Dec. 21, 1965 W. J. SHAPIRO 3,224,138

TOY GLIDER WITH DOUBLE WING MEANS

Filed Oct. 10, 1963 7 Sheets-Sheet 1

Fig. 1

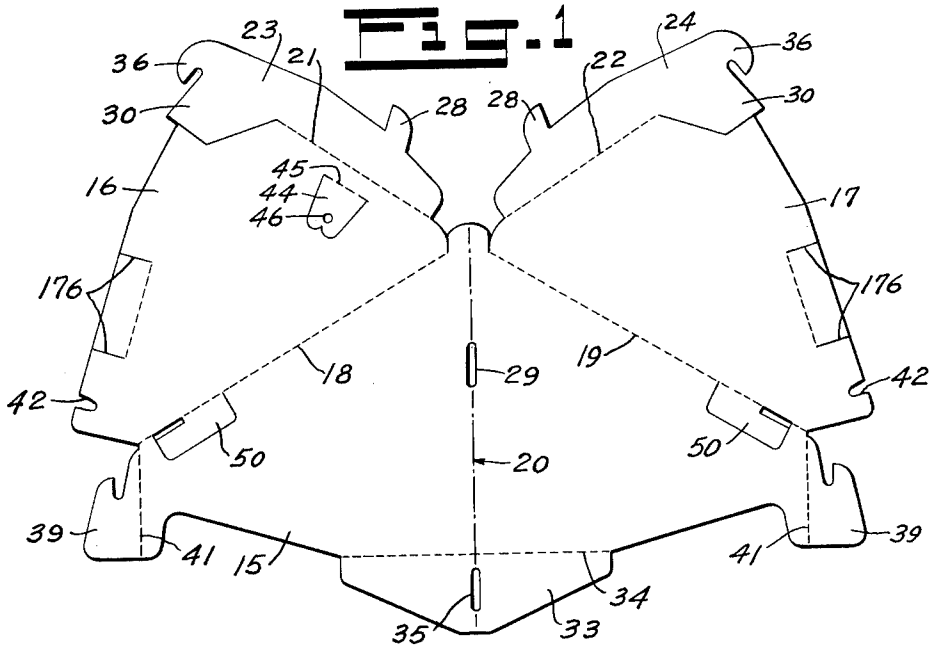
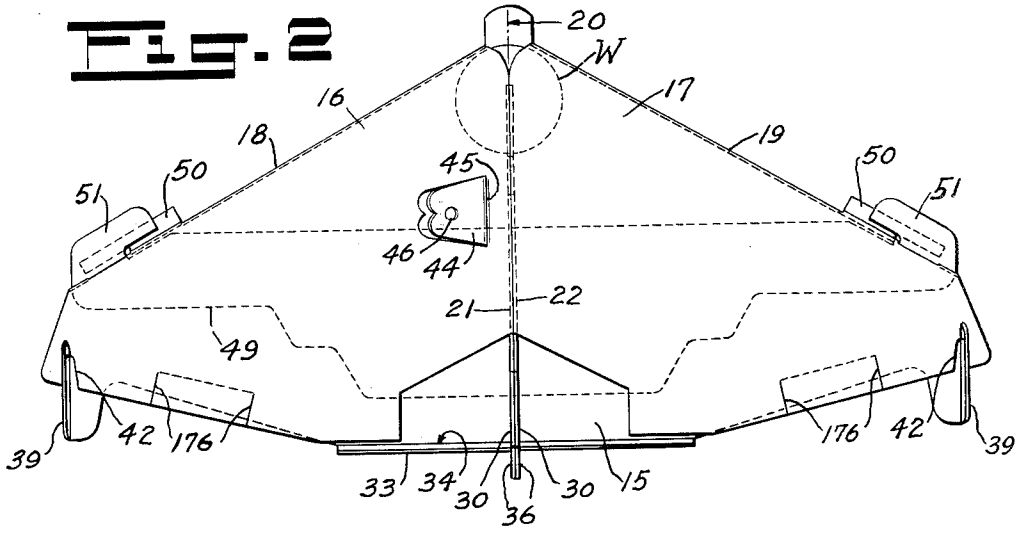


Fig. 2



INVENTOR.
WILLIAM J. SHAPIRO
BY
John M. Montstream
ATTORNEY

Dec. 21, 1965 W. J. SHAPIRO 3,224,138

TOY GLIDER WITH DOUBLE WING MEANS

Filed Oct. 10, 1963 7 Sheets-Sheet 2

Fig. 3

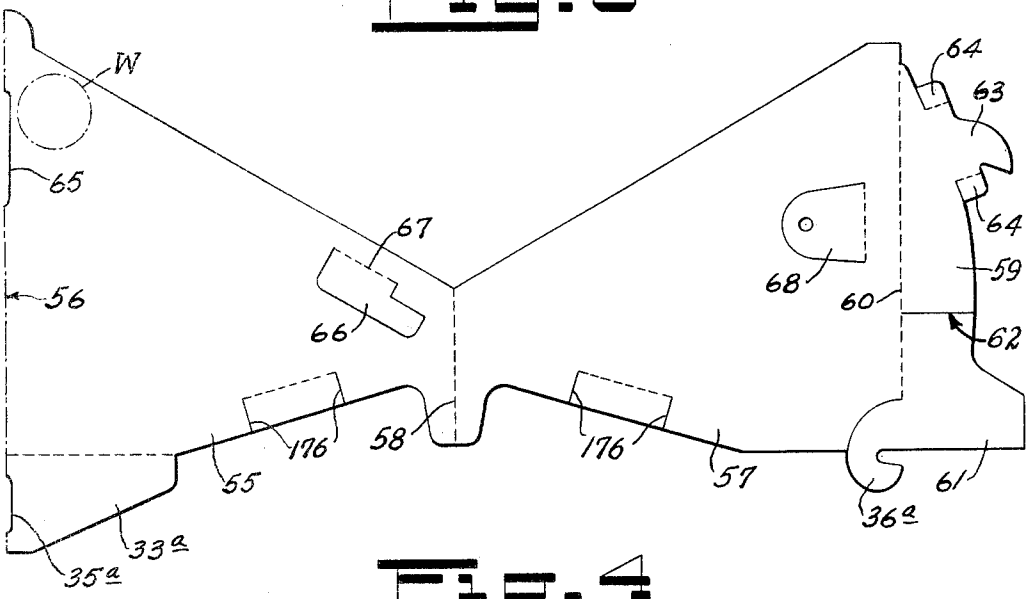
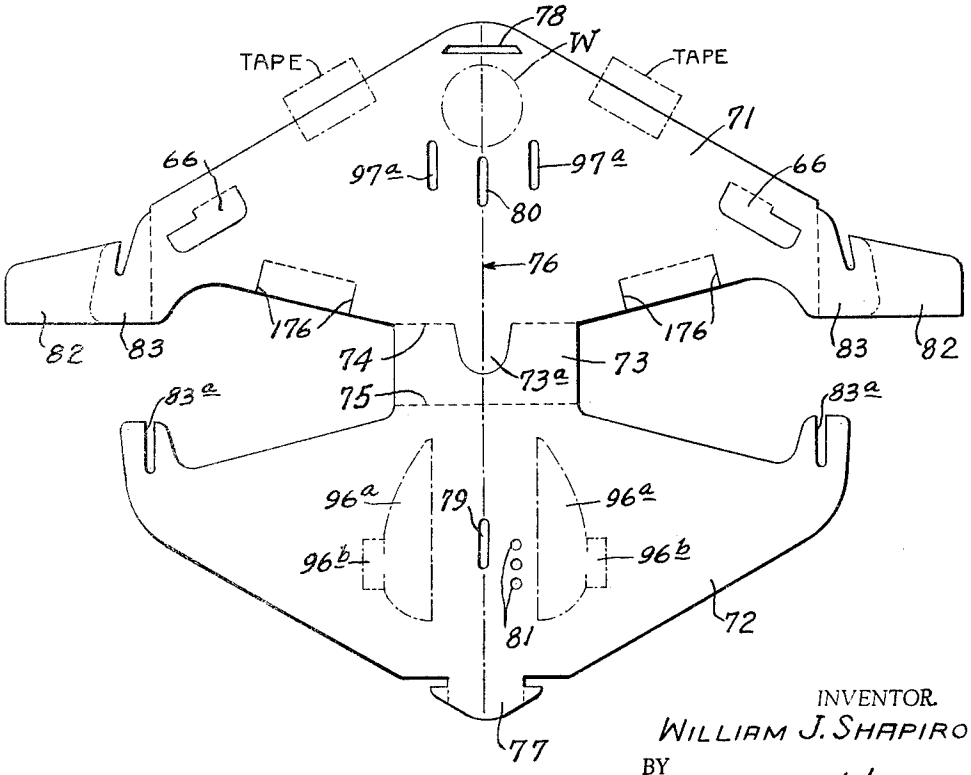


