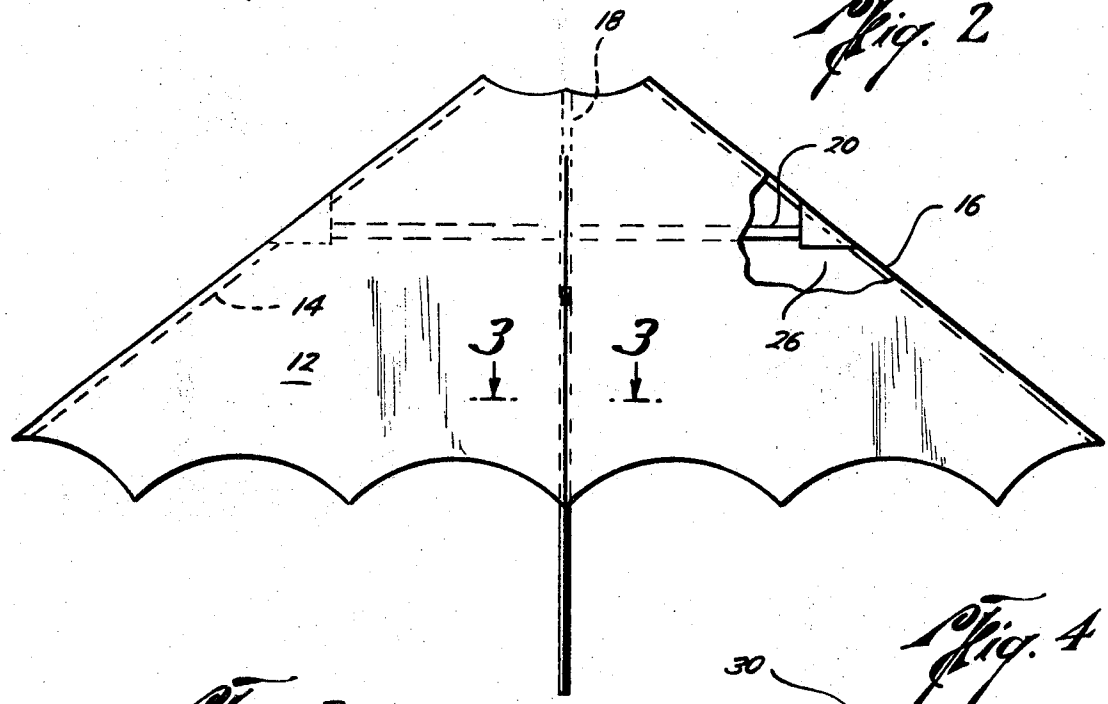


Fig. 3

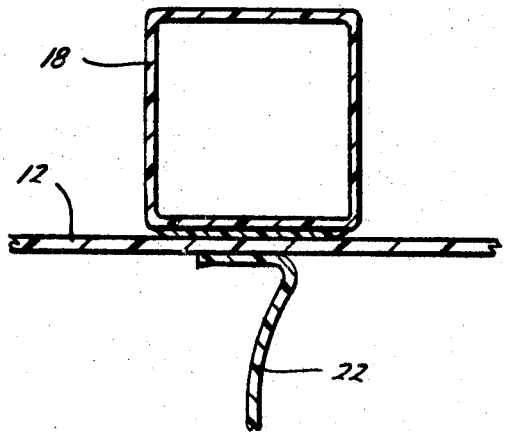
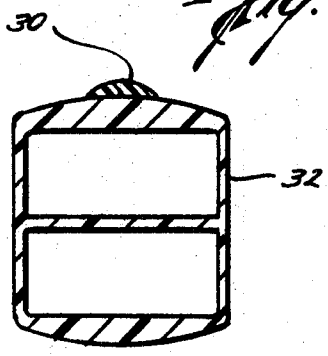


