Oct. 21, 1924. 1,512,428

W. D. LINTHICUM

AIRPLANE

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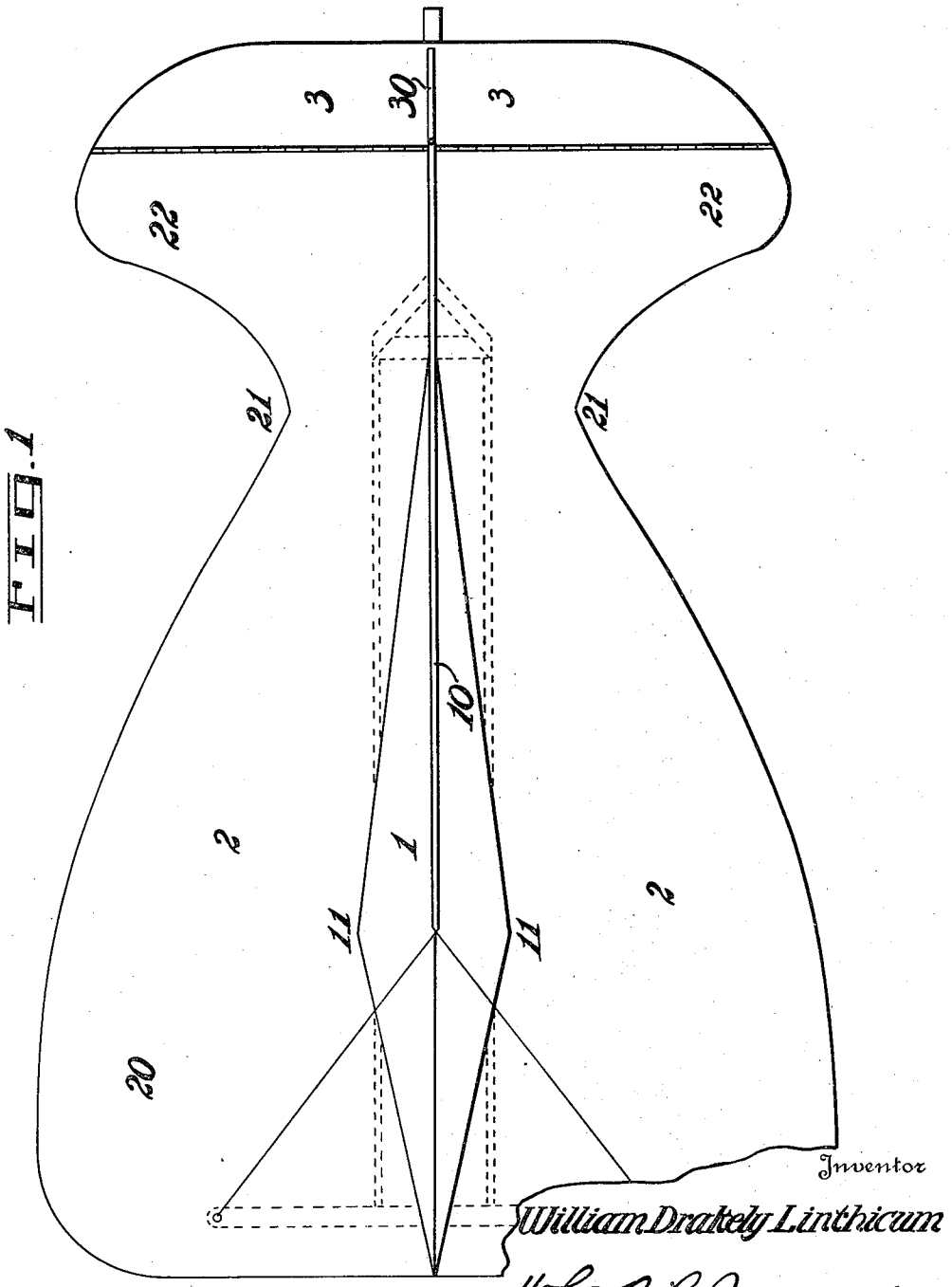


FIG. 1

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FIG. 2.

