

AERODROME.

992,410.

3 SHEETS—SHEET 1.



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AERODROME.

APPLICATION FILED OCT. 5, 1910.

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Patented May 16, 1911.

3 SHEETS—SHEET 2.

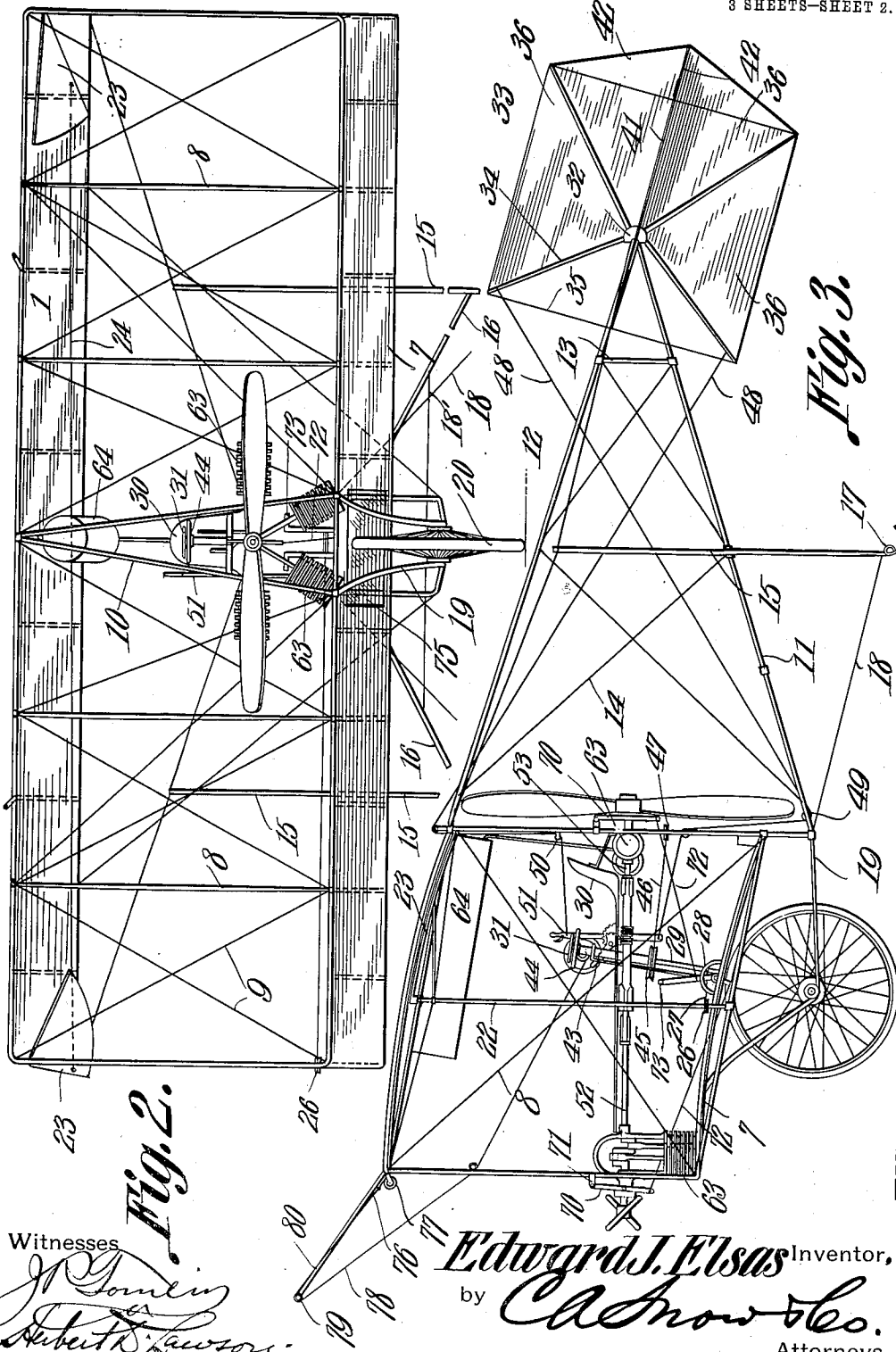


Fig. 2.

Fig. 3.