Fig. 4



INVENTOR.
WILLIAM J. SHAPIRO
BY
John M. Montstream
ATTORNEY

Dec. 21, 1965 W. J. SHAPIRO 3,224,138

TOY GLIDER WITH DOUBLE WING MEANS

Filed Oct. 10, 1963 7 Sheets-Sheet 3

Fig. 5

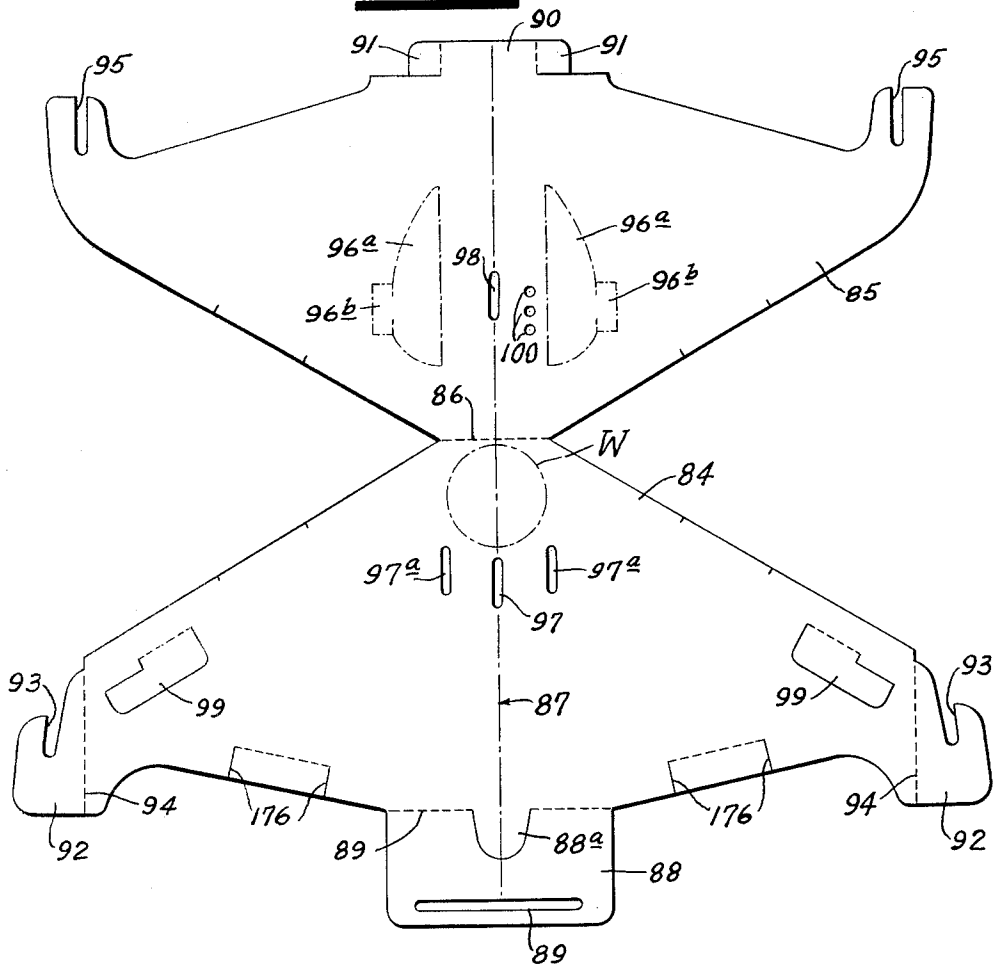
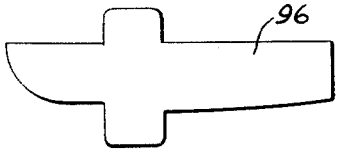


Fig. 5-A



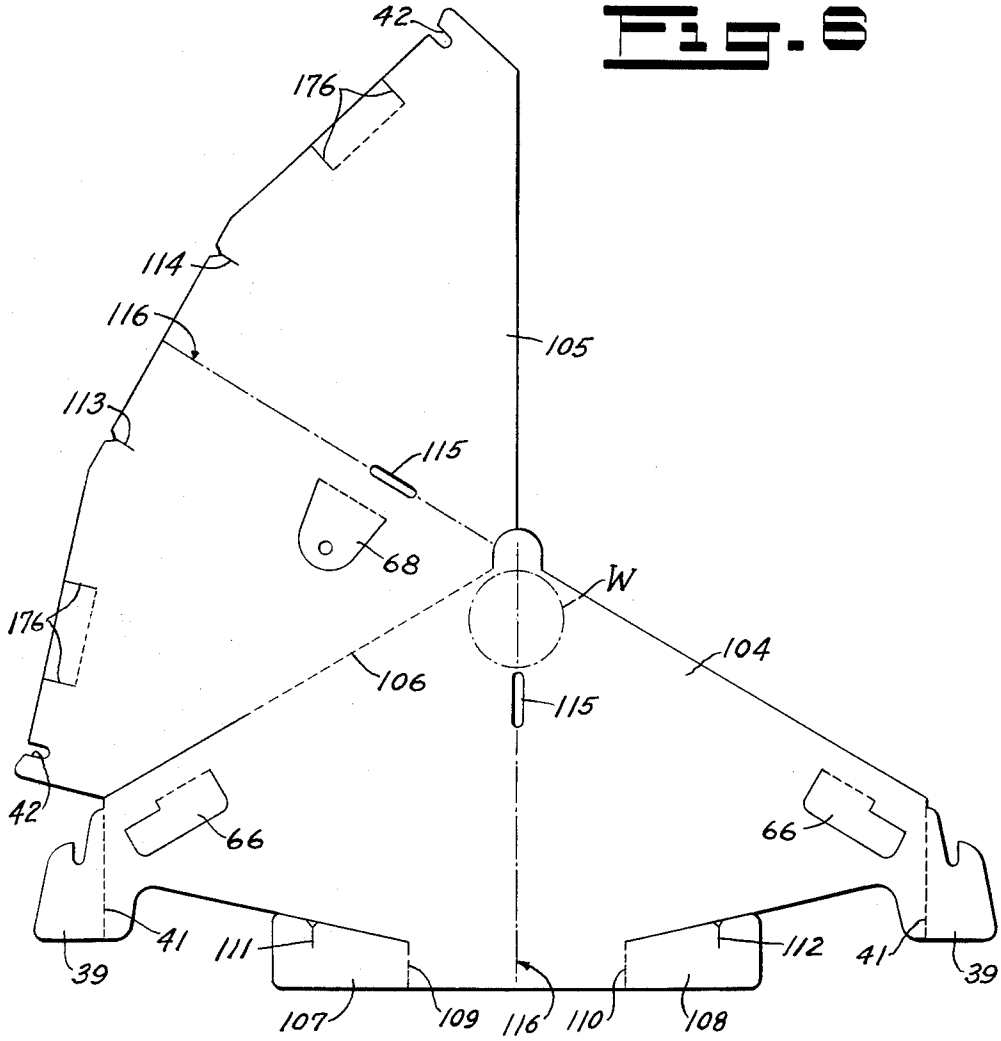
INVENTOR.
WILLIAM J. SHAPIRO
BY
John M. Montstream
ATTORNEY

