Jan. 6, 1953 K. D. SNEED 2,624,152

CONTROL SYSTEM FOR MODEL AIRPLANES

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Fig. 1.

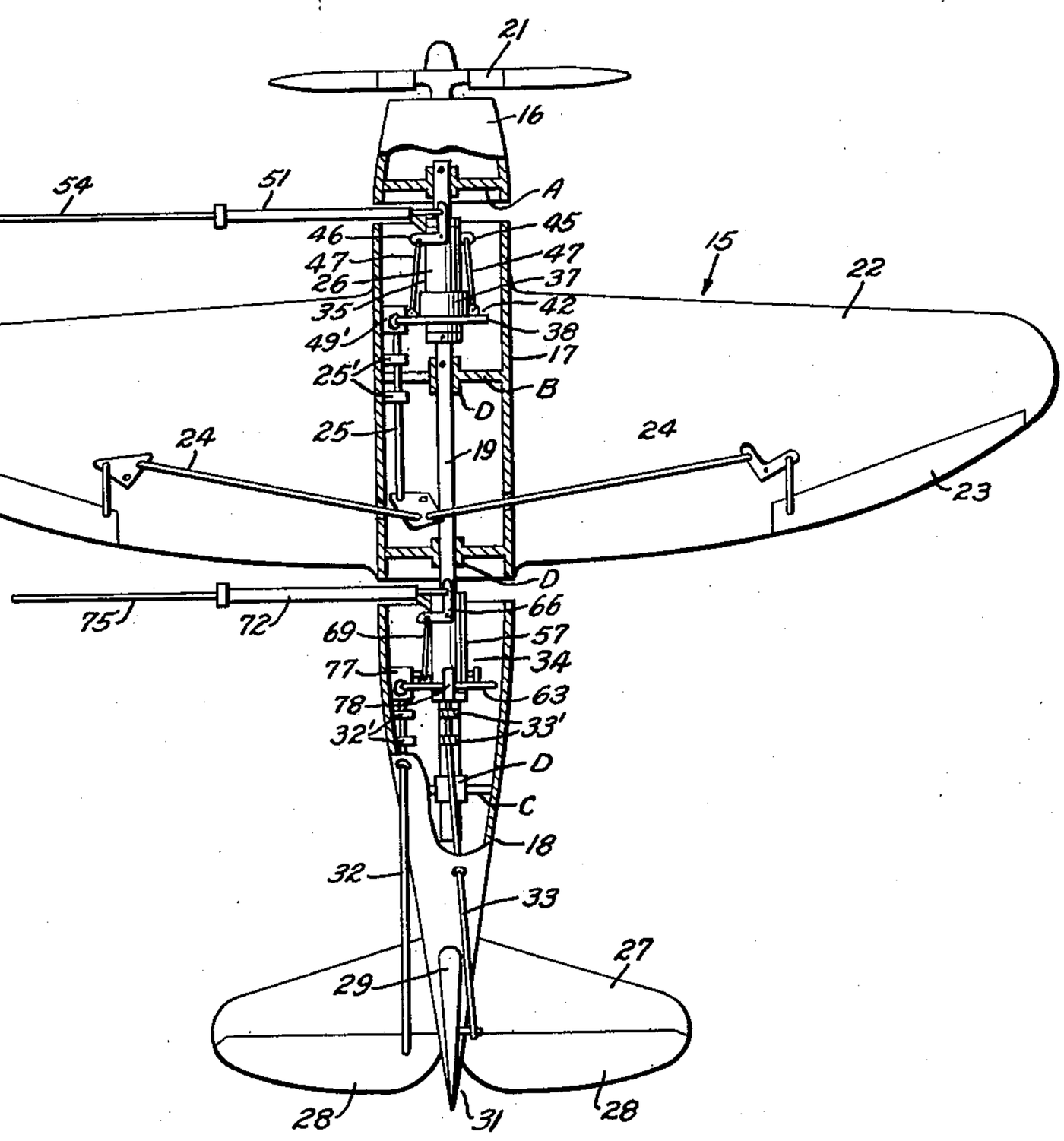

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Fig. 2.