Fig. 4



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Fig. 5

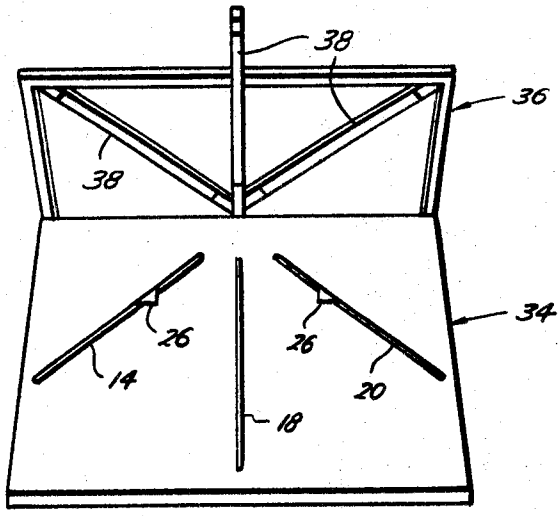


Fig. 6

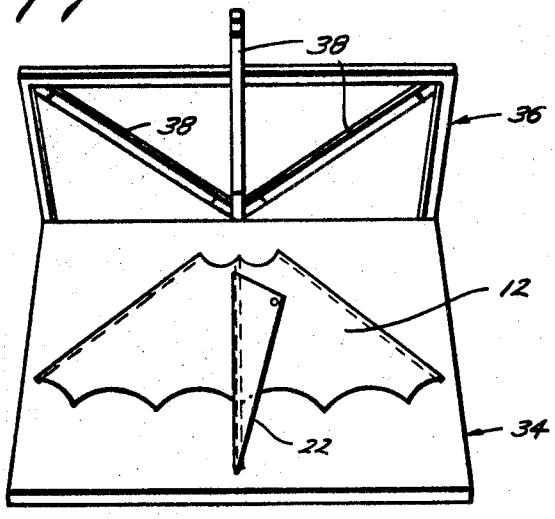


Fig. 7

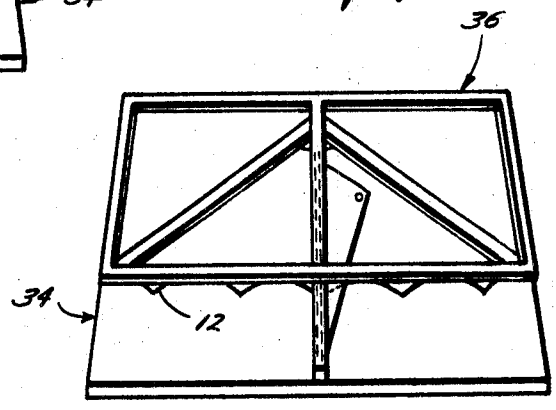
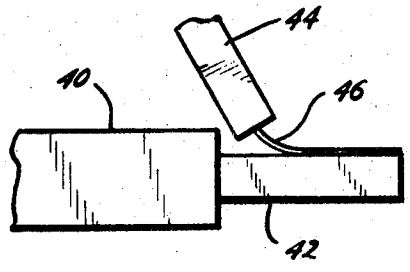


Fig. 8



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METHOD OF MAKING A KITE AND KITE STRUCTURE

SUMMARY

The present invention relates to an improved kite structure and its method of manufacture.

An object of the present invention is to provide an improved kite structure which is sturdy and easy to manufacture.

Another object is to provide an improved method of making a kite adaptable to high rates of production.

Another object is to provide an improved kite structure in which the components are secured together by a simple and quick bonding step.

A further object is to provide as a subcombination in a kite structure having a body of an improved structural member which is readily bondable to the sheet material of the body.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other objects and advantages of the present invention are hereinafter set forth in the description of the kite structure illustrated in the drawings wherein:

FIG. 1 is a perspective view of a kite structure of the present invention in flight.

FIG. 2 is a plan view of the kite structure.

FIG. 3 is a sectional view taken along line 3–3 in FIG. 2 to illustrate the bonding of the body and keel to the structural member.

FIG. 4 is a typical sectional view of a modified form of the improved structural member of the present invention.

FIG. 5 is a schematic view of the structure used for making the kite structure showing the positioning of the structural members on a fixture and the bonding frame associated therewith.

FIG. 6 is a similar view showing the body and keel positioned on the fixture.

FIG. 7 is another similar view showing the bonding of the body, keel and structural members with the bonding frame.

FIG. 8 is a schematic view illustrating the dual extrusion formation of the structural member with the bondable material being deposited along one side thereof.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The kite 10 shown in FIGS. 1 and 2 includes a body 12 of sheet material, the structural members 14,16, 18 and 20 and the keel 22. As shown, the keel 22 is formed to attach the string or cord 24 for flying the kite. The structural members include the wing sticks 14 and 16, the keel stick 18 and the cross-stick 20. Wing sticks 14 and 16 and keel stick 18 are secured to body 12 as hereinafter described. Pockets 26 are provided on the wing sticks 14 and 16 to receive the ends of cross-stick 20. With cross-stick 20 positioned as shown in FIG. 2, the body 12 and wing sticks 14 and 16 are spread to flying position. Cross-stick 20 is removable so that the remainder of the kite structure may be collapsed and rolled for convenience in packing and shipping.

The sheet material of both body 12 and keel 22 is a bondable plastic material such a as polyvinylchloride. The structural member (wing stick 18) is shown in FIG. 3 to be a hollow extruded plastic but may be of any suitable shape. The structural member itself may be a bondable plastic material or as shown in the drawings may have a bondable material deposited thereon. For example, if the structural member does include a bondable material thereon such as the film, the film may be a low durometer polyvinylchloride which is dually extruded with the structural member on one longitudinal side thereof and the structural member is a higher density polyvinylchloride. Other materials such as polyethylene may be used provided they are bondable by a heating process such as resistance or induction heating or by other suitable processes such as dielectric or ultrasonic bonding processes. All of these processes are believed to provide a bond which results from an integration or fusing of the molecular structures of the two materials being bonded. Also, such additional material for bonding may be applied as a bead 30 to the one side of the structural member 32 as shown in FIG. 4 or may be intermittently spotted as a film or bead along one side of the structural member (not shown). If desired, any suitable adhesive such as a hot melt, fast drying adhesive may be applied to the one side of the structural member provided it will bond to the structural member and, when subjected to the bonding steps as hereinafter described, will bond to the body material. As used herein, bondable shall mean capable of fusing but shall not include gluing and other contact types of joining two elements.