Dec. 21, 1965 W. J. SHAPIRO 3,224,138

TOY GLIDER WITH DOUBLE WING MEANS

Filed Oct. 10, 1963 7 Sheets-Sheet 4

Fig. 6



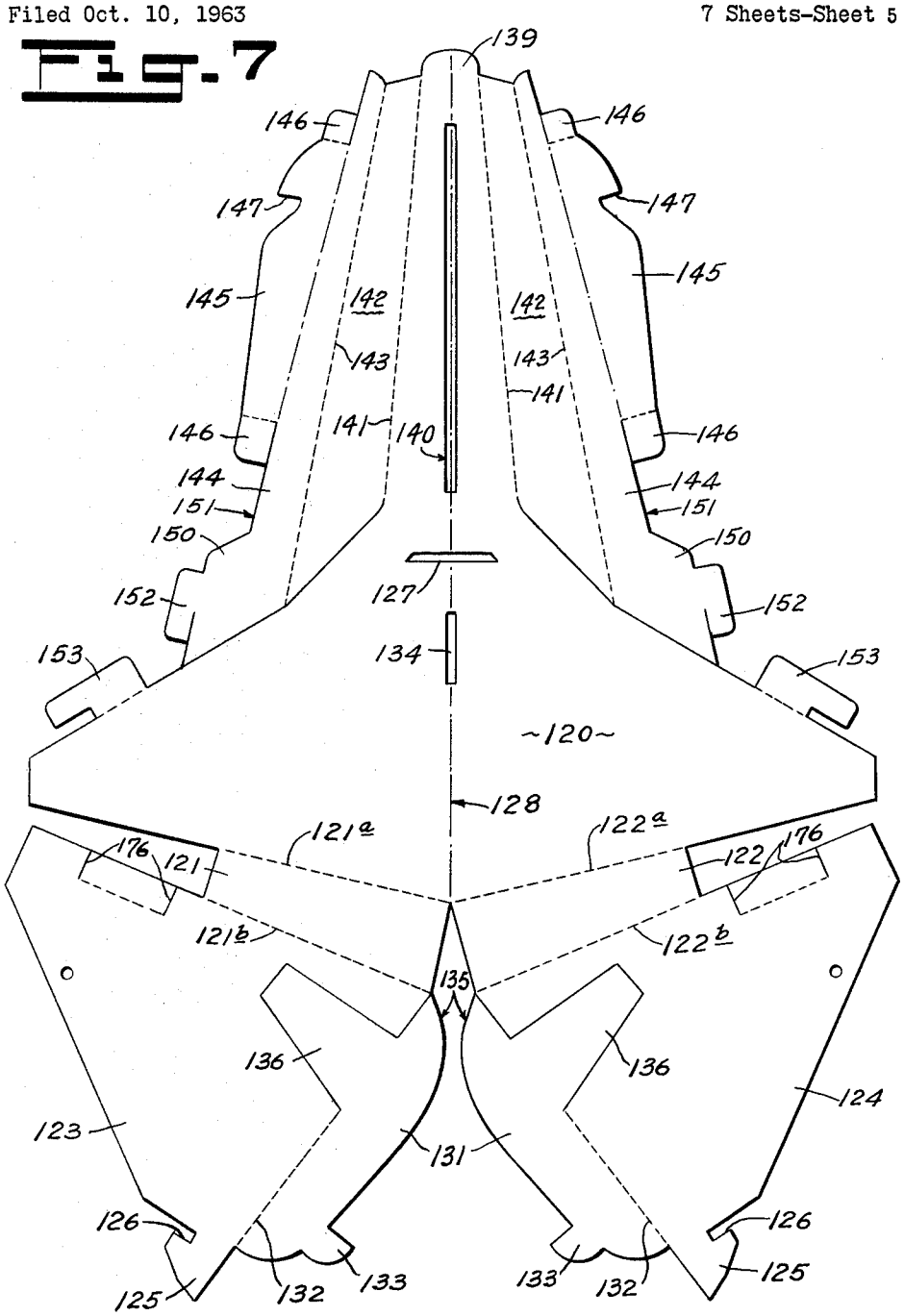
INVENTOR.
WILLIAM J. SHAPIRO
BY
John M. Montstream
ATTORNEY

Dec. 21, 1965 W. J. SHAPIRO 3,224,138

TOY GLIDER WITH DOUBLE WING MEANS

Filed Oct. 10, 1963 7 Sheets-Sheet 5

Fig. 7



INVENTOR.
WILLIAM J. SHAPIRO
BY
John M. Morriss Stream
ATTORNEY

Dec. 21, 1965 W. J. SHAPIRO 3,224,138

TOY GLIDER WITH DOUBLE WING MEANS

Filed Oct. 10, 1963 7 Sheets-Sheet 6

Fig. 8

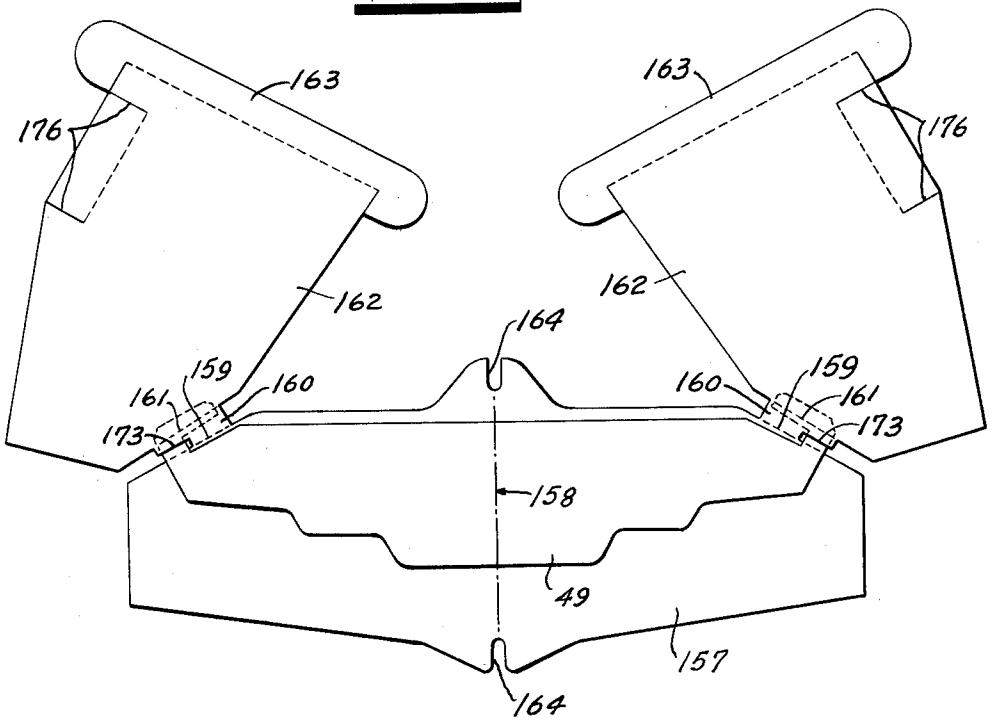
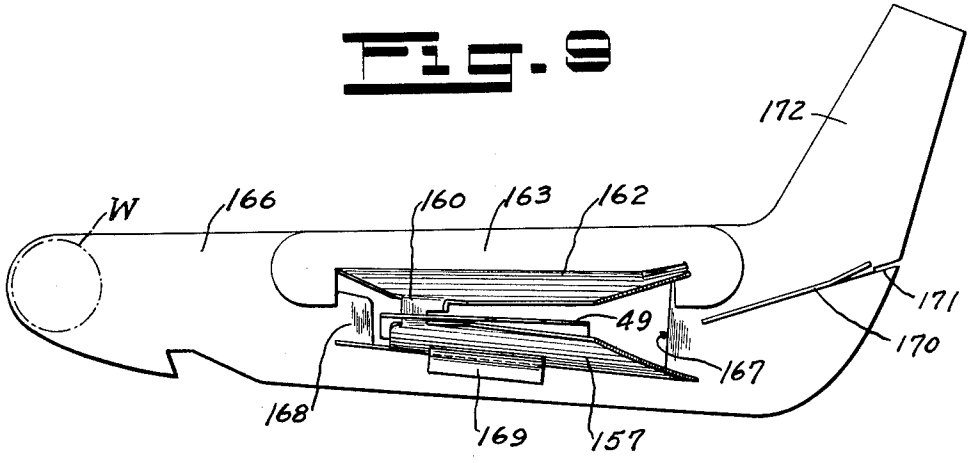