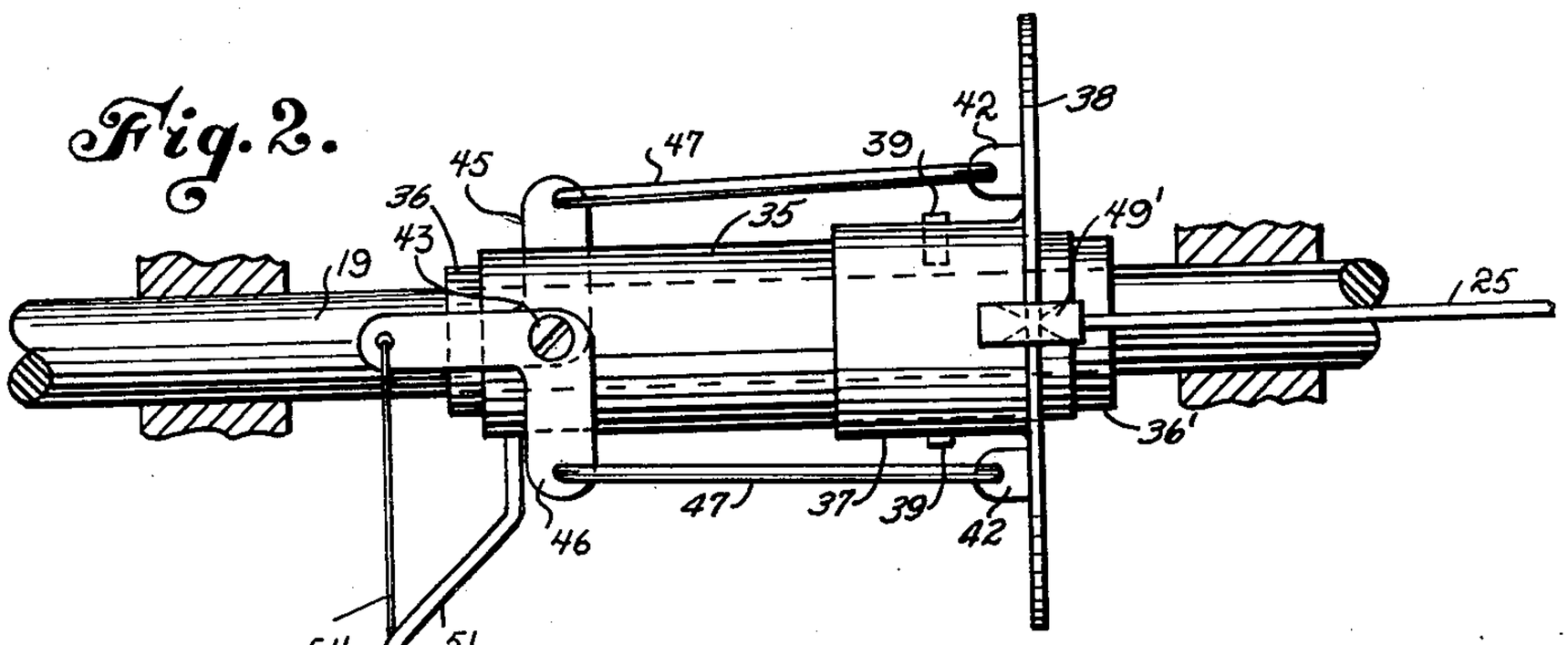

Fig. 4.

