Nov. 18, 1958 A. KOST ET AL 2,860,434

DISPLAY DEVICE SIMULATING AN OBJECT IN FLIGHT

Filed Sept. 3, 1957 2 Sheets-Sheet 1

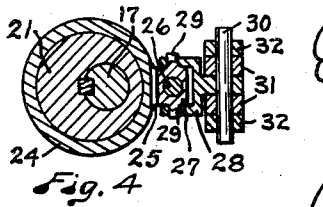


Fig. 4

Fig. 1

Fig. 3

Fig. 8

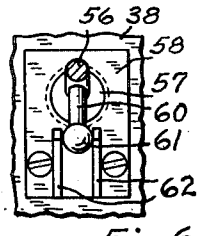


Fig. 6

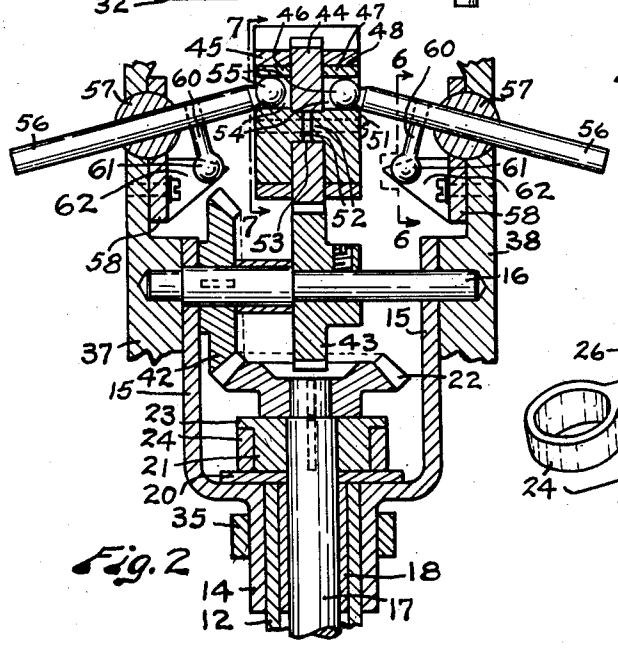


Fig. 2

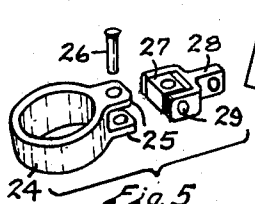


Fig. 5

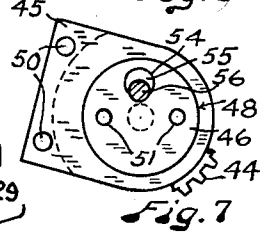


Fig. 7

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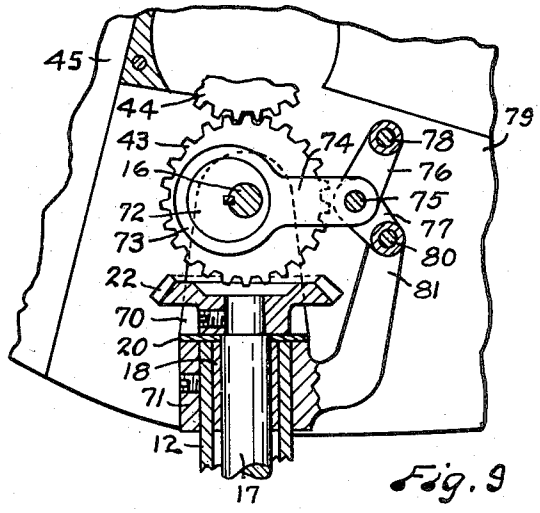