Fig. 9



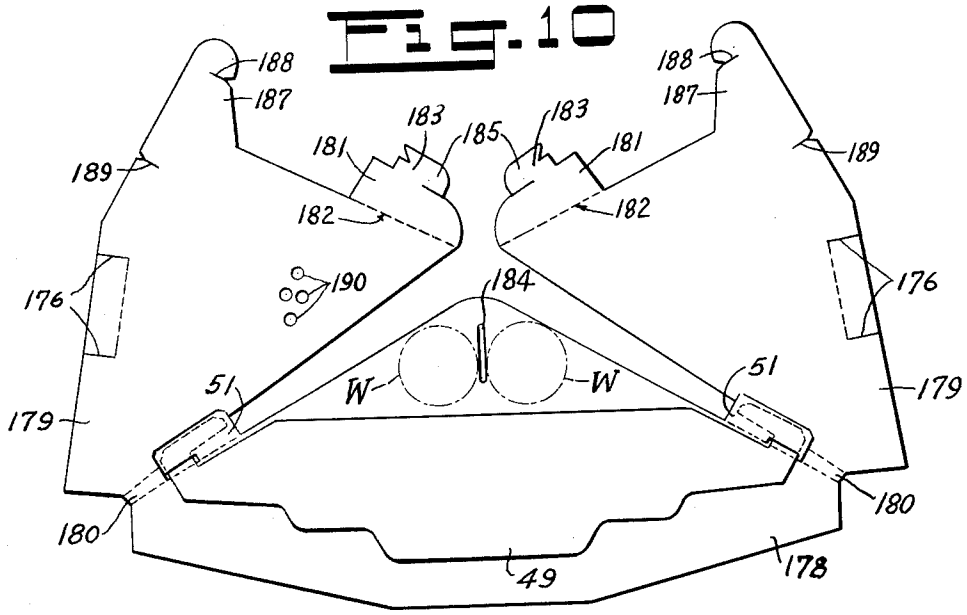
INVENTOR.
WILLIAM J. SHAPIRO
BY
John M. Montstream
ATTORNEY

Dec. 21, 1965 W. J. SHAPIRO 3,224,138

TOY GLIDER WITH DOUBLE WING MEANS

Filed Oct. 10, 1963 7 Sheets-Sheet 7

Fig. 10



INVENTOR.
WILLIAM J. SHAPIRO
BY
John M. Montstream
ATTORNEY

United States Patent Office 3,224,138 Patented Dec. 21, 1965

3,224,138

TOY GLIDER WITH DOUBLE WING MEANS

William J. Shapiro, 658 Montgomery St., Brooklyn, N.Y.

Filed Oct. 10, 1963, Ser. No. 315,171
27 Claims. (Cl. 46—79)

The invention relates to a toy glider having a double wing construction on a pair of adjacent wing means. The invention also includes this construction with a sound emitter mounted on, or in, the wing means in which combination the spaced adjacent wing means forms a sound box for the sound emitter. The sound box particularly increases the volume and improves the quality of sound generated by the emitter as compared to that produced by a single wing construction. The glider may be constructed for attachment to a twirling string to be twirled around the head for tethered flight, or it may be constructed to be projected by suitable means, such as a rubber band, for free flight. Although the form of the glider illustrated is made of cardboard folded into wing form, the glider may also be formed from sheet plastic having similar characteristics or sheet metal or be molded of plastic into the same or substantially the same shape or form. The glider blank formed from sheet material adapts itself to be printed on a sheet so that a child may cut it out or the glider blank may be perforated on sheet material. The form of the glider blank adapts it also for printing on a carton box of merchandise such as a cereal box so that a child may cut out the blank and fold it into the finished glider.

An object of the invention is to construct a glider of a new form having a double wing construction of relatively adjacent but spaced wing elements.

Another object of the invention is to construct a glider having spaced adjacent wing elements forming a sound box and on, or in which a sound emitter is mounted for vibration when twirled or projected.

A further object is to construct a toy glider of sheet material which is folded into glider form with wing elements in adjacent spaced relation.

A still further object is to construct a toy glider with wing elements in adjacent spaced relation forming a sound box on or in which a sound emitter is mounted.

Another object is to construct a toy glider having a sound box on or in which a sound emitter is mounted and which may be constructed for tethered and projected flight.

A still further object is to construct a toy glider of new form and of sheet material which is folded into glider form.

Another object is to construct blanks of sheet material which can be folded into the toy gliders identified in the above objects.

Other objects of the invention will be more apparent from the following description when taken in connection with the accompanying drawings illustrating preferred embodiments thereof, in which:

FIG. 1 is a view of a blank, in reduced size as compared to FIG. 2, of sheet material from which a glider may be folded into glider form with adjacent wing elements with the fold lines at the leading edges of the wing elements.

FIG. 2 is the toy glider in full size formed from the blank of FIG. 1 and carrying a sound emitter.

FIG. 3 is a view of half of a glider blank for forming a glider in which the fold line for the wing elements is at the end edge of a double wing element.

FIG. 4 is a view of a glider blank in which the fold line for the wing elements is at a rear or trailing edge of the wing elements.

FIG. 5 is a view of a blank for forming a glider in which the fold line of the wing elements is at right angles to the axis of the glider and at the leading edge of the wing elements.

FIG. 5A is a chordal spacer or panel for the glider formed from the blank of FIG. 5.

FIG. 6 is a view of a blank for a glider in which the wing elements are double elements and are integral with one forward or leading edge of the wing elements.

FIG. 7 is a view of a glider blank with extended nose intended primarily for free flight without use of or with miniminm use of nose weight.

FIG. 8 is a view of a glider blank which is assembled or folded into glider form and carrying a sound emitter between the wing elements or within the sound box.

FIG. 9 is a side view of a glider using a fuselage member and made from the folded wing means of the blank of FIG. 8, and

FIG. 10 shows a glider blank constructed to form a glider to receive a sound emitter between the wing elements.

The glider blank shown in FIG. 1, is made from sheet material such as light weight cardboard of about .012" thickness although this thickness is not critical. The glider has a first wing means which includes a double wing element **15** and a second wing means which in this embodiment includes a pair of single wing elements **16** and **17** each integral with a leading edge of the double wing element. Each leading edge **18** and **19** forms an integral hinge or a fold line or bending axis on each side of the double wing element. The wing fold lines particularly shown in this embodiment of the glider are at an angle with respect to the longitudinal axis of the glider so that when the single wing elements are folded over the double wing element, a delta wing type of glider is formed.