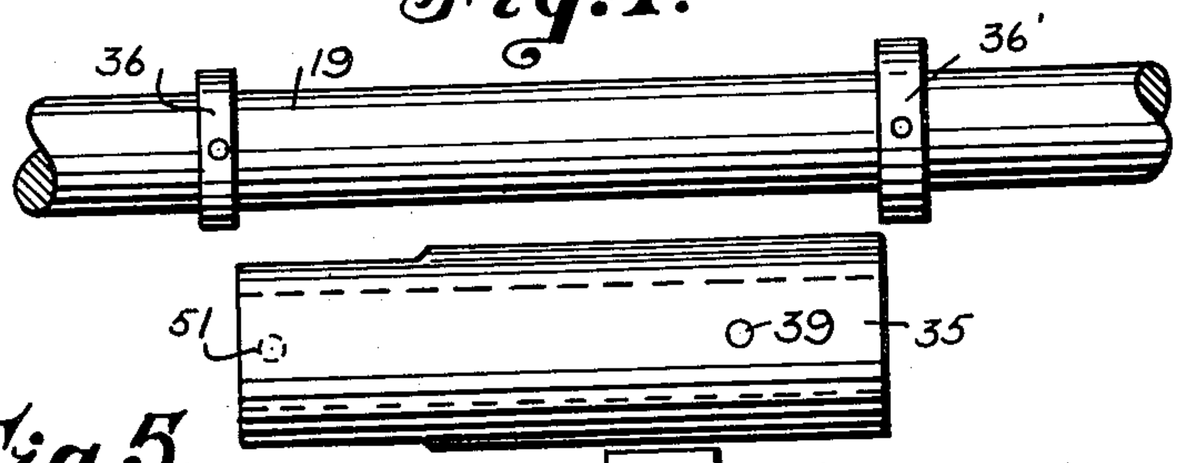

Fig. 5.

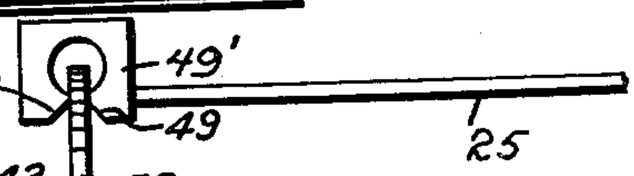

Fig. 3.