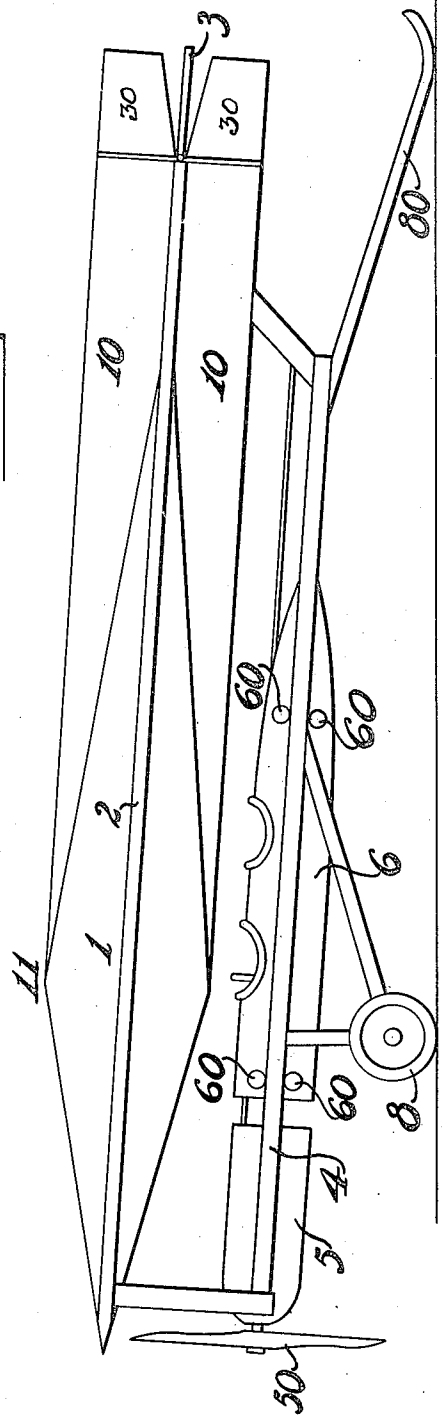
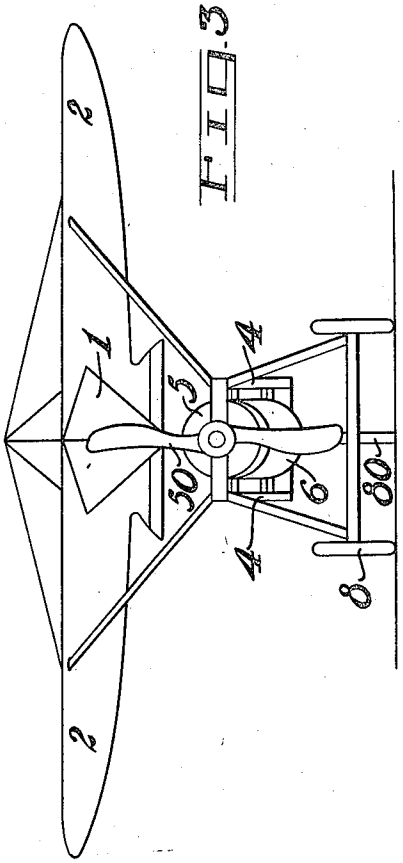


FIG. 3.