The angle shown for the integral hinge means or fold lines at the leading edges is about 60 degrees with respect to the longitudinal central axis **20** of the glider but a considerable range of angles is permissible; however, the smaller the angle, the longer the leading edges become in order to provide sufficient span for flight and for a sound emitter, if used. Also with a smaller angle, the glider is longer for an equivalent wing span which projects the nose farther forwardly and permits use of a lighter drive weight in the nose. Also the fold need not be a sharp fold but may be a rounded or rolled edge to more nearly simulate the leading edge of the wings of an aeroplane.

Locking means is provided to retain the wing elements in adjacent spaced relation and is spaced from the fold line. Each single wing element may have a second fold line **21** and **22** at an outer edge thereof in the blank for an integral chordal spacer **23** and **24**. Preferably the second fold line is located such that when each single wing element is folded over on the respective first fold line **18** and **19**, the second fold line preferably comes over, as shown in FIG. 2, but may be adjacent to the central longitudinal axis **20** of the double wing element. The chordal spacer of each single wing element is bent at right angles to its single wing element so that it forms a vertical supporting or chordal means between the two wing elements and as located in the drawings, the two panels are side by side. Preferably each chordal spacer has a locating projection **28** at the outer edge thereof, which is projected through a slit or slot **29** shown particularly at the longitudinal axis of the double wing element and the locating projection extends therethrough and secures the spacer against lateral and longitudinal movement. This projection preferably is long enough also so that it may be used as a projecting hook to receive a rubber band for projecting the glider for free flight.

At least one of the chordal spacers has a rudder **30** at the end thereof, which, when the spacer is folded vertically, projects the rudder above the surface of the wing means to give stability for flight. As shown the rudder projects above the single wing elements. The rudder may be on the outer edge of the panel in which event it projects beyond the double wing element so that the latter may then form the top surface of the glider in flight rather than the single wing elements.

Locking means is provided to retain the ends of the double wing element and the two single wing elements together at the trailing edge or spaced from the fold lines. In the form shown in FIG. 1, this locking means is shown as a single locking panel **33** integral at the rear edge of the double wing element which is folded vertically on a folding line **34**. The locking panel has a locking slot **35** therein. Each chordal spacer carries a hook **36** at its rear end and forms a part of the locking means, which hook is received in the locking slot **35**, and the flexibility in the cardboard brings the hook to and keeps it at the end of the slot and in locking relation.

The wing means may have additional locking means at the ends of the wings which locking means is shown as an end tab **39** at each end of one wing element, such as the double wing element, and having a locking notch **42** in the edge of the other wing element. Each end tab is bent on its fold line **41** into a vertical position. The other wing element or elements, such as each single wing element, has a cooperating locking notch **42** in the rear edge thereof which interlocks with the notch in the locking tab. If desired, the end locking tabs **39** may project vertically well beyond the plane of the wing element to form spaced rudders for stability in flight. The glider may be provided with either the chordal panel rudder or the end tab rudder or both as desired. The chordal panel rudder may also serve as a gripping tab to hold the glider when stretching a projecting rubber band for projected flight.

Means may be provided for tethered flight which means may be merely a hole punched through a wing element to attach the end of a twirling string or to receive a hook at the end of the string. Natural flight is more nearly simulated if one of the wing elements, such as particularly shown on the single wing element **16**, carries a twirling string tab **44** adjacent to the fold line **21**, at the longitudinal axis of the glider. As shown the tab may be cut from the wing element and having a fold line **45** to project the string tab outwardly. The string tab has a hole **46** therein to which the string may be tied or to receive a hook on the end of a twirling string. With this form of string attachment, the glider in tethered flight takes an angle of about 30 degrees as the glider is twirled around the head.

Means may be provided to attach a sound emitter **49** onto the surface of a wing means as shown in the glider of FIG. 2. It is preferable that the sound emitter be mounted to lie adjacent to the double wing element **15**. This may be accomplished by having a sound emitter hook **50** cut from the double wing element adjacent to each end of the double wing element which hooks are bent outwardly on the fold lines **18** and **19**. In this position each hook may receive a cooperating hook **51** on each end of the sound emitter so that the latter is mounted adjacent to the surface of the wing element and beats thereon. The sound emitter particularly shown is that of my Patent No. 2,826,862, although other types may be used.

The glider blank shown in FIG. 3 is of a different construction from that shown in FIG. 1, although the wing means include a double wing element **55**, half of which is shown to the longitudinal axis **56** and a pair of single wing elements **57**, forming a second wing means. In this construction the double wing element has a locking panel **33***a* at the rear edge thereof and a slot **35***a* which parts are identical with the locking panel of the

construction of FIG. 1. Each single wing element **57** is integral with its respective end of the double wing element on a hinge means or fold line **58** which is shown particularly as parallel with the longitudinal axis **56** of the glider although this fold line may be at a not too great angle thereto. Each single wing element carries a supporting or chordal spacer or panel **59** on a fold line **60** on the inner edge of the wing element when assembled or folded, or the outer-most end in the blank form. This spacer may be essentially the same as the spacer in FIG. 1, in that it has a locating projection or tab **63** with at least one locking tab **64**, two being shown, which projection with tabs passes through a slot **65** in the double wing panel. Since the fold line **58** in this single wing form of glider is some distance from the longitudinal axis **56** the locking tab **64**, or equivalent means such as tape, is essential. For projected flight the glider should have a rudder which may be provided by a rudder and locking hook panel **61** on a continuation of fold line **60**. A slit **62** separates the same from the chordal spacer **59** so that this rudder panel may be bent upwardly above the single wing elements. The hook **36***a* serves also then as means to retain the rudder vertically.

The glider may have also, a pair of spaced sound emitter hooks **66**, shown as carried on the double wing element at each end thereof. The sound emitter hook is bent outwardly on a fold line **67**. The chordal spacers or panels **59** are bent at right angles to the wing elements and provide support and rigidity for the wing elements as well as retains them in spaced adjacent relation. A string tab **68** may also be provided for tethered flight.

FIG. 4, shows a construction of glider blank with the wing means including two double wing elements **71** and **72** integral at their trailing edges and are held spaced apart at the trailing edge by an integral hinge means formed by a connecting panel **73** having spaced and parallel fold lines or hinges **74** and **75** extending at right angles to the longitudinal axis **76** of the glider and glider blank. The leading edge or nose of this construction of glider has suitable locking means to retain the same together, the locking means shown includes a locking nose or tab **77** at the nose or forward end of one double wing element **72** which is received in a locking slot **78** at the nose or forward end of the other double wing element **71**. Means are provided for locking the wing tips together which means is the same as that of FIG. 1. This glider also may use a chordal spacer centrally thereof which is of the same construction as that illustrated in FIG. 5A and received in slots **79** and **80** in the wing elements. The leading edges may be additionally secured together such as by tape. A twirling string attachment **81** may also be provided.

For projected flight, the glider must have rudder means which may be provided as rudder extension on the end hook tabs **83** which hooks engage in slots **83***a* to retain the ends together. The hooks also function to retain the rudders in vertical position. If desired, chordal spacers may be integral with the wing element as shown by **96***a* in which each spacer carries locking tabs **96***a* which is received in a slot **97***a* in the other wing element **71**. A gripping tab **73***a* may be cut from panel **73** for use in projected flight.

FIG. 5 illustrates a glider bank in which each wing means includes integral wing elements **84** and **85** having hinge means or a fold line **86** at the forward end of the elements. In this construction, both wing elements are double wing elements. The two wing elements are folded to overlie each other on the fold line **86** which extends at right angles to the longitudinal axis **87** of the glider so that when the blank is folded, the wing elements are adjacent but spaced from each other in overlying relation. This glider shows a different form of locking means in order to secure the trailing edges of the wing elements in spaced relation. An integral locking panel **88** is folded vertically along a fold line **89** and has a horizontal lock-

ing slot spaced from the fold line which slot receives a locking projection **90** on the trailing edge of the other wing element **85**. Double locking tabs **91** are provided, one at each end of the locking projection so that with the projection inserted in the locking slot **89**, the tabs may be angled to anchor or lock the projection in the slot.

