Oct. 16, 1962 L. A. SANBORN 3,058,260

HAND CONTROL APPARATUS

Filed March 10, 1960

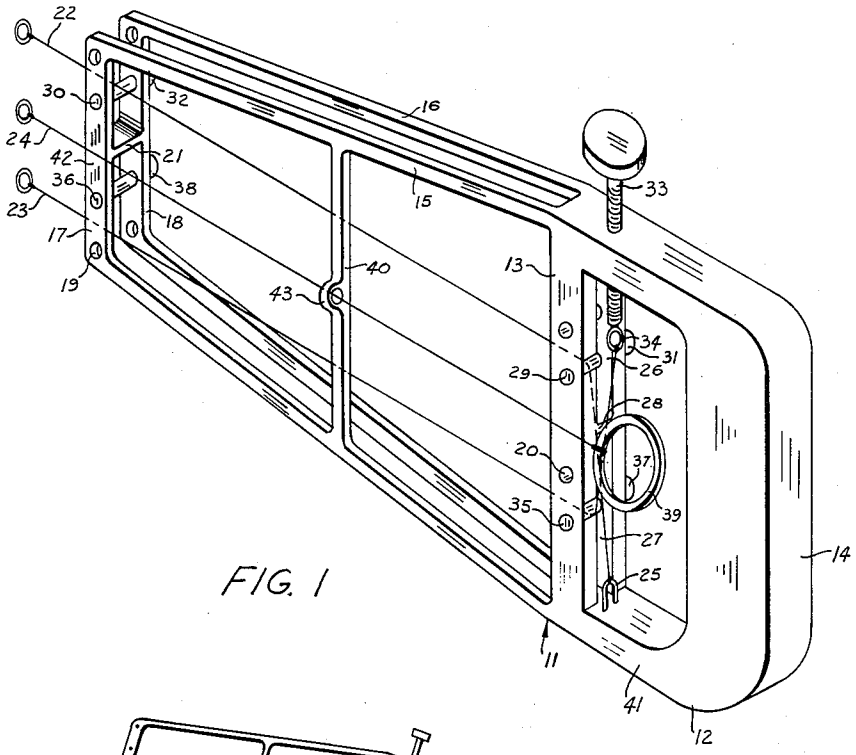


FIG. 1

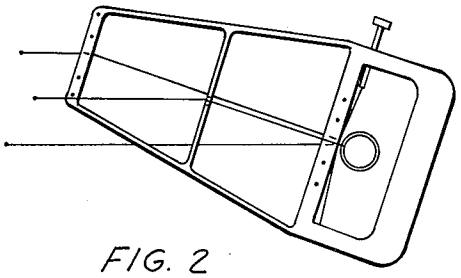


FIG. 2

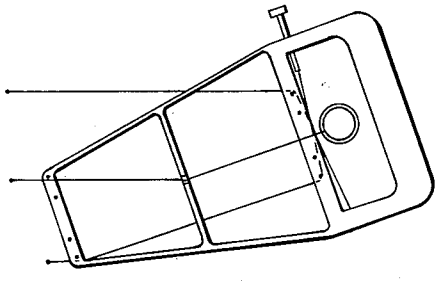


FIG. 3

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HAND CONTROL APPARATUS

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This invention relates to an improved hand control apparatus for line controlled mobile devices and more particularly to an improved device for the line control of self-powered captive model aircraft. While not limited to use with captive model aircraft, the present invention will be described in such relation.

A main object of the invention is to provide novel and improved control apparatus for guiding a tethered, power-driven airplane, said apparatus being simple in construction, being easy to operate, and being arranged so that a model airplane controlled thereby may be guided in a desired direction merely by the wrist or arm action of the operator.

A further object of this invention is to provide an improved hand control apparatus for guiding the flight of a power driven tethered model airplane, the control apparatus being inexpensive to manufacture, being durable in construction, being light in weight, and compact in size.

A further object of this invention is to provide an improved hand controlled apparatus with more sensitive control of the movement of a tethered, self-powered model airplane.

A further object of the invention is to provide an improved hand controlled apparatus in which the control lines and the sensitivity of the control can be readily adjustable.

A further object of the invention is to provide an improved hand controlled apparatus in which the apparatus itself exerts added resistance to movement from its neutral position thereby facilitating an operator's control of the apparatus.

A further object of the invention is to provide an improved hand controlled apparatus in which a throttle control line is adapted for use in conjunction with elevator control lines.

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

FIGURE 1 is a perspective view of the hand control apparatus in its normal operating position showing details of construction.

FIGURE 2 is a side view of the apparatus in raised operating position.

FIGURE 3 is a side view of the apparatus in lowered operating position.

Referring to the drawings, and more particularly to FIGURE 1, 11 generally designates one form of control apparatus in accordance with the present invention. The apparatus 11 comprises a generally D-shaped handle 12 having a forward portion 13 and a rearward grip portion 14. Two parallel guide bars 15 and 16 extend forward and are attached to the handle 12 at the upper and lower ends of the forward portion 13.

At the forward portion of the bars 15 and 16 are attached parallel plates 17 and 18 having spacer holes 19 as shown in FIGURE 1.