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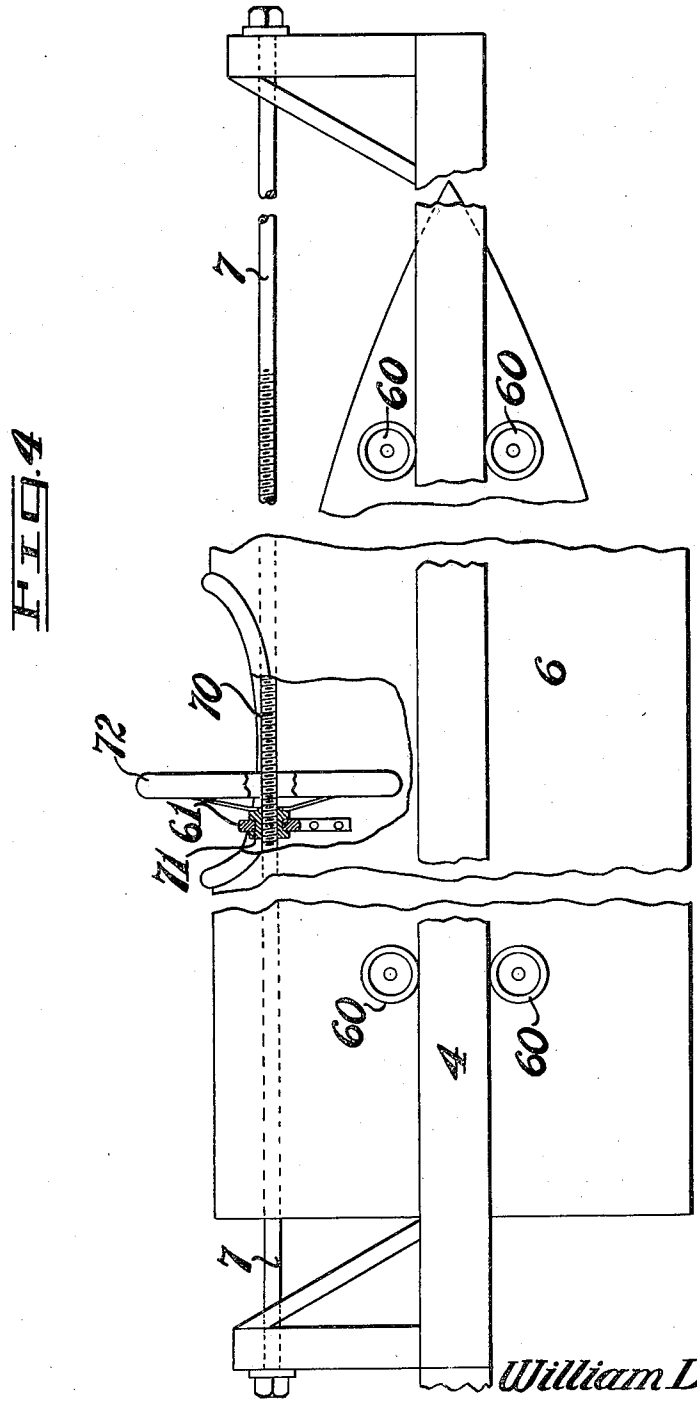


FIG. 4

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UNITED STATES PATENT OFFICE.

WILLIAM DRAKELY LINTHICUM, OF SEATTLE, WASHINGTON, ASSIGNOR OF ONE-EIGHTH TO JULIA E. GLASSCOCK AND ONE-EIGHTH TO EMMA J. LYON, BOTH OF SEATTLE, WASHINGTON.

AIRPLANE.

Application filed September 26, 1921. Serial No. 503,190.

To all whom it may concern:

Be it known that I, WILLIAM DRAKELY LINTHICUM, a citizen of the United States of America, and resident of the city of Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Airplanes, of which the following is a specification.

My invention relates to air planes and consists of an airplane having certain features whereby its construction is simplified and whereby its operation upon new principles may be secured.

One object of my invention is to provide a machine wherein a certain part of the weight thereof may be adjusted in a fore-and-aft direction to thereby affect the angle of the sustaining planes and thus control the upward and downward inclination of the course.

A further object of my invention is to provide a central body as a base from which the sustaining planes spring, which body will have, at least approximately, a stream line form having plane surfaces disposed to prevent side slip.

Other objects of my invention will be disclosed in the following description and particularly pointed out in the claims.

In the accompanying drawings I have illustrated an embodiment of my invention.