Fig. 9

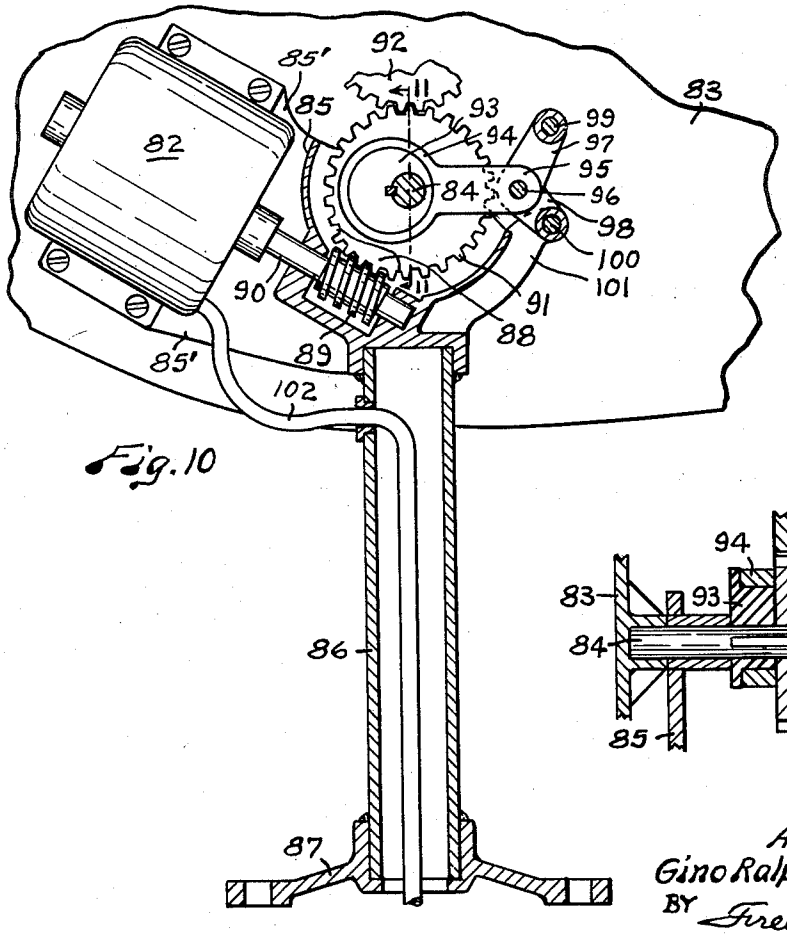


Fig. 10

Fig. 11

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DISPLAY DEVICE SIMULATING AN OBJECT IN FLIGHT

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Application September 3, 1957, Serial No. 681,786

9 Claims. (Cl. 40—106.33)

This invention relates to mechanical movements used to simulate the movements of an object in flight.

By way of illustration this mechanism is shown as applied to a winged horse but it will be understood that the same may be applied to a figure of a bird or any other object conceived to have wings for the purpose of flight.

An object of this invention is to provide a simple, efficient and inexpensive mechanism consisting of relatively few parts for simultaneously imparting to a winged figure a rocking movement of the body and a movement of the wings similar to the wing movement of a bird in flight.

Another object is to provide a mechanical movement used in connection with a winged figure in such a manner as to tilt the figure up at the front and down at the rear as the wings are moving rearwardly and to reversely tilt the figure down at the front and up at the rear as the wings are moving forwardly thus imparting to the figure a very realistic illusion of flight.

Other objects of this invention will be apparent from the following description taken in connection with the accompanying drawings.

In the drawings Figure 1 is a view partly in vertical section and partly in elevation showing this mechanical movement applied to the winged figure of a horse.

Fig. 2 is a fragmentary view in cross section taken substantially on broken line 2—2 of Fig. 1 and on a larger scale than Fig. 1.

Fig. 3 is a fragmentary view in cross section taken substantially on broken line 3—3 of Fig. 1 and on a larger scale than Fig. 1.

Fig. 4 is a view in cross section taken substantially on broken line 4—4 of Fig. 1 and on a larger scale than Fig. 1.

Fig. 5 is an exploded perspective view showing parts of universal joint and eccentric devices used in the structure shown in the preceding figures.

Fig. 6 is a fragmentary view partly in cross section and partly in elevation taken substantially on broken line 6—6 of Fig. 2.

Fig. 7 is a fragmentary view partly in section and partly in elevation taken substantially on broken line 7—7 of Fig. 2.

Fig. 8 is a detached fragmentary view showing a counterweighted wing carrying arm which may be used in connection with this invention.

Fig. 9 is a fragmentary view partly in vertical section and partly in elevation showing a modified form of this invention.