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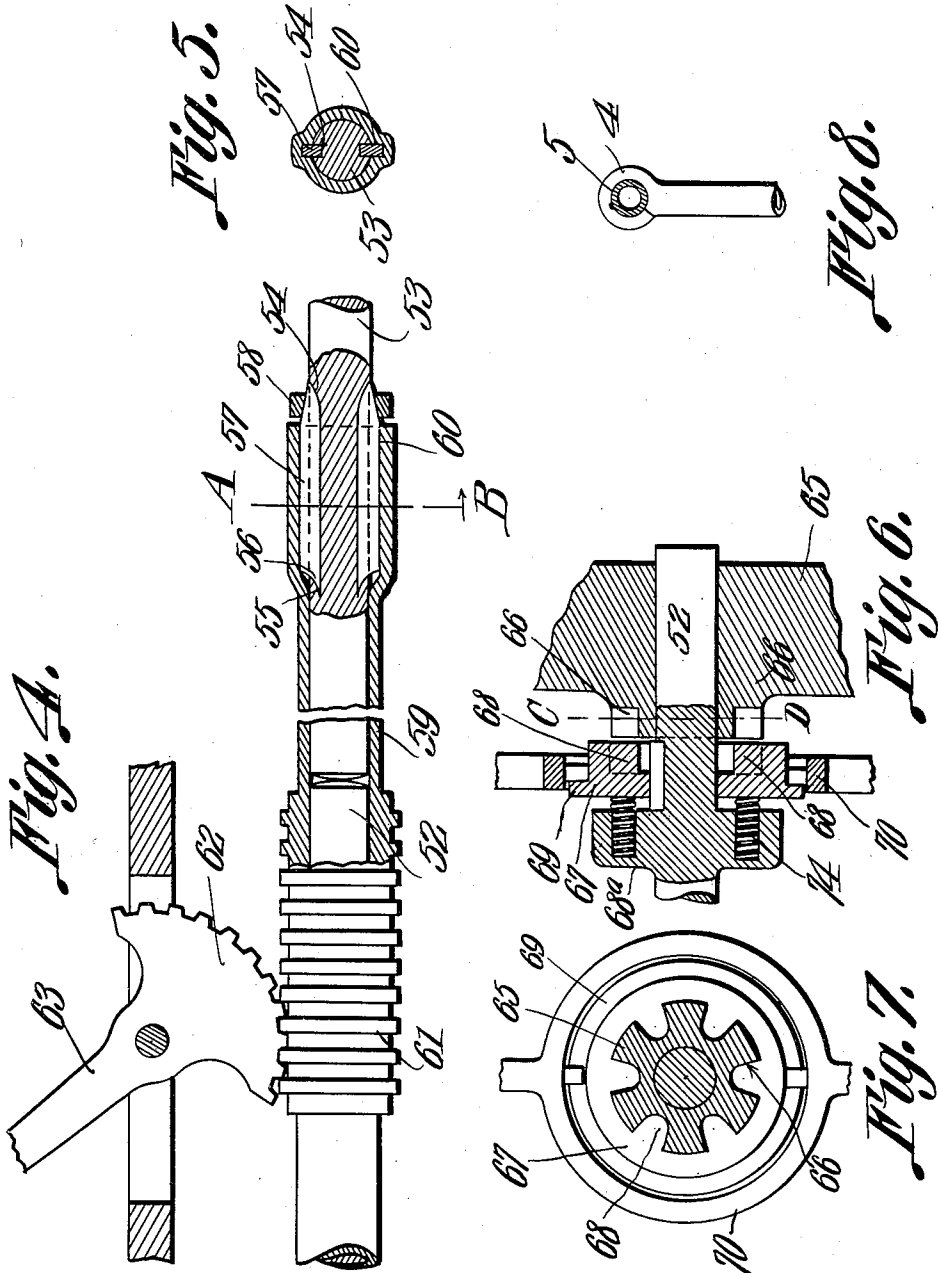
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UNITED STATES PATENT OFFICE.

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AERODROME.

992,410.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, EDWARD J. ELSAS, a citizen of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented a new and useful Aerodrome, of which the following is a specification.

This invention relates to aerodromes of the by-plane type, one of its objects being to provide means whereby the lateral balance of the machine may be maintained, said means being under the constant control of the aviator.

A further object is to provide an aerodrome having spaced propellers and a separate motor for driving each propeller, means being employed whereby the motors can be caused to operate independently or can be coupled so as to drive the two propellers in unison.

Another object is to provide simple means for placing each propeller in or out of operative relation with its motor.

Another object is to provide improved steering mechanism whereby the machine may be directed in a desired path, either laterally or in an upward or downward direction.

Another object is to provide a front deflecting plane adapted to be furled when not in use and which, when extended, operates to prevent forward dipping of the machine and to restore longitudinal equilibrium.

With the foregoing and other objects in view the invention consists of certain novel details of construction and combinations of parts hereinafter more fully described and pointed out in the claims.