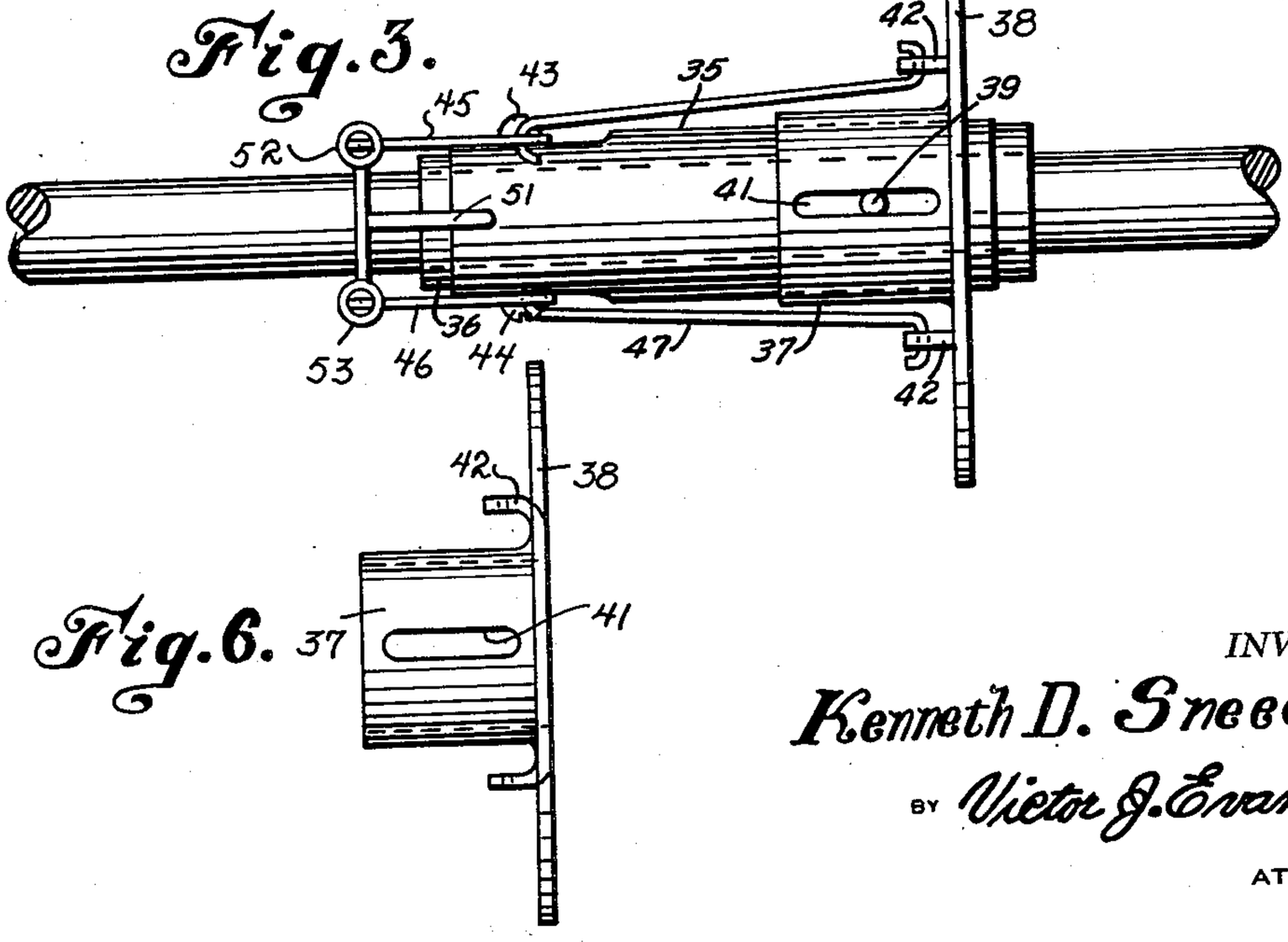

Fig. 6.

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Fig. 7.

