TOY FLIGHT SIMULATOR AND DISPLAY STAND

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Abstract

A simulator-display stand, including a control stick and linkage to simulate flight movement with a toy airplane. The linkage includes five elements, two of which includes integral living hinges for transmitting motion of the control stick to parallel motion of the airplane in an easily manipulated, inexpensive and exciting fashion.

11 Claims, 8 Drawing Figures
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BACKGROUND OF THE INVENTION

1. Field of the Invention
The present invention relates to a toy flight system and, more particularly, to a toy flight simulator and display stand for a toy vehicle, such as a toy airplane; the toy flight simulator can be easily manipulated by a young child and is inexpensively manufactured and assembled.

2. Description of the Prior Art
The prior art is replete with toy airplanes and other toy flight vehicles such as space capsules of various forms. For example, there are model airplanes, airplanes with small gasoline engines, airplanes which move along a guide line or cable, airplanes which move along a track system etc. However, in most of these toys there is illustrated the inherent dilemma between cost of production and ability to simulate real flight vehicles. Such toys are either not very realistic or are too expensive to be commercially feasible. Further, it is difficult to provide a toy which simulates realistically the control of an aircraft and yet is easily manipulated by small children in addition to being inexpensive to produce so as to be made available for mass marketing.

SUMMARY OF THE INVENTION
The present invention has solved the problems mentioned above by providing a toy flight simulator for a toy controlling the toy vehicle, including causing the toy flight vehicle to pitch and bank; and means connected to the housing and to the control means for transmitting motion from the control means to the toy vehicle. The invention additionally includes linkage for a toy flight simulator comprising a pivot mount adapted to be mounted to a support structure for providing rotation about two mutually perpendicular axes; a first articulating link mounted to the pivot mount and connected to a control means, the first link having three integral hinges; two motion transmitters connected to the first link; and a second articulating link having four integral hinges, a portion for connecting to a toy vehicle and a portion for pivotally connecting to the support structure, whereby the toy vehicle can be moved and controlled by the control means. The invention further includes a link comprising a unitary element having means oppositely disposed for connecting to two motion transmitters, means for connecting to an object to be moved, a portion for pivotally connecting to a support structure and four hinges; two of the hinges are for cooperating to pivot the object connecting means in a first direction and the other two of the hinges for cooperating to pivot the object connecting means in a second direction, the second direction being perpendicular to the first direction.

A general aim of the present invention is to provide a toy flight simulator which is simply constructed, easily manipulated and inexpensive to manufacture and assemble.

Another aspect of the present invention is to provide a toy flight simulator having a minimum of parts, having a rugged construction and being reliable and exciting in operation.

Other objects and advantages of the invention will appear from the following description taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS
FIG. 1 is a perspective view of the toy flight simulator and display stand and a toy airplane.
FIG. 2 is an enlarged perspective view of the toy flight simulator linkage and control stick.
FIG. 3 is an enlarged elevational sectional view of the toy flight simulator and display stand and a portion of the toy airplane.
FIG. 4 is an enlarged elevational sectional view taken along line 4-4 of FIG. 3.
FIG. 5 is a sectional elevational view taken along line 5-5 of FIG. 3.
FIG. 6 is a perspective view of an upper articulating link in the "as molded" position.
FIG. 7 is a perspective view, partially broken away, of a lower articulating link.
FIG. 8 is a perspective view of a pivot mount.

DESCRIPTION OF THE PREFERRED EMBODIMENT

While the present invention is susceptible of various modifications and alternative constructions, an illustrative embodiment is shown in the drawings and will herein be described in detail. It should be understood, however, that it is not the intention to limit the invention to the particular form disclosed; but, on the contrary, the intention is to cover all modifications, equivalents and alternative constructions falling within the spirit and scope of the invention as expressed in the appended claims.

Referring now to FIG. 1, there is illustrated a toy flight simulator and display stand 10 to which is mounted a toy airplane 12. The toy simulator includes a control stick 14 which may be manipulated as indicated by the arrows to move the airplane in a controlled fashion to simulate flying a real airplane. For example, if the control stick is moved forward and away from the simulator-display stand 10, as indicated by the arrows designated 16, the airplane will be rotated about an axis designated 18 so that the aircraft is moved in what is termed a "pitching" motion. If the control stick is moved laterally in the direction of the arrows designated 20, then the aircraft will rotate about a second axis designated 22 in what is called a "banking" movement. It is to be noted that the axes 18 and 20 are mutually perpendicular. Should the control stick be moved in a circular fashion such as indicated by the curved arrows designated 24, then the aircraft will be moved simultaneously about the two axes much in the same way as a real aircraft pitches and banks. To further simulate realism, a simulated instrument panel 26 is provided affixed to the housing of the simulator-display stand.

It is to be understood that while a toy airplane is illustrated, any other toy vehicle such as a space capsule or other types of aircraft may be used without detracting from the invention herein.