In the accompanying drawings, the preferred form of the invention has been shown.

In said drawings,—Figure 1 is a plan view of the machine, a portion of the sustaining plane being removed. Fig. 2 is a front elevation of the machine. Fig. 3 is a side elevation. Fig. 4 is an enlarged view, partly in section and partly in elevation, showing the means employed for coupling or uncoupling the motors of the two propellers. Fig. 5 is a section on line A—B Fig. 4. Fig. 6 is an enlarged section through one of the propeller clutches. Fig. 7 is a section on line C—D Fig. 6. Fig. 8 is a detail view showing means whereby two frame members may be connected together.

Referring to the figures by characters of reference 1 designates bowed ribs which are preferably parallel and have upstanding eyes 2 in which are arranged diagonal braces 3, the rear terminals of the ribs being formed with notches to receive the border wires of the plane, and with split eyes 4 adapted to engage the rear standards, the front ends of these ribs, having eyes to engage the rear members 5 of the frame of the top sustaining plane 6, this plane being in the form of a fabric which is stretched upon the bottom faces of the ribs, braces, etc., and is curved from its front to its rear edge, the concave surface of the plane being lowermost. The lower sustaining plane 7 is of the same construction as the upper plane and is connected thereto by hollow oval standards 8 secured to the ends of the ribs 1 and which are braced by means of cross stay wires 9 extending along the front and rear as well as the side edges of the planes. The middle rib 1 of the upper plane is connected to the two middle ribs of the lower plane by means of downwardly diverging frame members 10. These members 10 extend below the rear edge of the plane 7 and are secured to rearwardly converging spars 11 which are inclined upwardly and are connected, at their rear ends, to a similar spar 12 inclined upwardly toward and connected to the rear end of the central rib of the frame of the top plane 6. The spars 11 and 12 thus form a rearwardly extending frame which may be braced at desired points by means of connecting strips 13 and crossed wires 14. The side spars 11 and 12 have uprights 15 secured to them and extending downwardly therebelow, said uprights being attached to the spars by downwardly diverging spars 16 and by brace wires, the uprights thus being capable of lateral flexibility. Each upright is provided at its lower end with a spring skid 17. A brace wire 18 may connect the lower end of each upright to one of the frame members 10, as shown in Fig. 3, and the two uprights may be connected by a cross wire 18'.

Curved bars 19 extend forwardly and upwardly from the lower ends of the frame members 10 and are practically continuous of spars 11 and are secured to the middle ribs of the lower plane 7, these bars 19 forming bearings for a supporting wheel 20.

The wheel 20 and the skid 17 are adapted to cooperate to hold the machine in proper position while the same is resting upon the ground prior or subsequent to its flight.

5 As shown in Fig. 3, the two planes 6—7 are inclined upwardly and forwardly with relation to the surface on which the machine is supported. The top plane 6 has its rear corner portions cut away along rearwardly
10 converging lines, as indicated at 21 and journaled within the frames of the two planes are upstanding shafts 22 each of which extends upwardly to the forward end of one of the cutaway portions of the top plane. A seg-
15 mental shutter or balancing plane 23 is fixedly connected to each of the shafts 22 and is so proportioned as to close one of the cut away corner portions of the top plane, when said balancing plane is shifted in one direc-
20 tion, and to thus increase the sustaining and balancing effect of the plane 6. The two balancing planes or shutters are connected by a cord 24 and the two shafts have sheaves 26 attached to the lower portions thereof
25 and secured to the ends of an operating cord or belt 27 which is looped about and attached to a sheave 28 secured to the lower end portion of a tubular steering or controlling shaft 29. This shaft extends upwardly
30 adjacent the seat 30 to be occupied by the aviator and an operating wheel 31 connected to the upper end of the shaft. It will be seen that, by rotating the shaft 29, motion will be transmitted through the cord 27 and the
35 wheels 28 and 26 to the shafts 22 which will, by reason of the connection between the two balancing planes 23, result in the simultaneous movement of said planes toward either side of the machine. One plane 23
40 will thus be retracted under the top plane 6, while the other plane 23 will be projected beyond said plane. It will be seen that by means of this mechanism the plane 23 can be shifted laterally so as to obtain the desired
45 lateral balance while the machine is in flight.