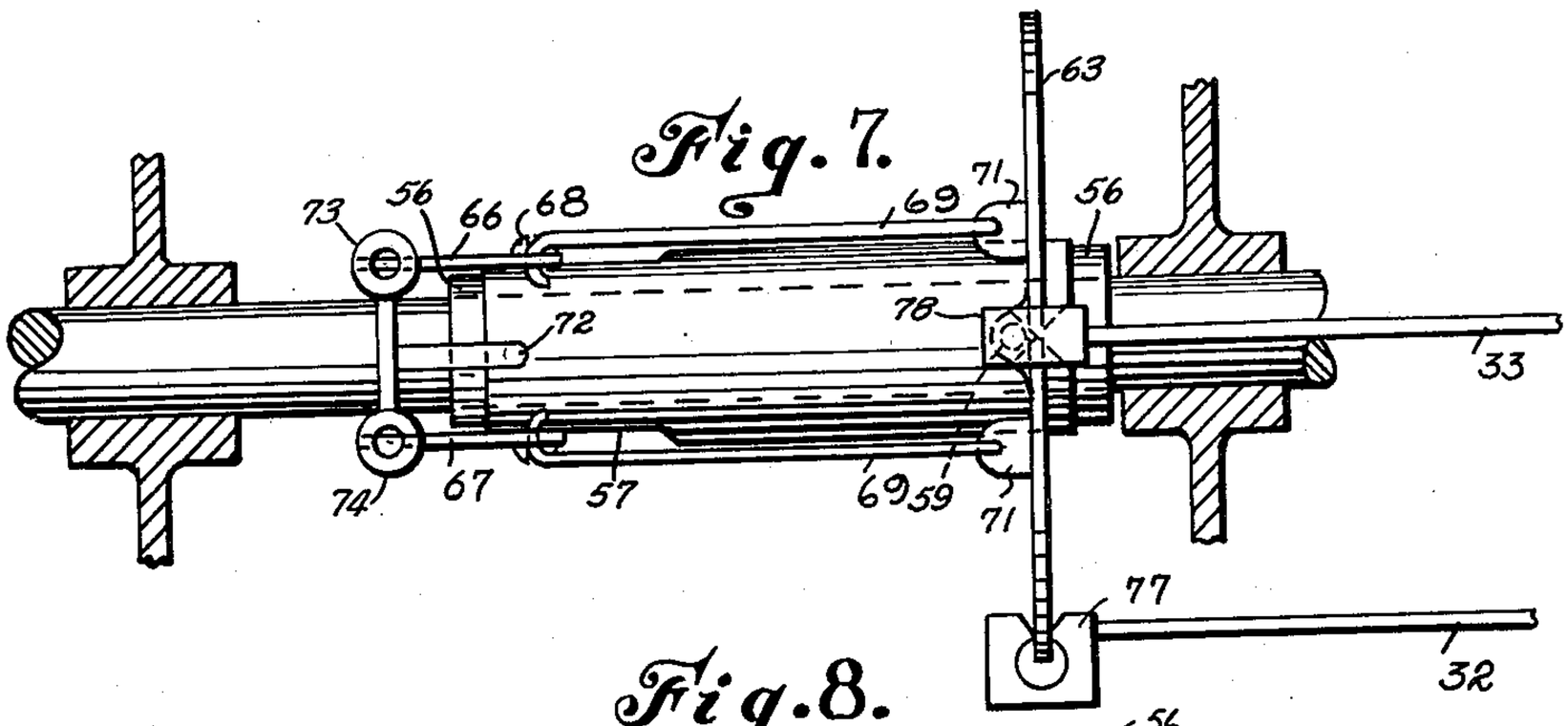

Fig. 8.

Fig. 9.