Figure 1 is an upper plan view of an airplane made in accordance with my invention.

Figure 2 is a side elevation of the same machine.

Figure 3 is a front elevation of this machine.

Figure 4 is a side view, with sections broken out, showing on a larger scale the adjustable nacelle and the manner of giving a relative fore-and-aft movement thereto.

The airplane illustrated has a central elongated body 1 from which spring the sustaining planes 2, the planes of the wings being joined to said central body along its central horizontal plane. These sustaining planes extend throughout the length of this central body and beyond the same at the rear. The greatest extent of these planes is from front to rear. Towards the front, as at 20, they are of maximum width, their outer edges drawing inward to their minimum width at about the rear end of the central body forming a neck 21, and rearwardly of this widening as at 22, forming a shape much resembling that of a fish tail. At the rear end of this is or may be pivoted a horizontal rudder 3 of standard type.

The central body 1 I prefer to make of a diamond cross section with a major axis placed vertical and a minor axis horizontal and to have the sustaining planes joined thereto along the apex of the angles at its sides.

This body tapers from a point, as 11, well forwardly of the center of its length, towards each end, thus forming an approximation to a stream line shape having outer plane surfaces. These plane surfaces are important in preventing side slip and the keel vanes or vertical fins 10 which extend rearwardly from the point 11 of maximum diameter of this central body to the end of the sustaining planes also act as steadying planes and to prevent side slip. Rearwardly of the keel fins 10 are pivoted vertical or steering rudders 30 of any suitable or standard type.

According to my invention the fuselage, meaning by such term the frame structure fixed rigidly to and beneath the sustaining planes, has as a characteristic feature guide rails extending in a fore-and-aft direction and located beneath the central body 1. Such rails are indicated at 4. At the forward ends of these rails is mounted the engine and the propeller 50. The engine is supposed to be within the casing 5.

Two laterally separated guide rails 4 are shown, between which is placed a structure which will herein be referred to as a nacelle. This is an enclosed body 6, which is designed to accommodate the operator, any passengers carried, and control mechanisms.

This nacelle has guides, as rollers 60, which engage the guideways or rails 4, to support the nacelle and to guide it in fore-and-aft movements. The nacelle and the guideways of the fuselage are thus held to prevent any relative movement except in a fore-and-aft direction.

Suitable means are provided to control the relative fore-and-aft position of the fuselage, of which the rails 4 are a part, and of the nacelle, and to provide means for changing the relative fore-and-aft positions

of these parts. While various means for doing this may be used, I have shown for this purpose a rod or shaft 7 which parallels the guide ways and has its ends secured in a part of the fuselage and a threaded section as 70, upon which turns a nut 71 which is turned through connection with a wheel 72 conveniently placed for operation by the operator. The nut is held against fore-and-aft movement relative to the nacelle, as by a bar 61 which is fixed relative to the nacelle, and occupies a groove in the nut, so that the nut may freely turn. The reverse construction in which the nut is held against turning and the shaft turns, may be adopted and has certain advantages of convenience.

Any suitable type of landing gear, as the wheels 8 and the skid 80 may be adopted.

In operation it is designed that the vertical control of the airplane be secured largely by fore-and-aft shifting of the center of gravity of the nacelle and its contents relative to the sustaining planes. Shifting of this weight forwardly will cause a shifting of the angle of the planes to depress their front edges and shifting of this weight rearwardly will depress the rear edges of the planes, thus causing a corresponding upward or downward line of flight. The rudders 3 are provided for supplemental or optional use.

Birds in soaring flight, control this flight by shifting the angle of their wing surfaces relative to the direction of flight. It is an object of my invention to secure a construction in which substantially the same thing may be done. I have, however, adopted the expedient of shifting the weight relative to the angle of the sustaining planes, which results in shifting the angle of the planes relative to the line of flight. By suitable control of this angle to conform to the air currents and the velocity of movement, soaring flight is obtainable.