Similar spacer holes 20 are located in the forward portion 13 of the handle 12.

A spacer bar 21 joined to the guide bars 15 and 16 assists in keeping them rigid and parallel.

The control lines 22 and 23 actuate the elevators of a model airplane and the control line 24 actuates the throttle.

The control line 22 is fastened by means of a screw 25 or other fastener to the inner forward portion 13 of the D-shaped handle 12 as shown in FIGURE 1.

The forward portion 13 has an upper slit 26 and a lower slit 27 separated by a spacer bar 28. Control line 22 is passed through slit 26 and is spaced outwardly by means of removable pins 29 and 30 which have knobs 31 and 32 to facilitate moving the pins to any desired position in the holes 20 and 19 respectively.

Control line 23 is fastened to an adjusting screw 33 by means of a swivel eye 34. Control line 23 passes through slit 27 and is spaced outwardly by means of pins 35 and 36. These pins have knobs 37 and 38 like the knobs on pins 29 and 30.

Control line 24 is fastened to a ring 39 which is normally held by the middle finger of the right hand in operation to control the throttle. Control line 24 passes through a looped guide bar 40 which is attached to guide bar 15, as shown in FIGURE 1. The looped guide bar 40, for best results, is spaced midway between the holes 19 of the parallel plates 17 and 18 and the holes 20 of the forward portion.

The ends of the pins 29 and 35 opposite their knobs are flush with the surface 41 of handle 12. Similarly the ends of the pins 30 and 36 opposite their knobs are flush with the surface 42 of plate 17. The ends of the pins should not be made longer to avoid interference with control line 24.

The adjusting screw 33 is used to lessen or shorten control line 22 with respect to control line 23 so that when the apparatus is in its neutral position (FIGURE 1), the elevators on the model plane are in level position. Final adjustment should be made while the airplane is in flight.

In operation, the apparatus is raised as shown in FIGURE 2 by upward movement of the wrist or arm to shorten line 22 with respect to line 23 thereby actuating the elevators on the airplane causing them to rise.

The distance separating the pins 29, 30 from the pins 35, 36 provides leverage which causes resistance to movement from neutral position. This resistance enables the operator to feel the movement of the apparatus from neutral position more readily and thereby facilitates control of the model airplane.

With the loop 43 in guide bar 40 spaced midway between holes 19 and holes 20 and with pins 29, 30, 35 and 36 spaced an equal distance from the loop in the guide bar 40, the control line 24 remains midway between the control lines 22 and 23. Shortening line 23 thereby causes line 22 to be lengthened by an equal amount with respect to line 24. Thus the model airplane can change altitude without affecting the throttle control. In addition line 24 thereby remains midway between lines 22 and 23 and lessens the chance of the lines becoming entangled. This is true regardless of whether the apparatus is raised or lowered as shown in FIGURES 2 and 3.

The sensitivity of the elevator control can be adjusted to suit the operator by spacing pins 30, 36 in holes 19 and pins 29, 35 in holes 20, far apart or close together as desired. Sensitive elevator control means that slight handle movement will result in substantial elevator movement. This apparatus can thus be adjusted for either sensitive or non-sensitive elevator control. In the non-sensitive set-up, a large handle movement will result in a small elevator movement.

The apparatus can also be successfully operated with the four pins removed and with control line 22 spaced above spacer bars 21 and 28 and control line 23 spaced below said spacer bars. In other words, the spacer bars 21 and 28 can perform the function of the four pins 29, 30, 35 and 36 for the maximum non-sensitive setup.

The guide bars 15 and 16 assist in keeping the control

lines 22 and 23 in their proper positions and in addition further assist in preventing control lines 22 and 23 from becoming entangled with control line 24.

What I claim is:

1. An apparatus for controlling a tethered self-propelled mobile device such as a model airplane comprising a handle for gripping in one hand, said handle in relation to the hand having a rearward portion located near the base of the hand, a forward portion extending toward the fingers of the hand, and an upper portion extending upward and a lower portion extending downward when said apparatus is held in a normal position, retaining means for attaching upper and lower control lines to said handle so that said control lines extend forward from the upper and lower portions of said handle respectively, a pair of parallel rods extending forward a considerable distance in generally oblong semicircular fashion from the handle with one end of each of said rods being attached to the upper portion of said handle and the other end of each of said rods being attached to the lower portion of said handle, said rods functioning as a guide for said control lines and a spacer bar connecting said rods together at their forward portion, said upper control line being guided by the upper portions of said pair of rods and bending at said spacer bar thereby foreshortening said upper control line when said handle is raised above a neutral position, said lower control line being guided by the lower portions of said pair of rods and bending at said spacer bar thereby foreshortening said lower control line when said handle is lowered below a neutral position, said distance between said handle and said forward portion of said parallel rods where said spacer bar is located providing leverage causing resistance to movement from neutral position and enabling such movement to be felt more readily when said handle is raised or lowered thereby facilitating control of said mobile device.