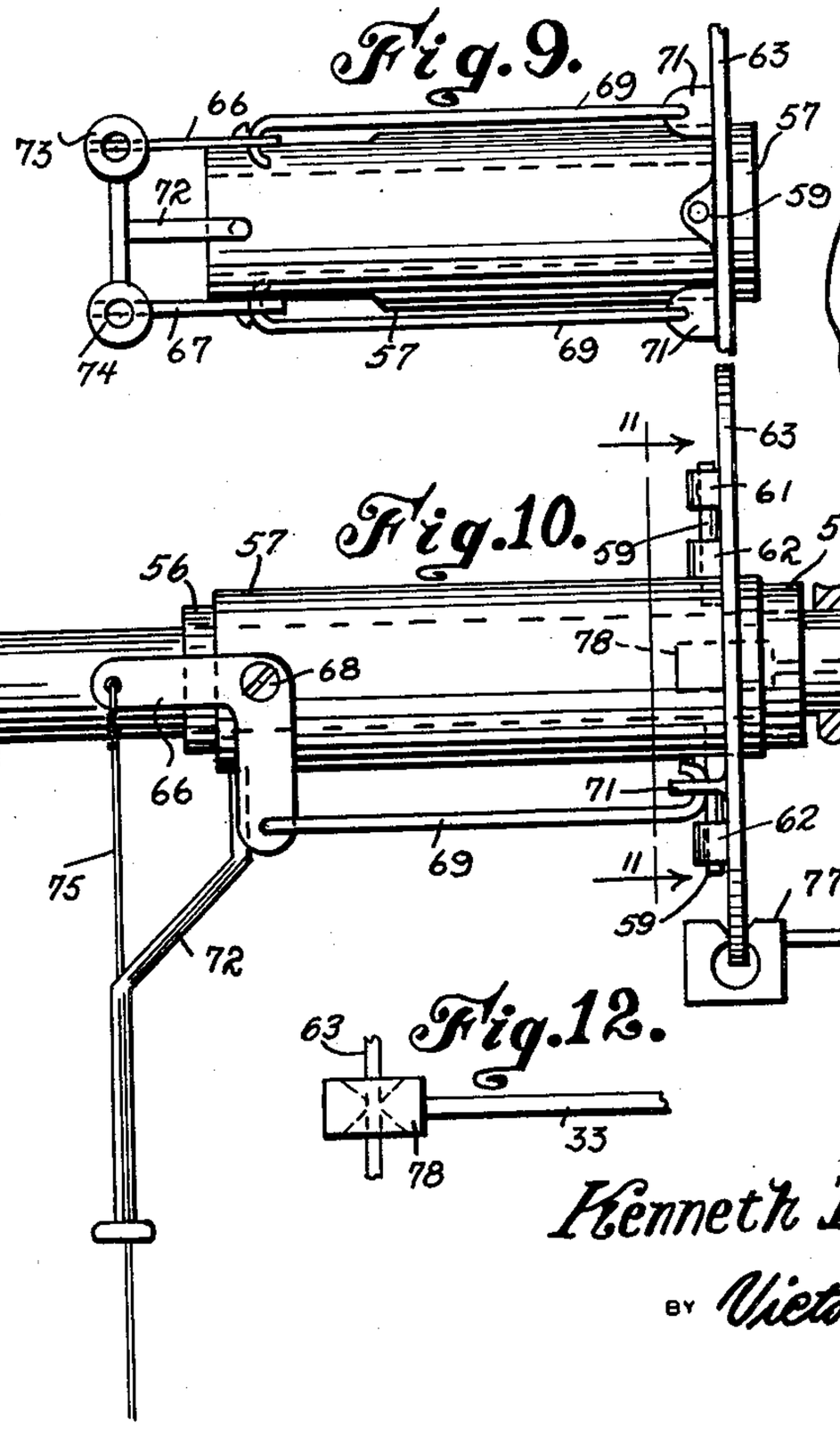

Fig. 11.

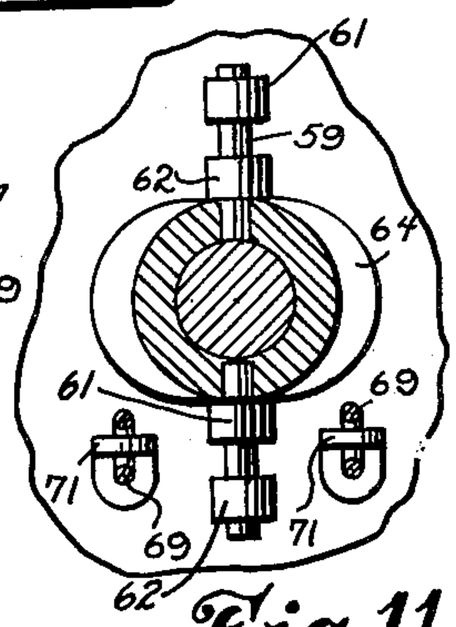

Fig. 10.

Fig. 12.

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CONTROL SYSTEM FOR MODEL AIRPLANES

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5 Claims. (Cl. 46—77)

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This invention relates to model airplanes and more particularly to control mechanisms adapted to extend to the ground by means of wires for controlling the airplane while in flight.

It is an object of the present invention to provide control mechanisms for a model airplane adapted to be propelled by a miniature engine, which are of simple construction, easy to make, and efficient in operation.

It is another object of the present invention to provide control mechanisms for model airplanes by which a skilled operator may maneuver the plane to cause it to roll an indefinite number of times, climb or dive, loop in or out, or any combination of these maneuvers thereby to perform any maneuver which is possible with any of the latest pursuit planes.

For other objects and for a better understanding of the invention reference may be had to the following detailed description taken in connection with the accompanying drawing, in which

Fig. 1 is a plan view of an airplane in three sections and connected by a tube with spaces between the sections for the control wires and the control arms and showing diagrammatically the control mechanisms connected respectively with the wing section and the rudder and elevator section,

Fig. 2 is a plan view of the aileron control mechanism mounted on the tube,

Fig. 3 is a plan view of the aileron mechanism taken at an angle of ninety degrees from the angle at which the view in Fig. 2 was taken,

Fig. 4 is a fragmentary view of a portion of the tube with the stop collars thereon,

Fig. 5 is a detail view of the body sleeve which is rotatably mounted on the tube between the stop collars,

Fig. 6 is a detail side view of the sliding sleeve having limited sliding movement on the body sleeve of Fig. 5,

Fig. 7 is a side view looking upon the elevator and rudder control mechanism,

Fig. 8 is a side view of a tube with the stop collars thereon,

Fig. 9 is an elevational view of the body sleeve and the operating parts which are adapted to be rotatably mounted on the tube,

Fig. 10 is a side elevational view of the elevator and rudder control mechanism looking upon a plane at an angle of ninety degrees to the plane on which the view in Fig. 7 was taken,

Fig. 11 is a transverse cross-sectional view taken on the line 11—11 of Fig. 10 and looking in the direction of the arrows thereof,

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Fig. 12 is a detail fragmentary view of the rider block for the elevator which is operated on the airplane structure and rotates therewith.