The power plant of the airplane illustrated in the accompanying drawings is necessary in starting a flight and quickly acquiring elevation. It is, however, contemplated that when elevation is secured the engine will be stopped and soaring flight secured by proper adjustment of the wing angles through fore-and-aft shifting of the weight of the nacelle, together with periods of descending glides by which velocity is attained alternating with upward inclines against the wind by which elevation is acquired. But slight variations in the disposition of the movable weight, and only comparatively light shifting weights are required to effect such control. Too great a shifting weight may cause too abrupt angular deviations, and is moreover quite difficult to handle and control. The use of a lightweight nacelle, carrying only the pilot and passenger, and the controls, will be found amply sufficient for effecting the desired changes, and will be found to be much more sensitive and simple to control than a heavier nacelle, or one which supports the engine, propeller, and like parts. It is for this reason that I have supported the engine in a casing, 5, which is separate from the shifting nacelle 6, and which is rigidly fixed to the fuselage 4.

In the design of the present invention care should be taken to balance air resistances, not only of laterally-spaced elements, but of superposed elements. If the air resistance of the body 1 varies greatly from that of the fuselage and nacelle suspended therebeneath, there will result an instability tending to cause the airplane either to rise or to dive abruptly, pivoting on a line joining the centers of pressure of the individual wings 2. I have therefore so proportioned the body 1 that it offers substantially the same resistance in moving through the air as the fuselage, including the casing 5, and the nacelle 6 combined. In this manner the tendency towards instability is overcome, and the equilibrium of the airplane is indeed enhanced, by reason of the suspension of its center of gravity well below its general center of pressure. Taken in connection with the means for longitudinally shifting the relative positions of the center of pressure and the center of gravity, there is thus provided an airplane of marked stability and ease of control. It is in fact so easy of control as to make it, except when climbing rapidly to a desired altitude, practically independent of its motor.

What I claim as my invention is:

1. An airplane having sustaining planes, a fuselage fixed relative to said planes and adapted for carrying a propelling power plant, a nacelle mounted in said fuselage for relative fore-and-aft movement, and means controllable from the nacelle for moving said nacelle forwardly and rearwardly at will.

2. An airplane having a fuselage and a nacelle, one having guide ways and the other complemental guides for relative fore-and-aft movement, a fore-and-aft rod connecting fuselage and nacelle and having a threaded section, a nut mounted upon the threaded section, said rod and nut being secured, one to the fuselage and one to the nacelle, and means for securing relative rotation of nut and rod to thereby cause and control relative fore-and-aft movement between fuselage and nacelle.

3. An airplane having an enclosed central body of a diamond cross section tapering towards each end and sustaining planes extending laterally therefrom, and a weighted fuselage suspended beneath said body.

4. An airplane as in claim 3 in which the

largest transverse measurements of the central body are forwardly of the center of its length and rearwardly of its forward end.

5. An airplane as in claim 3 in which the greater diagonal of the diamond shaped section is vertical.

6. A monoplane having an elongated central body and sustaining planes substantially bisecting said body lengthwise, and a fuselage suspended beneath said body.

7. A monoplane having an elongated hollow central body and sustaining planes extending lengthwise at each side of and substantially bisecting said body, and a fuselage suspended from said body.

8. An airplane having an elongated hollow body of diamond-shaped cross section along each of three perpendicular intersecting planes, the transverse plane being located adjacent its forward end, sustaining planes extending lengthwise thereof and substantially conforming in outline with the plane of a major diagonal of said body.

9. A monoplane having an enclosed central body, sustaining planes extending laterally from the said body, a nacelle suspended from the said body, said body and nacelle being proportioned to offer substantially equal air resistance.

10. A monoplane having sustaining planes extending substantially continuously from side to side, a supporting frame suspended beneath the longitudinal axis of said planes, and a body surrounding said longitudinal axis, and of air resistance substantially equal to the air resistance of said supporting frame.

Signed at Seattle, King County, Washington, this 21 day of September, 1921.

WILLIAM DRAKELY LINTHICUM.