Fig. 10 is a view in vertical section, with parts in elevation, of another modified form of this invention.

Fig. 11 is a fragmentary sectional view, with parts omitted, looking in the direction of broken line 11—11 of Fig. 10.

Like reference numerals refer to like parts throughout the several views.

The display device shown in Figs. 1 to 7 inclusive comprises an upright tubular support 12 mounted on a base

member 13 and having on its upper end a sleeve 14 which is integral with or rigidly secured to an upwardly extending U-shaped fork or bracket 15. A horizontal shaft 16 extends crosswise of and is journaled in the upper end portions of the U-shaped bracket 15. A driven shaft 17 extends upwardly through the upright tubular support 12 and is journaled in said tubular support by bushings 18. A thrust collar 19 is secured on the shaft 17 below the lower end of the tubular support 12. The end portion of the shaft 17 which protrudes upwardly into the U-shaped bracket 15 is provided with a washer 20, an eccentric disc 21 and a bevel gear 22. A flange 23 is provided on the upper end of the eccentric disc 21 and a cylindrical bearing sleeve 24 is operatively disposed on said eccentric disc 21 between the flange 23 and the washer 20. The bearing sleeve 24, Figs 4 and 5, has spaced apart flanges 25 which are connected by a pivot pin 26 with a bearing block 27. A forked bracket 28 is connected by bearing pins 29 with said bearing block 27, the axis common to the pins 29 being at right angles to the axis of the pin 26 so that some universal movement is provided. The forked bracket 28 is further connected by a bearing pin 30 with adjoining ends of an upper forked toggle member 31 and a lower forked toggle member 32. The lower end of the toggle member 32 is connected by a pivot pin 33 with spaced apart arms 34 of a collar 35. The collar 35 is rigidly secured to the sleeve 14 which fits over and is supported by the tubular upright support 12. The upper end of the upper toggle member 31 is pivotally connected by a cross pin 36 with a display device or figure herein shown to be a figure of a horse made up of two parts 37 and 38. The parts 37 and 38 are secured together by screws or bolts 40 and are pivoted for rocking movement on the shaft 16, see Fig. 2. Spacer members 41, Fig. 3, are provided on the cross pin 36 between bracket 31 and the respective parts 37 and 38 of the display device. Rotation of the shaft 17 will reciprocably move the forked bracket 28 thus angularly moving the toggle members 31 and 32 and imparting a rocking motion to the display device 37, 38 about the axis of the shaft 16.

The bevel gear 22 meshes with another bevel gear 42 which is fixedly secured on the shaft 16. The shaft 16 further has a spur gear 43 fixedly secured thereto. The spur gear 43 meshes with another spur gear 44 which is disposed between the two sides of a bracket 45 and between two discs 46 and 47 which fit rotatively within circular openings 48 in the bracket 45. The bracket 45 is fixedly secured to at least one side of the display device 37, 38 by screws 50. The discs 46 and 47 are fixedly secured to the spur gear 44 by screws 51 and preferably each of said discs 46 and 47 has a hub 52 which fits within an axial opening 53 in the spur gear 44 to accurately center the disc relative to the spur gear.

Each disc 46 and 47 has an opening 54 therein to receive a ball 55 on the end of a lever arm 56. The two openings 54 are aligned with each other. Each lever arm 56 extends outwardly from the disc 46 or 47 with which it is connected and through a ball 57. Each ball 57 is supported for universal pivotal movement within a socket formed partly in the wall of the display device and partly in a bracket plate 58 which is secured to the display device. Each lever arm 56 has an arm oscillating pin 60 rigid therewith and extending at right angles therefrom and each pin 60 terminates in a ball 61 which is positioned between two spaced apart flanges 62. The flanges 62 are rigid with one of the fixed bracket plates 58. Rotation of the discs 46 and 47 will move the lever arms 56 in conical paths and the pins 60 will simultaneously oscillate these arms on their own axes. A wing member 63 is rigidly secured to the outer end portion of each lever arm 46

and preferably is positioned approximately at right angles thereto.