Locking means may be provided for the wing tips which locking means is similar to the locking means at this point previously described and shown as a foldable locking tab **92** at each wing tip of one wing element and having a locking slot **93**. The tabs are folded at right angles to the wing element on a fold line **94**. The other wing element carries a locking slot **95** at each end thereof to be received in the locking slot **93** of the wing tip locking tab. In this construction, the second wing means is a double wing element.

Chordal means shown as single chordal spacer or panel **96** may be provided to give a wing element or both wing elements an outward bulge or curve at the forward end thereof and increases their tautness. The chordal spacer is shown as a separate element, although it need not be. The chordal spacer is received by a longitudinal slot **97**, **98** in each wing element. Spaced sound emitter hooks **99** may also be provided as well as a string attaching means **100**. If desired, the chordal spacers **96***a* may be integral as described in the FIG. 4 construction and a gripping tab **88***a* may be cut from the panel **88**.

FIG. 6 shows a glider blank in which the two wing means are double wing elements **104** and **105** but the two wing elements are integral along one leading edge which forms hinge means or a fold line **106** upon which one wing element is folded over the other wing element in adjacent spaced relation. The trailing edges of the wing elements may be held in spaced relation by locking means which may be the same as the locking means shown in FIGS. 1 or 5 although the construction shown in FIG. 6, is of a different type. This locking means includes a pair of spaced locking panels **107** and **108** each integral with one wing element and bendable on fold line means or folded lines **109** and **110** spaced from the longitudinal axis of the glider blank and parallel therewith. Each locking panel has a locking slit **111** and **112** spaced outwardly from its fold line which locking slit engages its respective cooperating slit **113** and **114** at the trailing edge of the other wing element **105** to retain the trailing edges in adjacent spaced relation. It is desirable that this form of glider have a chordal spacer or panel which is the same as or similar to that of FIG. 5A, and is retained in place by a slot **115** in each wing element of the longitudinal axis **116**. This glider may also have a locking means at the wing tips which is similar to or identical with that heretofore described. Spaced sound emitter hooks may be provided as well as a string tab for tethered flight.

FIG. 7 shows a construction of a glider with a longitudinally extending fuselage or nose means projecting forwardly so that the glider more nearly simulates a conventional plane and also provides forward nose weight. In this glider, a double wing element **120** is provided and at the trailing edge thereof, there is a pair of connecting panels **121** and **122** each having spaced integral hinges or fold lines **121***a* and **121***b*; and **122***a* and **122***b* respectively with a single wing element **123** and **124** attached to its fold line **121***b* and **122***b* respectively. The forward end of each single wing element is anchored to the double wing element in any suitable manner, however, the locking means shown is a locking projection **125** at the forward end having a locking notch **126**. The tips of the locking projection **125** are bent inwardly whereupon the projection is received in a locking slot **127** extending at right angles to the longitudinal axis **128** of the glider and the tips then bent out for anchoring the forward end of each single wing element to the double wing element.

Preferably each single wing element carries a chordal spacer **131** integral therewith along a fold line **132** at an edge of the element. In this glider the leading edge is open into the wing element. The chordal spacer may have a locking and locating projection **133** at an edge thereof which is received in a central slot **134** in the double wing element. The chordal spacer has a rounded shape **135** forwardly to give an outward curve to the double wing element. At least one of the chordal spacers has a rudder **136** projecting therefrom which projects above the single wing element to form a stabilizing rudder.

The double wing element carries a fuselage means therewith projecting forwardly at the forward end thereof which fuselage means includes a horizontal fuselage panel or element **139** having a longitudinal extending slot means **140** along the longitudinal axis of the glider. The horizontal element has a first fold line **141** on each side thereof preferably extending at a relatively small angle to the longitudinal axis so that a nose or connecting panel **142** is integral therewith. The outer edge of each panel **142** and hence spaced from the first fold line of each first panel, is a second fold line **143** preferably extending at a relatively small angle with respect to the first fold line and at a greater angle with respect to the longitudinal axis. A second panel is integral with the connecting panel **142** and forming a vertical fuselage panel or element **144**. The outer edge of the second panel or vertical fuselage element carries a locking projection and skid **145** with locking tabs **146** preferably at each end thereof. This locking projection may have a hook **147** for receiving a rubber band for projecting the glider for free flight.

The nose of the glider is formed by bending each first or connecting panel **142** along its fold line **141** so that the panel extends at an angle over the horizontal fuselage element **139**. Each second panel or vertical fuselage element **144** is bent on its fold line **143** at an angle so that this element is at right angles to the horizontal panel and the locking tab **145** and hook projects through the locking slot **140**. The first panel **142** preferably has a width greater than the dimension between the longitudinal axis **128** of the glider and the first fold line **141** so that when the first and second panels are folded a triangular hood or tube is formed on each side of the nose with the vertical fuselage elements in side by side relation on the longitudinal axis. This construction is like that shown in my application S.N. 10,481 filed February 23, 1960.

The lateral width of each first panel **142** may be less than that enumerated in which event the vertical fuselage elements are spaced from each other and received in spaced slot means **140**. In this construction, FIG. 7, the vertical and horizontal fuselage elements stiffen and reinforce each other. The tubular hoods also resemble jet motors. This fuselage means or nose also provides nose weight for the glider which, with the length as shown, has not eliminated a forward weight but does reduce substantially the weight required to be added particularly for free flight. A paper clip at the end gives the required additional nose weight for flight. The vertical fuselage elements may be shorter or long as illustrated and engage a portion of the wing means. In this long construction at least one of these elements may carry a shaping tab at the end thereof which projects beyond the contacting edges **151** of the vertical fuselage elements. The shaping tab carries a locking flap **152** which is projected through the slot **134** and then bent to lock the tab in the slot. This shaping tab gives a downward curve to the front of the double wing element **120** when folded into glider form. The double wing element may have spaced sound emitter hooks **153**.

FIG. 8 illustrates a form of wing means blank in reduced size for a toy glider with the sound emitter to be located between the wing means. The wing means includes a double wing element **157** having a longitudinal central axis **158** and a leading edge on each side at least a portion of which forms a fold line **159**. A connecting panel **160** is integral with each integral hinge means or

fold line which is short so that the panel will not obstruct the opening between wing means. Each panel is relatively narrow also and its other edge has a fold line **161** which is integral with a single wing element **162**. At the end of each single wing element is a securing panel **163** bendable upon a fold line. Each single wing element is folded on fold lines **159**, **161** over the double wing element in spaced adjacent relation therewith. Suitable positioning means may be carried by the double wing element that shown being slots **164** at the leading and trailing edges on the longitudinal axis **158**.

The glider blank illustrated in FIG. 8 is used with a separate fuselage member **166** to which the wing means are attached in any suitable manner. The fuselage element used is about 3/32 of an inch thick in order to give sufficient rigidity thereto. It may be cardboard, plastic, wood such as Balsa wood or other suitable material. The particular manner shown of mounting and securing the folded wing means to the fuselage member is by providing a large opening **167** in the member through which the wing means is passed. The double wing element, FIG. 9, is located on the fuselage in any suitable manner that shown being the locating or positioning means including the slots **164** and the trailing edge of the opening **167** and a centering projection **168** at the leading edge of the opening which receives the forward slot **164**. The double wing means is secured to the fuselage such as by a piece of adhesive tape **169**. The securing panels **163** of the single wing elements **162** are bent upward at right angles which panels are attached to the fuselage member, such as by an adhesive to retain the wing means in spaced relation. The securing panels, therefore, do not obstruct the opening nor interfere with the sound emitter. The fuselage member may have stabilizer means **170** secured thereto such as in a slot **171** and a rudder **172** at the rear end thereof. The leading edges of the wing means have an opening therebetween so that an air stream may pass between the wing means and pass out through the open space between trailing edges of the wing means.