A universal joint 32 is arranged at the point where the spars 11 and 12 come together and this joint serves to connect the spars with the combined horizontal and vertical rudder used in connection with the machine. The vertical rudder which has been
50 indicated generally at 33, consists of ribs 34 radiating from the joint 32 and connected at their ends by wires 35, the fabric 36 constituting the body of the rudder, being interposed between these ribs and wires and terminating at the forwardly diverging ribs. The horizontal rudder, which has been indicated generally at 37, is also made up of ribs
60 38 radiating from the joint 32 and connected at their ends by wires 39 or the like, the fabric 40 constituting the body of the rudder, being interposed between these ribs and terminating along the forwardly diverging ribs

38. A central strip 41 extends rearwardly from the intersecting portions of the vertical and horizontal rudders and the free end of this strip is connected by means of brace wires 42 or the like to the outer ends of the rearwardly extending ribs 38 and 34. As the front edges of the two rudders diverge forwardly, it will be apparent that the rudders are free to swing upon the universal joint 32 to a desired extent without interference by the bars 11 and 12.

A tubular shaft 43 is mounted on the shaft 29 heretofore referred to and has a wheel 44 at its upper end while a sheave 45 is secured to the lower end thereof. A steering cord 46 is wrapped about and secured to the sheave and extends partly around guide sheaves 47 located adjacent the sides of the machine and thence rearwardly, said cord being brought and connected to the outer end portions of the front ribs 38. It will thus be seen that when the shaft 43 is rotated, as by means of wheel 44, the cord 46 will be paid out in one direction and taken up in the opposite direction so as to cause the vertical rudder, which is connected to and moves with the horizontal rudder, to swing about the substantially vertical axis extending through the universal joint 32. Actuation of the horizontal rudder is effected by means or cords 48 connected to the free end portions of the forward ribs 34, these cords being taut and extending partly around guide sheaves 49 and 50, the front ends of the cords being attached to a lever 51 at points above and below the fulcrum thereof. This lever may be provided with any suitable means for locking it against movement and, obviously, by shifting the lever the two cords connected thereto can be moved simultaneously in opposite directions so as to actuate the vertical rudder and thus cause the horizontal rudder to tilt about an axis extending substantially horizontally through the universal joint 32.

The propelling mechanism includes two central longitudinally extending shafts 52 and 53 arranged in alinement and each of which is provided, at an intermediate point, with key seats 54, one end of each seat being undercut, as indicated at 55 so as to receive the reduced pointed end 56 of a key 57. The other end of said key tapers and a ring 58 engages the tapered ends of the keys and binds them against the shaft so as to thus hold the keys firmly within their seats. A sleeve 59 is loosely mounted on the meeting end portions of the shafts 52 and 53 and is provided, at each end, with interior, longitudinal channels 60 adapted to receive the keys 57. The length of the sleeve 59 is such that, when said sleeve is moved longitudinally to one limit, one set of keys 57 will be engaged by the sleeve, while the keys upon

the other shaft will be disengaged from the sleeve. The two shafts are thus free to rotate independently of each other but the sleeve will of course rotate with that shaft with which it is interlocked. The sleeve has a series of annular ribs 61 adapted to engage a segmental gear 62 located at one end of a lever 63, said lever constituting means whereby the aviator can actuate the gear so as to shift the sleeve 59 longitudinally into engagement with either or both of the sets of keys 57. It is to be understood that by partly removing the sleeve from engagement with one set of keys 57, said sleeve is shifted into engagement with the other set so that the two shafts 52 and 53 are caused to rotate together.

Each of the shafts 52 and 53 is provided adjacent its outer end, with cranks adapted to be driven by a multiple cylinder motor 63' connected directly to the shaft, one of the motors being provided for each shaft. A fuel tank 64 may be mounted close to the center of the upper sustaining plane 6 and the supply of fuel fed to the motor can be controlled in any suitable manner, as by means of a valve-controlled lever located upon the wheel 31 and as found in some types of automobile structures.

Each shaft 52 and 53 is provided, at its outer end, with a propeller 65, the hub of which has a series of recesses 66 in one face thereof. A clutch member 67 is feathered on the shaft and has locking ribs 68. This clutch member 67 has an annular flange 69 which is engaged by a lever 70. The lever is fulcrumed at one end upon a bracket 71, while its other end is connected, by means of a cord 72 or the like to a foot lever 73. A collar 68^a is fixed on a shaft 52 near member 67 and springs 74 are interposed between the collar and clutch member and hold the ribs 68 normally seated in recesses 66. By actuating the foot lever the two levers 70 can be simultaneously shifted so as to disengage the clutch member 67 from the hubs of the propellers by withdrawing the ribs 68 from the recesses 66. This actuation of the lever 70 places under stress springs 74 which operate to hold said levers 70 and the clutches normally in predetermined positions. When the lever 73 is released the springs 74 return the clutch members 67 to their initial positions against the hubs of the propellers and the ribs 68 are thus held until they come into register with the recesses 66, whereupon they are projected automatically into the recesses and thus lock the propellers to the shafts 52 and 53.