If the wing members **63** are of substantial weight it may be desirable to counterbalance this weight to reduce vibration and provide smoother operation. Fig. 8 shows one way of doing this by rigidly securing a counterweight **56'** on the inner end portion of each wing carrying arm **56**.

In the operation of the device disclosed in Figs. 1 to 7 inclusive when the shaft **17** is rotated it will operate through the eccentric **21** and the devices connecting the same to the toggle brackets **31** and **32** to impart rocking movement about the axis of the shaft **16** to the display device. At the same time rotary movement is transmitted through gears **22**, **42**, **43** and **44** to the two discs **46** and **47** for the purpose of moving the wings. The rotation of the discs **46** and **47** causes the wing carrying lever arms **56** to move in conical paths and while they are thus being moved in conical paths the arm oscillating pins **60** will oscillate these arms **56** on their own axes. The combination of these movements imparts to the wings **63** movements which combine with the rocking movement of the body **37**, **38** to produce a realistic appearance of flight. These movements are synchronized so that the body is tilted up at the front and down at the rear as the wings are moving rearwardly and is tilted in the reverse direction as the wings are moving forwardly. The wings are positioned on the lever arms **56** so that clearance is allowed for the movements of said wings.

Fig. 9 shows movement imparting means of modified form for imparting a rocking movement to a display device. The mechanism shown in Fig. 9 for providing this rocking movement has the advantage of being shorter and more compact than that shown in Figs. 1 to 7 inclusive. In said Fig. 9 the tubular support **12**, shaft **17**, bushing **18**, washer **20**, bevel gear **22**, shaft **16** and gearwheels **43** and **44** are the same as the correspondingly numbered parts of Figs. 1 to 7 inclusive, hereinbefore described. The bevel gear **22** drives the shaft **16** through another bevel gear, not shown in Fig. 9, but which is similar to the bevel gear **42** of Fig. 2.

The shaft **16** is supported by a U shaped bracket **70** having an integral sleeve **71** mounted on the tubular support **12**. The bracket **70** and sleeve **71** are similar to the previously described parts **14** and **15**. An eccentric disc **72**, similar to the previously described disc **21**, is secured to the shaft **16** alongside of the gearwheel **43** and a cylindrical bearing member **73** is mounted on said eccentric disc **72**. The bearing member **73** has a rigid arm **74** extending radially therefrom. The outer end of the arm **74** is connected by a pivot **75** with the adjoining ends of two toggle links **76** and **77**. The upper end of the link **76** is connected by a pivot member **78** with a winged figure **79** similar to the winged figure formed by the parts **37** and **38** of Figs. 1, 2 and 3, previously described. The lower end of the link **77** is connected by a pivot member **80** with an arm **81** which is rigid with the collar **71** and which corresponds to the arm **34** of Fig. 1.

The mechanism shown in Fig. 9 and just described is more compact that the corresponding mechanism shown in Figs. 1 to 7. It will provide the same rocking movement of the figure **79** about the axis of the shaft **16** and it will cooperate with the previously described devices for moving the wing carrying members in conical paths and rotatively on their own axes.

When the body of the winged figure is of large enough size then an electric motor may be mounted within this body for imparting movement to the wings and body. Such a structure is shown in Figs. 10 and 11 wherein we show a motor **82** mounted on an extension **85'** of a bracket **85** which is mounted on an upright tubular post **86**. A hollow body **83**, similar to the body formed by the parts **37** and **38** of Fig. 1, is supported for rocking movement on a cross shaft **84**. The shaft **84** is mounted in the bracket **85** and corresponds to the cross shaft **16** of Figs. 1, 2 and 9. The hollow body **83** is large enough internally to be clear of the motor **82**.

The shaft **84** has a worm wheel **88** fixedly mounted thereon and a worm **89** on the shaft **90** of the motor **82** meshes with the worm wheel **88** for driving the shaft **84**. Also a gearwheel **91** is rigidly mounted on the shaft **84** and meshes with another gearwheel **92**. The gearwheels **91** and **92** correspond to the gearwheels **43** and **44** of Figs. 1 and 2 and function in the same manner.