The sound emitter is attached between the wing means and to the wing means and preferably adjacent to the double wing element **157**. This may be done by separate spaced hook tabs as in the other forms, which are projected inwardly and carried on one of the wing means. A simpler construction, however, uses the connecting panels **160** between wing elements to receive the hook on each end of the sound emitter **49**. Each connecting panel **160** may have a hook receiving slot **173** which assures that the sound emitter is on or adjacent the double wing element **157**. In projected and tethered flight the sound emitter vibrates and emits a noise simulating a motor. It has been found that better sound emission occurs when the leading edge of the sound emitter is at or near the leading edge of the wing means.

All of the gliders illustrated are capable of tethered flight by attaching a string thereto either by tieing the same to the glider or the end of the twirling string may be provided with a simple wire hook which is received in a hole in the glider. A better plane flight simulating attitude is secured, if one of the wing elements is provided with a string tab adjacent to but spaced from the longitudinal axis which tab has a hole therein. The tab is bent outwardly on a fold line as illustrated.

Each of the gliders requires a drive weight W in the nose thereof except for the glider of FIG. 7 which may use one if flight requires it. A weight of about a nickel is usually adequate although in some gliders better flight control and drive seems to be secured with a heavier weight such as that of a quarter. This weight also flies the glider forwardly in tethered flight in that the glider takes a position with the weight forward of the string attachment to the glider. The forward direction is secured without attention and merely by twirling of the glider.

Each of the gliders may carry, and desirably does carry, a sound emitter such as that illustrated in FIGS. 2, 8 and 9. All of the glider blanks illustrated have sound emitter hooks attached to a wing element or elements. These hooks are preferably cut from the wing elements and folded outwardly. Any suitable attachment may be used in FIG. 9, although the connecting panel **160** is used so that here the connecting panel serves a double function. Preferably the emitter is mounted to lie adjacent to the double wing element and strike this element when it vibrates in the wind stream to emit a sharp staccato noise simulating somewhat the sound of a motor of a plane. With the double wing element and the cooperating wing means in spaced but adjacent relation, the glider or wing means also form a sound box for the sound emitter which increases the sound emitted and improves the character of the sound as well. With a sound emitter carried by the glider, it may be used either in tethered flight with a twirling string or in free or projected flight by use of projecting means such as a rubber band. The sound emitter may be positioned between the wing elements as in FIG. 9, however, in this construction it is necessary that the longitudinal portion of the leading edges of the wing elements be open to pass a wind streams between the wing elements to vibrate the sound emitter. It has been found too that consistent sound emission is secured with the emitter between the wing elements when the forward edge of the sound emitter is adjacent to the leading edge of the wing element. This is not necessary for an emitter on an exterior surface of the wing means.

The glider may be molded of plastic in essentially the same shape as in the sheet material folded constructions particularly illustrated. The sheet material form, however, has the do-it-yourself character to appeal to children as well as representing an economic or cost advantage in dies and material as well as a wider range of interest such as with boxed food products. The sheet material satisfactorily used for gliders of roughly 7 or 8 inches span is light weight cardboard having a thickness of about .012 of an inch. The thickness may be greater over a relatively wide range for this size glider even for projected flight gliders. Gliders of greater span preferably use a heavier grade of cardboard or sheet material.

The wing elements are spaced apart at the trailing edges at least at the longitudinal axis by about 3/4 of an inch. This is not a precise dimension for securing the sound effects or for projected and tethered flight.

FIG. 10 shows a blank for a glider in which the sound emitter may be carried between or within the wing means and in which the form of the glider is related or similar to that of FIGS. 1 through 7, in that it does not use a separate fuselage element as in the construction of FIGS. 8 and 9. The wing means comprises a double wing element **178** having angularly directed leading edges and a pair of single wing elements **179** integral therewith on a narrow connecting panel **180** at the outer or tip portions of the leading edge. Each single wing element has a chordal spacer **181** at the other edge thereof and integral therewith on hinge means or a fold line **182**. This chordal spacer has a locating projection **183** at its outer edge, in blank form, which is projected through a slot **184** in the double wing element in order to support the single wing elements spaced from the double wing element and also to secure the single wing elements in folded or assembled relation with the double wing element. The projection is retained in the slot by a locking tab **185**. The chordal spacer is relatively short so that the sound emitter may extend from wing tip without interference therewith. The sound emitter is retained in position between the wing elements or within the wing means by emitter hooks **51** at the leading edge of the double wing element.

Suitable means are provided to retain the trailing edges of the two single wing elements in assembled rela-

tion. Those previously described are suitable, however, the figure shows another form which includes a locking projection **187** at the adjacent trailing edge portions, when folded, of each single wing element and having a locking slit **188** therein. Each wing element has a cooperating locking slit **189** in the trailing edge thereof to receive the slit **188** in the locking projection of the other single wing means to provide interlocking means. The particular locking means described in FIG. 10, may be used with the other constructions of glider described herein having single wing elements. The glider is shown for tethered flight in that holes **190** are provided through the wing means to which a twirling string may be tied or otherwise secured.

In all of the constructions of a chordal spacer, it is desirable that the forward end thereof be well rounded so that the double wing element carrying the sound emitter is given an increased bend or curvature at its forward portion. This form of wing improves sound emission. For projected flight, a control or trim flap means is desirable which may be provided by spaced slits **176** in the trailing edges of the wing means at least one flap being provided on each side of the longitudinal axis. The flaps may be bent up or down or one up and the other down or one only up or down as flight may indicate. The locating projections carried by the chordal spacers of all of the forms of gliders illustrated may be or may carry a hook for a rubber band for projected flight.

Since the two wing means support and give reinforcement one to the other, the sheet material used may be thinner than that necessary for a single wing glider. The constructions providing single wing elements enable the rudders on each single wing element to be brought together which can not be done with a single wing construction. The sound emitter hooks may take several forms and need not be integral parts of the glider blank although this assures proper location and spacing for the emitter provided. Since the gliders of FIGS. 3, 4, 5 and 7 have a substantial opening between wing means at the leading edges, the sound emitter may be located between wings merely by directing the sound emitter hooks inwardly and using a short chordal spacer at the nose so that interference with the emitter is avoided. These constructions may carry a sound emitter exterior of and within the wing means. The holes or tab for the attachment of the twirling string to the glider for tethered flight may be located in many positions near or distant from the longitudinal axis and a change in its location changes the flexibility or shape of the wing means and influences the sound characteristic of the emitted sound. A projecting string tab such as **44**, and **68** gives greater stability to tethered flight than when holes are used. The glider with a vibrating sound emitter flies higher or zooms higher than the same glider with the sound emitter silenced so that the emitter adds improved flight characteristics to the glider. Although the gliders herein were designed to carry a sound emitter, the glider construction alone has desirable features such as appearance, and greater selectivity for location of parts and shape of parts. The separate chordal spacers may be of metal and provide nose weight.

This invention is presented to fill a need for improvements in toy gliders having spaced wing means. It is understood that various modifications in structure, as well as changes in mode of operation, assembly and manner of use, may and often do occur to those skilled in the art, especially after benefiting from the teachings of an invention. This disclosure illustrates preferred means of embodying the invention in useful form.

What is claimed is:

1. A toy glider for flight comprising a pair of wing means having a longitudinal axis, the wing means having a lateral dimension such as to support the glider in flight, each wing means including at least one wing element, the wing means being spaced apart a substantial distance at least at the trailing edge but adjacent to each other and a substantial portion of the space between trailing edges being open to form a sound box, spaced attaching means carried by one of the wing means with one on each side of the longitudinal axis to attach a sound emitter thereto, a sound emitter of inelastic sheet material, and cooperating attaching means on the ends of the sound emitter to receive the attaching means on the wing means with the sound emitter in position to contact a wing means when the glider is in flight.

2. A toy glider as in claim **1** in which the wing means is open along the leading edge thereof, and the sound emitter attaching means being carried by a wing means between the two wing means.