When the two shafts 52 and 53 are uncoupled, they will be rotated independently by their respective motors and the propellers will thus be independently actuated. Both propellers can be operated in unison by

coupling the two shafts together, and, should one motor become disabled, the other motor can thus be employed for rotating both of the propellers..

In operating the machine either or both of the propellers are set in motion and the shafts thereof may be coupled together if desired. The inclined upper and lower planes 6 and 7 will thus be drawn forward and will glide upwardly, the direction of flight both laterally and upwardly and downwardly being controlled by the vertical and horizontal rudders 36 and 37, respectively. Should the machine tilt laterally to an undesirable extent, the balancing planes 23 may be shifted to the right or to the left, according to the side which is lowermost and the lateral balance of the machine may thus be quickly restored by increasing the area of the upper plane at one side of the center and reducing the area thereof at the other side. Either or both of the propellers can be placed out of connection with its motor by shifting the clutch 67 belonging thereto.

The provision of the two motors connected in the manner described is advantageous for the reason that, should one of the motors become disabled from any cause while the machine is in flight, the other can be utilized to drive one or both of the propellers.

The skids operate as resilient runners to ease the machine while alighting. The seat 30 which has been referred to may be extended any desired distance longitudinally of the machine and may be of any construction desired. The aviator may sit astride the seat or with his feet directly in front of it, the latter position being necessary should it be deemed desirable to attach supplemental seats to the sides of the aviator's seat for holding passengers. In order that the aviator may have a view of the ground directly under the machine, a portion of the lower plane is made of transparent material, as indicated at 75 in Fig. 2.

For the purpose of preventing forward dipping of the machine and for restoring the longitudinal balance, a supplemental front plane 76 may be employed, this plane being normally rolled, as indicated at 77 and having one or more operating cords 78 connected to its free end and guided upon sheaves 79 certain of which are located at the forward ends of forwardly projecting spars 80 extending from the frame of the top sustaining plane. These operating cords extend downwardly to points adjacent the seats to be occupied by the aviator and may be provided with any suitable means for operating them. The spars 80 are inclined upwardly toward their front ends and diverge forwardly so that, when the said supplemental plane 76 is drawn forward onto the spars, it operates to deflect the machine

upwardly and thus restore and maintain the longitudinal balance thereof.

Various changes can of course be made in the construction and arrangement of the parts without departing from the spirit or sacrificing any of the advantages of the invention as defined in the appended claims.

What is claimed is:—

1. An aerodrome including separate alining shafts, a propeller upon each shaft, a motor for driving each shaft, keys detachably connected to the shafts, a coupling member loosely mounted on said shafts, and means for shifting said member into engagement with the keys upon either or both of the shafts.

2. An aerodrome including alining shafts, a propeller upon each shaft, a motor for driving each shaft, coupling elements fixedly mounted upon the shafts, a shiftable member upon the shafts and having annular ribs upon said member, and an actuating device including a segmental gear engaging the rib portion of said member to shift the member into engagement with the coupling elements upon either or both of the shafts.

3. An aerodrome including alining shafts, longitudinally extending keys fixedly connected to the adjacent end portions of the shafts, a sleeve loosely mounted on said end portions and having interior longitudinal channels in the end portions thereof, there being annular ribs upon the outer surface of the sleeve and means engaging said ribs for shifting the sleeve longitudinally during the rotation thereof to engage the keys upon either or both of the shafts.

4. In an aerodrome, the combination with alining shafts, a propeller connected to each shaft, and a motor for driving each shaft, of keys extending longitudinally upon and secured to the adjacent end portions of the shafts, a sleeve loosely mounted on said end portions, said sleeve having interior longitudinal seats in the end portions thereof and having exterior annular ribs, means engaging the ribs for shifting the sleeve longitudinally during the rotation thereof to engage the keys upon either or both of the shafts.

5. In an aerodrome, the combination with upper and lower sustaining planes, of alining shafts arranged therebetween, a propeller at the front end of one of the shafts and at the back end of the other shaft, a motor for driving each shaft, said motors being close to the respective propellers, coupling members secured upon the adjacent end portions of the two shafts, a sleeve loosely mounted on said end portions and having means at its ends for engaging said coupling members, and means under the control of the aviator for shifting the sleeve during the rotation thereof to engage the coupling members upon either or both of the shafts.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

EDWARD J. ELSAS.

Witnesses:

CHAS. E. MACDONALD,
CLEM TEMPLIN.