An eccentric member **93** is secured to the shaft **84** adjacent the gearwheel **91**. The eccentric member **93** is connected by a bearing sleeve **94** and arm **95** with the common pivot **96** of two toggle links **97** and **98**. The upper end of the upper toggle link **97** is connected by a pivot **99** with the body or figure **83**. The lower end of the lower link **98** is connected by a pivot member **100** with a flange **101** which is rigid with the bracket **85**. The parts **91** to **101** inclusive operate in the same manner as the previously described parts **73** to **78**, **80** and **81** of Fig. 9 to provide rocking movement of the body **83**. Electrical conductors represented by cable **102** extend through tubular post **86** into the body **83** to supply electric current to the motor **82** and to lamps or any other electrically actuated devices which may be placed in said body **83**.

In all of the disclosed forms of this invention the display object is pivotally mounted on an upright support for rocking movement on a generally horizontal axis; substantially all of the operating mechanism is housed and concealed within the display object; the wings are movably mounted on the object and power operated devices are provided for rocking the object and simultaneously moving the wings relative to the object; the wing mounting shafts are moved in conical paths and are simultaneously oscillated on their own axes; the eccentric and gear means used for imparting movement to the body and wings is designed and synchronized so that the front end of the object is tilting downwardly as the wings are moving forwardly and said front end is tilting upwardly as the wings are moving rearwardly. This movement coupled with the gyrating wing movement resulting from conically moving the wing mounting shafts and the up and down wing movement resulting from the oscillation of the wing mounting shafts on their axes imparts to the display figure a very realistic illusion of flying.

The foregoing description and accompanying drawing clearly discloses preferred embodiments of this invention but it will be understood that changes in the same may be made within the scope of the following claims.

We claim:

1. In a display device simulating an object in flight, a support; a flight display object mounted for rocking movement on a generally horizontal axis on said support; wings pivotally mounted on said object; and power operated means connected with said object and said wings capable of rocking said object and simultaneously moving said wings relative to the object in simulation of flight.

2. In display devices simulating an object in flight, a support; a flight display object mounted for rocking movement on a generally horizontal axis on said support, said flight display object having a forward part and a rear part; wings pivotally mounted on said object for movement forwardly and rearwardly relative to the object; and power operated means connected with said object and said wings providing downward tilting movement of the forward part and upward tilting movement of the rear part of the object while the wings are moving forwardly relative to the object and upward tilting movement of the forward part and downward tilting movement of the rear part of the object while the wings are moving rearwardly relative to the object.

3. In display devices simulating an object in flight, a

support; an upright driven shaft carried by said support; a flight display object mounted for rocking movement on a substantially horizontal axis on said support; movement transmitting means connecting said shaft with said object providing rocking movement of said object when said shaft is rotating; wings movably mounted on said object and extending in opposite directions therefrom; and wing moving means connected with said wings and driven from said shaft providing movement of said wings relative to said object as said object is rockingly moved relative to said support.

4. In display devices simulating an object in flight, a support; an upright driven shaft carried by said support; a flight display object mounted for rocking movement on a substantially horizontal axis on said support; movement transmitting means connecting said object with said driven shaft providing rocking movement of said object when said driven shaft is rotating; two wing carrying shafts pivotally supported by said object and extending outwardly from opposite sides of the object; a wing secured to each of said wing carrying shafts outwardly from the object; and means connecting each wing carrying shaft with said driven shaft providing movement in conical paths of the wing carrying shafts synchronously with the rocking movement of said object.

5. In display devices simulating an object in flight, a support; a substantially horizontal shaft carried by said support; a flight display object mounted for rocking movement on a substantially horizontal axis on said support; shaft driving means connected with said substantially horizontal shaft; object rocking means connecting said driving means with said object providing rocking movement of said object when said substantially horizontal shaft is being driven; two wing mounting shafts pivotally supported by said object and extending in opposite directions therefrom; means connected with said substantially horizontal shaft imparting movement in conical paths to said wing mounting shafts when said horizontal shaft is being driven; devices oscillating said wing mounting shafts on their own axes when they are moved in conical paths; and a wing fixedly attached to the outer end portion of each of said wing mounting shafts.