Referring now to the figures, 15 represents a model airplane having a power plant section 16, an intermediate or wing section 17 and a rear or tail section 18, all connected together by a tube or rod 19. The tube or rod 19 is rigidly attached to the interior of the sections by means of struts A, B, and C that have centrally located collars D that embrace the tube 19. The power plant section 16 includes an engine which drives a propeller 21. The intermediate section 17 includes wings 22 with ailerons 23. These ailerons are connected together through a linkage 24 to a single link or rider rod 25 to an aileron control mechanism 26 to be hereafter more specifically described. As seen in Fig. 1 the rider rod 25 is slidably mounted in guide blocks 25' which are fixed to the interior of the intermediate section 17. The rear or tail section 18 includes a horizontal stabilizer 27 with elevators 28 thereon and a vertical stabilizer 29 with a rudder 31 thereon. The elevators 28 and rudder 31 are respectively connected by control wires or rods 32 and 33 with an elevator and rudder control mechanism 34 carried in the rear section 18 and to be hereinafter more specifically described. The rods 32 and 33 are slidably mounted in guide blocks 32' and 33' in similar fashion to the rod 25.

Referring now particularly to Figs. 2 to 6, there is shown the aileron control mechanism 26 and the parts thereof in detail. On the tube 19 there is freely mounted a body sleeve 35. This sleeve is retained against axial displacement on the tube by stop collars 36 and 36', but the sleeve will oscillate slightly on the tube depending upon the banking of the plane during the flying thereof. On the sleeve 35 there is mounted for limited up and down movement a sleeve 37 with a plate portion 38 thereon. This sleeve 37 is retained against rotation relative to the sleeve 35 by diametrically opposite pins 39 projecting outwardly from the exterior of the sleeve 35 into diametrically opposite elongated slots 41 extending longitudinally on the sleeve. The sleeve 37 has projections 42 extending forwardly from the plate portion 38 and at opposite sides of the sleeve 37. On the front of the sleeve 35 at 43 and 44 there are pivoted bell cranks 45 and 46 having portions extending longitudinally of the sleeve 35 and other portions transversely thereof. The connection of the bell cranks is made with screws at points 43 and 44 whereby the bell cranks can be pivoted. The bell cranks 45 and 46 are connected by links 47 with the ears 42 on the sliding sleeve 37. Ma-

nipulation of one bell crank will cause the sleeve **37** to be moved in one direction while manipulation of the other bell crank will cause the sleeve to be moved in the opposite direction. Connected to the outer periphery of the plate portion **38** by means of clamp jaws **49** is a rider block **49'** through which by reason of the jaws **49** the plate portion can slide and to which the rod **25** is connected. As the plate portion and sleeve is moved in one direction the ailerons will be given one movement to cause a lowering of the wings and a movement of the sleeve **37** and plate **38** in the opposite direction will cause a raising of the wings to cause the plane to ascend or descend as desired.

Fixed to the rotatable sleeve **35** is an arm **51** with eye portions **52** and **53** on its lower end. Wires **54** extending to the ground pass through the eye portions **52** and **53** and connect respectively with the longitudinally extending portions of the bell cranks **45** and **46**. When one wire is pulled one of the bell cranks will be operated and when the other wire is pulled the other bell crank will be operated. Pulling on one wire will cause tilting of the plane wings in one direction and by pulling the other wire will cause tilting of the wings in the opposite direction.

Referring now particularly to Figs. 7 to 12, there is shown in detail the elevator and rudder control mechanism **34**. This mechanism is similarly connected to the tube **19** by the stop collars **56** and in such a manner as to be free to rotate thereon. A body sleeve **57** is mounted on the tube **19** and free to rotate thereon. Wobble plate **63** is mounted on body sleeve **57** by pins **59** carried in journalled brackets **61** and **62** on opposite sides of wobble plate **63**. In order to permit the wobble plate to be pivoted there is provided therein an elongated central opening **64** through which the sleeve **57** extends. This pivotal movement of the wobble plate **63** is effected by bell cranks **66** and **67** pivoted by means of screws **68** from opposite sides of the rear end of the sleeve **57**. These bell cranks are connected by links **69** with ears **71** at opposite sides of the pivot pins **59** and on the wobble plate **63**. An arm **72** extends downwardly and has eye portions **73** and **74** thereon. Through these eye portions there extend control wires **75** which lead to the ground.