3. A toy glider for flight comprising wing means of sheet material and having a longitudinal axis, said wing means including a double wing element extending on both sides of the longitudinal axis and having at least one forward leading edge and side edges and at least one trailing edge, the double wing element being a continuous straight and creaseless wing element from side edge to side edge, second wing means, the second wing means being connected with and overlying the double wing element, the wing means having a lateral dimension of substantial extent such as to support the glider in flight, and means carried by the two wing means securing the double wing element and the second wing means in adjacent spaced relation at least at the trailing edge including an integral hinge means connection at least at one of the edges and locking means carried by the two wing means at or adjacent another edge spaced from the hinge means, and one of said parts including the hinge means connection and the locking means being located at the trailing edge and retaining the wing means in spaced relation.

4. A toy glider for flight comprising wing means of sheet material and having a longitudinal axis, said wing means including a double wing element extending on both sides of the longitudinal axis and having at least one forward leading edge and side edges and at least one trailing edge, second wing means, integral hinge means connecting the second wing means and the double wing element together along at least one edge of the latter, the second wing means overlying the double wing element on both sides of the longitudinal axis, the wing means having a lateral dimension of substantial extent such as to support the glider in flight, and locking means carried by the two wing means spaced from the integral hinge means and securing the double wing element and the second wing means in adjacent spaced relation, and that part including the integral hinge means and the locking means which is located at the trailing edge retaining the trailing edges of the wing means in substantial spaced relation and with a substantial portion of the space between the trailing edges of the wing means being open.

5. A toy glider as in claim **4** including spaced sound emitter attaching means carried by a wing means with one on each side of the longitudinal axis, a sound emitter of inelastic sheet material, and cooperating attaching means at the ends of the sound emitter to engage the attaching means on the wing means to retain the sound emitter adjacent to the wing means for vibration and to engage the same when the glider is in flight.

6. A toy glider as in claim **4** in which the hinge means includes a pair of integral hinges carried by the double wing element one hinge being on one side of the longitudinal axis and the other being on the other side of the longitudinal axis, a pair of single wing elements, one single wing element being integral with the double wing element at one hinge and the other being integral with the double wing element at the other hinge, and the locking means including a locking means for each single wing element.

7. A toy glider as in claim 6 including a chordal spacer for each single wing element and integral therewith on a hinge at the inner edge of the wing element and extending at right angles thereto, and anchoring means carried by each chordal spacer and the double wing element to secure the same together.

8. A toy glider as in claim 4 in which the double wing means has a pair of leading edges with one located on each side of the longitudinal axis and directed at equal angles of substantial size but less than 90 degrees with respect to the longitudinal axis, in which the second wing means includes a pair of single wing elements one being integral along a hinge at each leading edge of the double wing means, and the locking means being carried at the trailing edges of the wing elements to secure the trailing edges together in spaced adjacent position.

9. A toy glider as in claim 8 in which each single wing element includes a chordal spacer integral therewith and extending vertically towards the double wing element at or adjacent to the longitudinal axis; in which the locking means includes a locking panel integral with the trailing edge of the double wing element extending vertically with respect thereto and having a slot therein, and a locking hook on the end of each chordal spacer engaging within the slot.

10. A toy glider as in claim 4 in which the hinge means includes a hinge at each end of the double wing element and parallel or substantially parallel with the longitudinal axis, in which the second wing means includes two single wing elements each having an inner edge, one single wing element being integral on one hinge and the other being integral with the other hinge, a chordal spacer integral with each single wing element and located at the inner edge of each single wing element, and the locking means being carried by each chordal spacer.

11. A toy glider as in claim 6 including fuselage means projecting forwardly from the wing means including at least vertical fuselage means attached to the wing means.

12. A toy glider as in claim 11 in which the fuselage means projects forwardly and rearwardly of the wing means and has a hole therein to receive the double wing element, the inner edge of each single wing element being secured to the fuselage means.

13. A toy glider as in claim 12 in which the space between leading edges of the wing means is open, and a sound emitter attached to a wing means and on the inner surface thereof.

14. A toy glider as in claim 4 in which the second wing means is a double wing element and the hinge means being a single hinge along an edge of the double wing element.

15. A toy glider as in claim 14 in which the hinge is along the leading edge of the double wing means at right angles to the longitudinal axis.

16. A toy glider as in claim 14 in which the integral hinge means includes a connecting panel integral with the rear edge of the double wing element as a first fold line, the second wing means being integral at its rear edge with the connecting panel on a second fold line spaced from the first fold line, and the locking means being adjacent to the leading edges of the double wing element and retaining the same in contacting relation.

17. A blank for a toy glider comprising a first wing means including a double wing element having at least one leading edge and at least one trailing edge and a longitudinal axis, a second wing means integral with the first wing means along at least one of the edges forming hinge means, the wing means having a lateral dimension of substantial extent such as to support the glider in flight, interlocking means carried by the two wing means including a locking means integral with one of the wing means and a cooperating means carried by the other wing means, one of the parts including the hinge means and the interlocking means being located at the trailing edges of the wing means and having a panel to retain the wing means in adjacent spaced relation, the panel being shorter than the trailing edges leaving a substantial space between trailing edges and the blank being of sheet material which can provide an integral hinge means and with sufficient stiffness to retain its shape such as cardboard.

18. A blank as in claim 17 in which the second wing means includes a pair of single wing elements each integral with the double wing element on a hinge at an edge thereof with one single wing means being on one side of the longitudinal axis and the other single wing element being on the other side.

19. A blank as in claim 18 in which each single wing element has an inner edge, and securing means integral with the inner edge on a hinge to secure the same to other glider structure.

20. A blank as in claim 18 in which each single wing means has an inner edge spaced from the hinge and including a chordal spacer integral with each single wing means at its inner edge which edge forms a spacer fold line, and anchoring means integral with each chordal spacer and spaced from the spacer hinge to secure the same to the double wing element.

21. A blank as in claim 20 including a locking panel integral with the trailing edge of the double wing element, and a locking hook for each chordal spacer and integral therewith for engagement with the locking panel.

22. A blank as in claim 19 in which the single wing elements are integral with the double wing element at or adjacent to the ends of the latter providing an opening between each single wing element and the double wing element at the leading and trailing edges.

23. A blank as in claim 17 in which the second wing means is a double wing element extending equally on opposite sides of the longitudinal axis and the integral hinge means being solely at one edge of the wing means.

24. A blank as in claim 23 including a connecting wing panel connecting the wing means integrally at the trailing edges of the wing means, and interlocking means carried at the forward edges of the wing means.

25. A blank as in claim 23 in which the wing means are integral at their forward edges, and interlocking means carried by the trailing edges of the wing elements.

26. A blank as in claim 4 in which the locking means comprises hook means having at least one hook carried by one the wing means and slot means including a slot for each said hook, and rudder means including a rudder integral with each hook.

27. A toy glider as in claim 4 in which the locking means comprises vertical hook means including at least one hook carried by one of the parts including one wing means and a second wing means and the fuselage means and a slot means having a vertical slot for each hook carried by one of the other parts, said hook and slot interengaging, and a rudder integral with each hook and held vertically by the locking means.

References Cited by the Examiner

UNITED STATES PATENTS

865,419	9/1907	Moorhead	46—79
1,227,319	5/1917	Robbins	46—79
1,790,849	2/1931	Tegarty	46—79
1,791,366	2/1931	Markowitz	46—78
1,803,789	5/1931	Burgess	46—79
1,902,001	3/1933	Wasserberg	46—76 X
2,154,487	4/1939	Bonnell	46—79
2,529,979	11/1950	Turnbull	46—79
2,826,862	3/1958	Shapiro	46—52
3,010,250	11/1961	Huston	46—79

FOREIGN PATENTS

3,381	1914	Great Britain.

RICHARD C. PINKHAM, *Primary Examiner.*