6. In display devices simulating an object in flight, a support; a substantially horizontal shaft carried by said support; a flight display object mounted for rocking movement on a substantially horizontal axis on said support; shaft driving means connected with said substantially horizontal shaft; object rocking means connecting said shaft driving means with said object providing rocking movement of said object when said substantially horizontal shaft is driven; two wing mounting shafts positioned above said substantially horizontal shaft and extending in opposite directions outwardly from the respective sides of said object; ball type pivot means carried by said object pivotally supporting each wing mounting shaft intermediate its two ends; means connecting said wing mounting shafts with said substantially horizontal shaft imparting movement in conical paths to said wing mounting shafts in response to rotation of said substantially horizontal shaft; a lever arm extending transversely from each wing mounting shaft adjacent the ball type pivot support thereof; brackets fixed to the object and engaged by the outer end portions of the lever arms providing angular oscillating movement of each wing mounting shaft on its axis when said wing mounting shaft is moved in a conical path; and a wing fixedly attached to the outer end portion of each wing mounting shaft.

7. In display devices simulating an object in flight; a support; a flight display object mounted for rocking movement on a substantially horizontal axis on said support; a substantially horizontal shaft journaled in said support; shaft driving means connected with said substantially horizontal shaft; object rocking means connecting said substantially horizontal shaft with said object providing rocking movement of said object when said substantially horizontal shaft is driven; two wing mounting shafts pivotally supported by said object and extending substantially crosswise thereof and protruding in opposite directions therefrom; a ball on the inner end of each of said wing mounting shafts; a gearwheel rotatively mounted coaxially of the pivotal supports of said wing mounting shafts adjacent the inner ends of said shafts and having off center receptacles receiving the balls on the inner ends of said wing mounting shafts; another gearwheel on said substantially horizontal shaft meshing with the gearwheel which receives said balls, whereby said wing mounting shafts will be moved in conical paths when said gearwheels are driven; devices oscillating said wing mounting shafts on their axes when they are moved in conical paths; and a wing fixedly attached to the outer end portion of each of said wing mounting shafts.

8. In display devices simulating an object in flight; a support; a flight display object mounted for rocking movement on a generally horizontal axis on said support; a driven shaft rotatively carried by said support; an eccentric having a driving connection with said driven shaft; two toggle links having two adjoining ends which are pivotally connected with said eccentric and having their other ends pivotally connected respectively with said object and with said support, whereby operation of said eccentric will impart a rocking movement to said object; wings carried by and pivotally mounted on said object; and wing moving devices connecting said wings with said driven shaft, whereby rotation of said driven shaft will impart to said wings a movement having a forward and a rearward component relative to said object simultaneously with the rocking movement of said object.

9. In display devices simulating an object in flight, a flight display object; a support extending upwardly into said flight display object; a substantially horizontal shaft carried by said support mounting said display object for rocking movement on said support; shaft driving means connected with said substantially horizontal shaft; an eccentric driven by said shaft driving means; two toggle links having adjoining ends pivotally connected with said eccentric and having other ends which are pivotally connected respectively with said object and said support, whereby operation of said eccentric will impart a rocking movement to said object; two wing mounting shafts positioned above and generally parallel with said substantially horizontal shaft and extending in opposite directions from the medial plane of the object outwardly to the exterior of said object; ball type pivot means carried by said object pivotally supporting each wing mounting shaft intermediate its two ends; a ball on the inner end of each of said wing mounting shafts; a gearwheel rotatively mounted coaxially of the pivotal supports of said wing mounting shafts adjacent the inner ends of said wing mounting shafts and having off center receptacles receiving the balls on the inner ends of said wing mounting shafts; another gearwheel on said substantially horizontal shaft meshing with the gearwheel which receives said balls, whereby said wing mounting shafts will be moved in conical paths when said gearwheels are driven; a lever arm rigid with and extending transversely from each wing mounting shaft adjacent the pivotal support thereof; brackets fixed to the display object and engaged by the outer end portions of the lever arms providing angular oscillating movement of each wing mounting shaft on its axis when the wing mounting shaft is moved in a conical path; and a wing fixedly attached to the outer end portion of each wing mounting shaft.

No references cited.