The transverse portions of the bell cranks **66** and **67** extend to the same side of the sleeve **57**. If one wire **75** is pulled the wobble plate **63** will move about pins **59** and rider block **77** thru rod **32** will move the elevators **28** in one direction. If the other wire **75** is pulled the wobble plate **63** moves in the opposite direction thus moving the elevators in the opposite direction. Since the rider block **78** is in alignment with the pivot pins **59** the movement of the plate **63** will not cause any movement of the rod **33**. As the airplane is rolled by means of the ailerons **23** rider block **78** being supported by the tail section structure moves out of alignment with the pivot pins **59** and is then operated by movement of wobble plate **63**. Rod **33** connecting rider block **78** to the rudder **31** transmits all control movements to the rudder.

While various changes may be made in the detail construction, such changes shall be within the spirit and scope of the present invention as defined by the appended claims.

I claim:

1. A model airplane adapted for controlled flight comprising engine, wing and rear sections, a rod connecting the respective sections together, said wing section having ailerons, a control mechanism, wires connected to said mechanism and extending to the ground for effecting the operation of the ailerons, said mechanism being rotatable upon the rod and having an arm rotatable therewith and extending outside of the sections, said control cables or wires being guided by said arm.

2. A model airplane adapted for controlled flight comprising engine, wing and rear sections, a rod connecting the respective sections together, said wing section having ailerons, a control mechanism connected to said ailerons, wires connected to said mechanism and extending to the ground for effecting the operation of the ailerons, said mechanism being rotatable upon the rod and having an arm rotatable therewith and extending outside of the sections, and control cables or wires guided by said arm, said mechanism including a main sleeve free to rotate upon said rod, a second sleeve slidable upon the first sleeve and a plate portion on the second sleeve, a pair of bell crank levers pivotally mounted on the opposite sides of said main sleeve in diametrically opposed relation to each other, linkage connected between the bell crank levers and the slidable sleeve and plate to cause its movement along the main sleeve whereby to effect a longitudinal adjustment of the slidable sleeve, a rider block on the outer periphery of the plate portion, and linkage connected between the rider block and the ailerons, said rider block having clamp jaws for connecting said rider block to said plate portion and said jaws being adapted to permit the plate portion to rotate therethrough.

3. A model airplane adapted for controlled flight comprising engine, wing and rear sections, a rod connecting the respective sections together, said wing section having ailerons, a control mechanism connected to said ailerons, wires connected to said mechanism and extending to the ground for effecting the operation of the ailerons, said mechanism being rotatable upon the rod and having an arm rotatable therewith and extending outside of the sections, and the control wires being guided by said arm.

4. A model airplane adapted for controlled flight comprising a plurality of sections and a rod connecting the sections together, one of said sections having control elements hinged thereto, and a control mechanism journalled on the rod and operating the control elements upon the section, said control mechanism including a main sleeve, a member connected to the main sleeve for longitudinal movement, linkage on the main sleeve and connected with the longitudinally adjustable member the latter having an outer periphery, and means for hooking the outer periphery of the member with the control elements including a rider block loosely connected to the section and adapted to permit the periphery of the member to be passed through it after the member and the main sleeve are rotated on the rod, an arm extending to the outer side of the sections, wires guided by the arm and connected with the linkage to effect the operation of said member.

5. A model airplane adapted for controlled flight comprising engine, wing and rear sections, a rod connecting all of said sections together, a rudder and elevator pivoted upon the rear section, and control mechanism for the rudder and elevator comprising a main sleeve journalled upon the rod, a wobble plate pivotally connected to one end of the main sleeve and adapted to be rotated with the sleeve, control linkages connected to the main sleeve and to the wobble plate

to effect a tilting movement of said plate, an arm depending from the main sleeve and having guide portions, wires extending through the guide portions of the arm and connected to the linkages to effect their actuation, said wires extending upwardly from the ground, rider elements connected to the outer periphery of the wobble plate and respectively connecting the wobble plate with the rudder and elevator, the rider elements being arranged so that a tilting of the plate will effect the adjustment of the elevator, and a rotation of the airplane and tilting of the plate will effect adjustment of the rudder.

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