With structural members and body material which are compatible for suitable bonding, manufacture of the kite structure of the present invention is simplified. It is suggested that the structural members 14, 18 and 20 may be cut to their desired size and positioned in their desired relationship to each other on the fixture 34 as shown in FIG. 5. The body sheet material 12 is cut to the desired shape and positioned with respect to the structural members 14, 18 and 20 so that it is in contact with the side of the structural members to which it is to be bonded as shown in FIG. 6. Thereafter the bonding may be accomplished by applying a minimum amount of heat at the desired points of bonding. The bonding frame 36 which is shown to be pivotally mounted to the fixture 34 and to have heating strips 38 is closed onto the fixture 34 to apply the heat for bonding along the length of the structural members 14, 18 and 20. With suitable heating strips 38, the heating step is accomplished in a short period of time, e.g. 6 seconds. This heating step may always be accomplished in less than 10 seconds. It is preferred that the temperature of the materials during bonding be maintained below the temperature at which damage to the materials takes place. For example, with polyvinylchloride body and structural members, it has been found that the bonding is satisfactory in the temperature range between 125° F. to 200° F. Also, bonding in this temperature range is substantially immediately effective allowing the bonded structure to be removed from the bonding fixture to thereby minimize production time and allow a substantially improved rate of manufacture of kite structures as compared to kite structures utilizing a glue or cement for bonding which requires some time for setting.

The heating strips 38 include some source of heat such as a resistance element and a cover which engages the heat-bondable material, which cover is not heat-bondable but will transmit sufficient heat for the bonding.

In FIG. 8, a dual extrusion process for producing the structural members is shown. The primary extruding die 40 extrudes a structural element 42 having the desired shape such as shown in FIGS. 3 and 4 and the secondary die 44 extrudes a bondable material 46 onto one side of the structural element 42. By extruding the material 46 onto the structural element 42 as it leaves the die 40, the material 46 is bonded to the structural element 42. As previously explained, the material 46 may take the form of a film or a bead. The structural element 42 is cut into preselected lengths to form the structural members which are used in the making of the kite structure 10 as previously described.

In addition to the manufacturing advantages of the kite structure of the present invention, the use of the plastic sheet material for the body of the kite structure has the further advantage that when the kite structure has been tightly rolled for packaging, it does not take on any permanent set which might adversely affect its flight characteristics.

Thus by proper selection of the materials for the body, the keel and the structural members, the kite structure of the present invention may be manufactured simply and quickly and such kite structure has improved structural strength and flying capability over previous kite structures.

The foregoing disclosure and description of the invention are illustrative and explanatory thereof, and various changes in the size, shape and materials, as well as in the details of the illustrated construction, may be made within the scope of the appended claims without departing from the spirit of the invention.

We claim:

1. A kite comprising:

a body of thin sheet material which is heat bondable without the introduction of a critical weakness in the material only with the application of a minimum amount of heat;

a pair of structural members which are heat bondable only with the application of substantial heat which heat would introduce critical weakness into the body material if it were to be bonded directly to said structural members;

said structural members having a bead of heat-responsive bondable material along one edge thereof, said bead material being heat bondable to said body material with the application of only such heat that it does not introduce a critical weakness in said body material; and

said body being bonded to said structural members by bonding to said bead material on said structural members.

2. A kite according to claim 1, including:

a pocket secured to each of said structural members;

a cross brace adapted to have its ends engaged within said pockets to retain said structural members and said body in extended, kite flying position; and

a keel secured to said body.

3. A kite according to claim 1, wherein:

said body is a bondable polyvinylchloride;

said structural members are a high density polyvinylchloride; and

said bondable bead material is a low durometer polyvinylchloride.

4. The method of making a kite, including the steps of:

depositing a bead of heat-responsive bondable material along one side of structural members;

positioning said structural members and a body of sheet material on a surface;

said body material being heat bondable without the introduction of critical weakness only with the application of a minimum amount of heat and said structural members being bondable only with the application of an amount of heat which would introduce critical weakness in said body material;

said bead of heat responsive bondable material being bonded to said structural members and bondable to said body material with a minimum amount of heat which does not introduce a critical weakness in said body material;

heating said body material along all of its mating surfaces with said structural members to bond the body material to the structural members by effecting a bond to said heat-responsive bondable material; and

removing the bonded structure from said surface.

5. The method of making a kite according to claim 4 wherein said heat-responsive bondable material is deposited along said structural members by dually extruding said structural members and said bondable material and cutting the composite structure into the desired lengths.

6. The method of making a kite according to claim 4 including placing a keel of bondable material on said surface in a preselected position with respect to said body material and heating said keel to effect a bond to said body material at the same time the body is being bonded to said structural members.