An important aspect of the present invention is provided by having a linkage between the control stick and the object to be manipulated, such as the airplane, which is simply constructed, rugged, reliable and inexpensively manufactured and assembled. Referring now to FIG. 2, the control stick 14 includes a cap 30 and is connected to a first or lower articulating link 32 which is mounted to a pivot mount 34. Connected to the first ar-
articulate link are two motion transmitter rods 36 and 38 which in turn are connected to a second or upper articulate link 40. The toy vehicle is mounted to the upper articulate link 40.

Referring now to FIG. 8, the pivot mount 34 includes a base portion 42 integral with two upstanding oppositely disposed flange portions 44 and 46, each having laterally extending crossed arms 48 and 50, respectively. The arms are received by corresponding slots 52 and 54, FIG. 5, of a support base 56. The pivot mount is supported by the support base 56 such that the pivot mount can pivot about an axis designated 58. The arms 48 and 50 act as journals while the wall surrounding the slots 52 and 54 act as bearings. Also integral with the base portion 42 are two additional upstanding flange portions 60 and 62 with each having laterally projecting shafts 64 and 66, respectively. By mounting the first link 32 upon the shafts 64 and 66 (see FIG. 2) movement about an axis designated 68 is provided. It is to be noted that the axes 58 and 68 are mutually perpendicular.

Referring now to FIGS. 3 and 5, the support base 56 includes two flanges 70 and 72 which have the slots 52 and 54, respectively, formed therein. The support base forms part of an outer housing 74 which is comprised of a lower portion 76 and an upper portion 78. Constructing the housing in two portions 76 and 78 allow the simulator-display stand to be packaged in a disassembled condition and, therefore, be less expensively packaged while also facilitating manufacturing.

Referring now to FIG. 7, the lower articulate link 32 includes a generally hemisphere portion 80 which is mountable to the shafts 64 and 66, FIG. 8, of the pivot mount 34 by providing a bearing surface 82 for the shaft 66 and a bearing surface 84, FIG. 2, for the shaft 64. Integral with the hemisphere 80 is a post 86 to which is fitted the control stick 14, FIGS. 2 and 3. As shown, the control stick is a hollow tube. The other portion of the first articulating link 32 includes a reinforced flange 88 and a tab 90 having three regions 92, 94 and 96 which are conveniently separated by two integral paralleled disposed hinges 98 and 100. In turn the tab 90 is separated from the reinforced flange by a third integral hinge 102 which is perpendicular to the position of the hinges 98 and 100.

Each of the hinges are formed by providing a groove in the material of the link having walls which are disposed by approximately 90° so as to provide a bridge of relatively thin gauge material where the walls intersect. It is to be understood that the angular distance between the walls of the groove is only approximate and can vary plus or minus many degrees without affecting the function of the hinge which is formed. Because the hinge is integral with the portions hinged, the hinge is often referred to as a “living hinge.” The tab 90 is pivotable relative the flange 88 and the hemisphere 80, while the first region 92 and the third region 96 of the tab are movable relative the second region 94. Integral with the first region 92 is an upstanding post 104, while integral with the third region 96 is an upstanding post 106.

With the first link mounted to the pivot mount 34, rotation of the first link about the axes 58 and 68 is provided. Thus, a manipulative force applied to the control stick 14 is transmitted through the link 32 as rotation about one or both of the axes 58 and 68. Referring now to FIGS. 2 and 3, the motion transmitter rod 36 is mounted to the post 106 of the third region 96, while the rod 38 is mounted to the post 104 of the first region 92. Each of the rods 36 and 38 are tubular so as to provide a receptacle to receive the posts 106 and 104 within lower ends 108 and 110, respectively.

Received within upper ends 112 and 114 of the rods 36 and 38, respectively, are cross-shaped arms 116 and 118, FIG. 6, of the upper articulate link 40. The upper link 40 is comprised of a tab 120 divided into three regions 122, 124 and 126 by two integral living hinges 128 and 130. The first region 122 is L-shaped and integral with the arm 116, while the third region 126 is L-shaped and integral with the arm 118. The hinges 126 and 130 are mutually parallel to one another and perpendicular to two additional living hinges 132 and 134. The hinge 132 separates the tab 90 from a center portion 136 having a mounting post 138 to be received by the toy airplane 12, FIG. 1, while the hinge 134 separates the center portion 136 from an end portion 140 which pivotally connects to the upper portion 78 of the housing 74, FIG. 3, by receiving a blunted shaft 142 within a circular opening 144, FIG. 6. The articulate link 40 is shown in FIG. 6 in its “as molded” position, while in FIGS. 2 and 4, the link is illustrated in a folded, operative position. To facilitate connection to an opening 150, FIG. 3, in the airplane 12, a closed end eyelet 152 is provided to receive the post 138 in a light-friction fit (see also FIG. 4).