2. An apparatus for controlling a tethered self-propelled mobile device such as a model airplane comprising a handle for gripping in one hand, said handle in relation to the hand having a rearward portion located near the base of the hand, a forward portion extending toward the fingers of the hand, and an upper portion extending upward and a lower portion extending downward when said apparatus is held in a normal position, retaining means for attaching upper and lower control lines to said handle so that said control lines extend forward from the upper and lower portions of said handle respectively, a pair of parallel rods extending forward a considerable distance in generally semicircular fashion from the handle with one end of each of said rods being attached to the upper portion of said handle and the other end of each of said rods being attached to the lower portion of said handle, said rods each having a plate attached to its forward portion, said plates being generally parallel to each other and having holes through each of the plates space along a generally vertical plane for the insertion of upper and lower pins, said upper control line being guided by the upper portions of said pair of rods and bending at said upper pin thereby foreshortening said upper control line when said handle is raised above a neutral position, said lower control line being guided by the lower portions of said pair of rods and bending at said lower pin thereby foreshortening said lower control line when said handle is lowered below a neutral position, said distance between said handle and said forward portion of said parallel rods where said upper and lower pins are located providing leverage causing resistance to movement from neutral position and enabling such movement to be felt more readily when said handle is raised or lowered thereby facilitating control of said mobile device.

3. An apparatus for controlling a tethered self-propelled mobile device such as a model airplane comprising a generally D-shaped handle for gripping in one hand, said handle being gripped by its rear portion located near the base of the hand, a forward portion comprising two generally parallel members extending vertically and spaced apart on the left and right hand sides respectively of said handle when looking in a forward direction, thus forming a slit between them, said members having holes for upper and lower pins spaced generally in a vertical plane, retaining means for attaching an upper control line to the lower portion of said handle, a second retaining means for attaching a lower control line to the upper portion of said handle, said lower control line being adapted to pass through the lower portion of said slit and extend forwardly, being held downwardly by said lower pin and said upper control line being adapted to pass through the upper portion of said slit and extend forwardly, being held upwardly by said upper pin, a pair of parallel rods extending forward a considerable distance in generally semicircular fashion from the handle with one end of each of said rods being attached to the upper portion of said handle and the other end of each of said rods being attached to the lower portion of said handle, said rods each having a plate attached to its forward portion, said plates being generally parallel to each other and having holes through each of the plates spaced along a generally vertical plane for the insertion of upper and lower pins, said upper control line being guided by the upper portions of said pair of rods and bending at said upper pin thereby foreshortening said upper control line when said handle is raised above a neutral position, said lower control line being guided by the lower portions of said pair of rods and bending at said lower pin thereby foreshortening said lower control line when said handle is lowered below a neutral position, said distance between said handle and said forward portion of said parallel rods where said upper and lower pins are located providing leverage causing resistance to movement from neutral position and enabling such movement to be felt more readily when said handle is raised or lowered thereby facilitating control of said mobile device.

4. An apparatus according to claim 1 which further includes a throttle control line located midway between said upper and lower control lines and capable of being held by a finger of the hand gripping said handle, said throttle control line being slidably held by a guide member located approximately one-half the distance between said handle and said forward portion of said rods, said throttle control line bending at said guide member when said apparatus is raised or lowered with approximately one-half the leverage of the upper end lower control lines being exerted on said throttle control line so that said throttle control line is not substantially foreshortened or lengthened with respect to said upper and lower control lines when said apparatus is raised or lowered.

5. An apparatus according to claim 1 wherein said retaining means is adapted to readily adjust the length of at least one of said control lines with respect to the other.

6. An apparatus according to claim 2 which further includes a throttle control line located midway between said upper and lower control lines and capable of being held by a finger of the hand gripping said handle, said throttle control line being slidably held by a guide member located approximately one-half the distance between said handle and said forward portion of said rods, said throttle control line bending at said guide member when said apparatus is raised or lowered with approximately one-half the leverage of the upper and lower control lines being exerted on said throttle control line so that said throttle control line is not substantially foreshortened or lengthened with respect to said upper and lower control lines when said apparatus is raised or lowered.

7. An apparatus according to claim 2 wherein said retaining means is adapted to readily adjust the length of at least one of said control lines with respect to the other.

8. An apparatus according to claim 3 which further includes a throttle control line located midway between said upper and lower control lines and capable of being held by a finger of the hand gripping said handle, said

throttle control line being slidably held by a guide member located approximately one-half the distance between said handle and said forward portion of said rods, said throttle control line bending at said guide member when said apparatus is raised or lowered with approximately one-half the leverage of the upper and lower control lines being exerted on said throttle control line so that said throttle control line is not substantially foreshortened or lengthened with respect to said upper and lower control lines when said apparatus is raised or lowered.

9. An apparatus according to claim 3 wherein said retaining means is adapted to readily adjust the length of at least one of said control lines with respect to the other.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,058,260 October 16, 1962

Lester A. Sanborn

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 3, line 55, for "space" read -- spaced --; column 4, line 47, for "end" read -- and --.

Signed and sealed this 26th day of February 1963.

(SEAL)
Attest:

ESTON G. JOHNSON
Attesting Officer

DAVID L. LADD
Commissioner of Patents