Referring now to FIGS. 2, 3 and 4, the airplane is controlled, as mentioned earlier, by the movement of the control stick. For example, when the control stick is moved toward or away from the rods 36 and 38, that is, in a rotational movement about the axis 58, the link 32 will pivot about the hinge 102 causing the tab 90 to be pivoted upwardly or downwardly thereby causing the rods 36 and 38 to be moved upwardly and downwardly. The rods in turn cause the upper link 40 to pivot about the hinges 132 and 134 (remember the end portion 140 is connected to the housing) so as to move the post 138, as depicted by the arrows 160 in the same direction as the original motion of the control stick. Referring to FIG. 1, this motion will cause the aircraft to pitch about the axis 18. If the control stick is moved laterally, then the lower link will rotate about the shafts 64 and 66 of the pivot mount (that is, about the axis 68) so as to flex the hinges 98 and 100. This causes the rods 36 and 38 to move relative one another. This relative motion is transmitted to the upper link 40 causing movement of the two hinges 128 and 130 and pivoting of the upper link about the shaft 142 (see FIG. 4). Therefore, the post 138 is moved in a direction as indicated by the arrows 162 which parallels the motion of the control stick. Referring to FIG. 1, this movement would result in a banking movement of the airplane about the axis 22.

In summary, movement of the control stick about the axis 68 causes the airplane to move about the axis 22, while movement of the control stick about the axis 58 causes the airplane to rotate about the axis 18. Of course, other movements of the control stick (at an angle to both the axes 58 and 68) causes a corresponding movement of the airplane about both of the axes 18 and 22 in a responsive fashion.
The material of the simulator-display stand may be of any suitable synthetic resin such as polypropylene and polystyrene. For example, the control stick 14, the lower link 32, the rods 36 and 38 and the upper link 40 may be of polypropylene, while the cap 30, the housing 74 and the pivot mount 34 may be made of polystyrene. Each of the parts may be easily and economically molded and assembled so as to readily mass market the apparatus.

It is, of course, understood that when the airplane is not being manipulated, the housing serves as a hand- some display stand for the airplane.

We claim:

1. A toy flight simulator for a toy vehicle comprising: a support stand; controlling means connected to said support stand for controlling a toy vehicle, and transmitting means connected to said support stand and to said controlling means for transmitting motion from said controlling means to said toy vehicle, for causing said vehicle to pitch and bank, said transmitting means including less than six links.

2. An apparatus as claimed in claim 1, wherein said toy vehicle is connected to one of said links, said one link having four integral hinges, two of said hinges being mutually parallel and the other two hinges being perpendicular to said first mentioned two hinges.

3. A toy flight simulator as claimed in claim 1 wherein said links comprise:
a pivotable mounting link connected to said support stand for allowing rotation about two mutually perpendicular axes;
a first articulate link mounted to said pivotable mounting link and connected to said controlling means, said first link having three integral hinges; two motion transmitters connected to said first link; and
a second articulate link having four integral hinges, a portion for connecting to said toy vehicle and a portion for pivotally connecting to said support stand whereby said toy vehicle can be moved and controlled by said controlling means.

4. A toy flight simulator as claimed in claim 3, wherein:
two of said hinges of said first articulate link and two of said hinges of said second articulate link move when pivot toy vehicle is pivoted about a first axis; and
the third hinge of said first articulate link and the two other hinges of said other articulate link move when said toy flight vehicle is pivoted about a second axis, said second axis being perpendicularly disposed relative said first axis.

5. A toy flight simulator as claimed in claim 4 wherein:
said first articulate link includes a portion for mounting to said pivotable mounting link and another portion having a hinged tab which tab includes the other two hinges of said first link whereby said tab is divided into three regions by said other two hinges;
said second articulate link portion for connecting to said toy vehicle is positioned between two mutually parallel hinges, said portion for pivotally connecting to said support stand is positioned opposite one of the hinges, a tab being positioned opposite the other of said hinges, said tab including the other two hinges which are mutually parallel to each other and perpendicular to said first mentioned parallel hinges, said other two hinges dividing said tab into three regions; and
one motion transmitter is connected at one end to a first region of said first link tab and at the other end to a first region of said second link tab, and the other motion transmitter is connected at one end to a third region of said first link tab and at the other end to a third region of said second link tab.

6. A toy flight simulator for a toy vehicle comprising: a support stand; a control means for directing the attitude of the toy vehicle; and
a linkage for transmitting movement of the control means and for moving the toy vehicle in response thereto, said linkage consisting of five links, two of said links having a plurality of integral hinges, the other three of said links being relatively rigid.

7. A toy flight simulator as claimed in claim 6 wherein one of the links of said linkage transmits motion from said control means about each of two mutually perpendicular axes.

8. A toy flight simulator as claimed in claim 6 wherein said linkage includes two relatively rigid links communicating the motion between two other links each of said two other links having a plurality of integral hinges.

9. A toy flight simulator as claimed in claim 8 wherein one of said other links having integral hinges transmits motion about two mutually perpendicular axes.

10. A toy flight simulator as claimed in claim 9 wherein said one link includes four integral hinges.

11. A toy flight simulator as claimed in claim 10 wherein said four integral hinges are divided into two sets of parallel hinges, each set mutually perpendicular to the other set.