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March 5, 1929. J. VON WALDY 1,704,449

FLYING MACHINE

Filed Dec. 8, 1924 2 Sheets-Sheet 1

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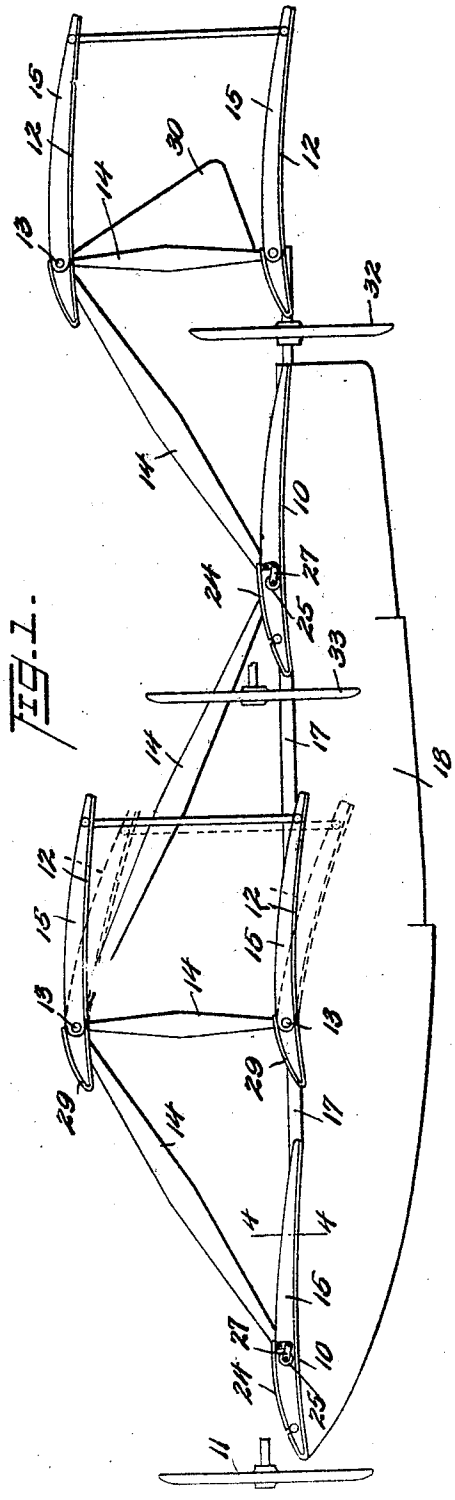


FIG. 1.

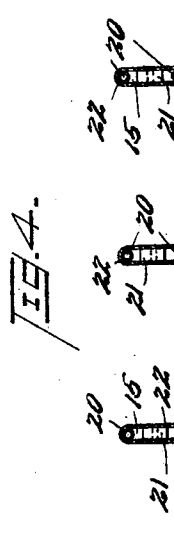


FIG. 4.

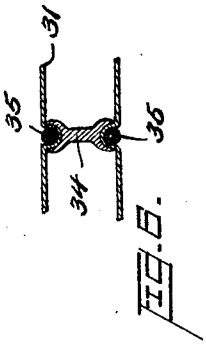


FIG. 6.

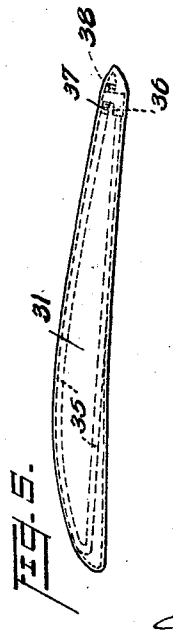


FIG. 5.

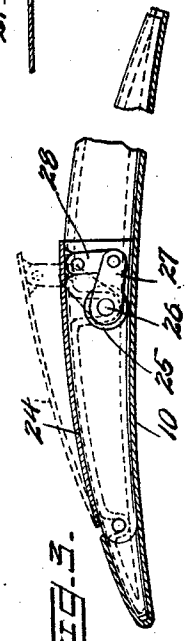


FIG. 3.

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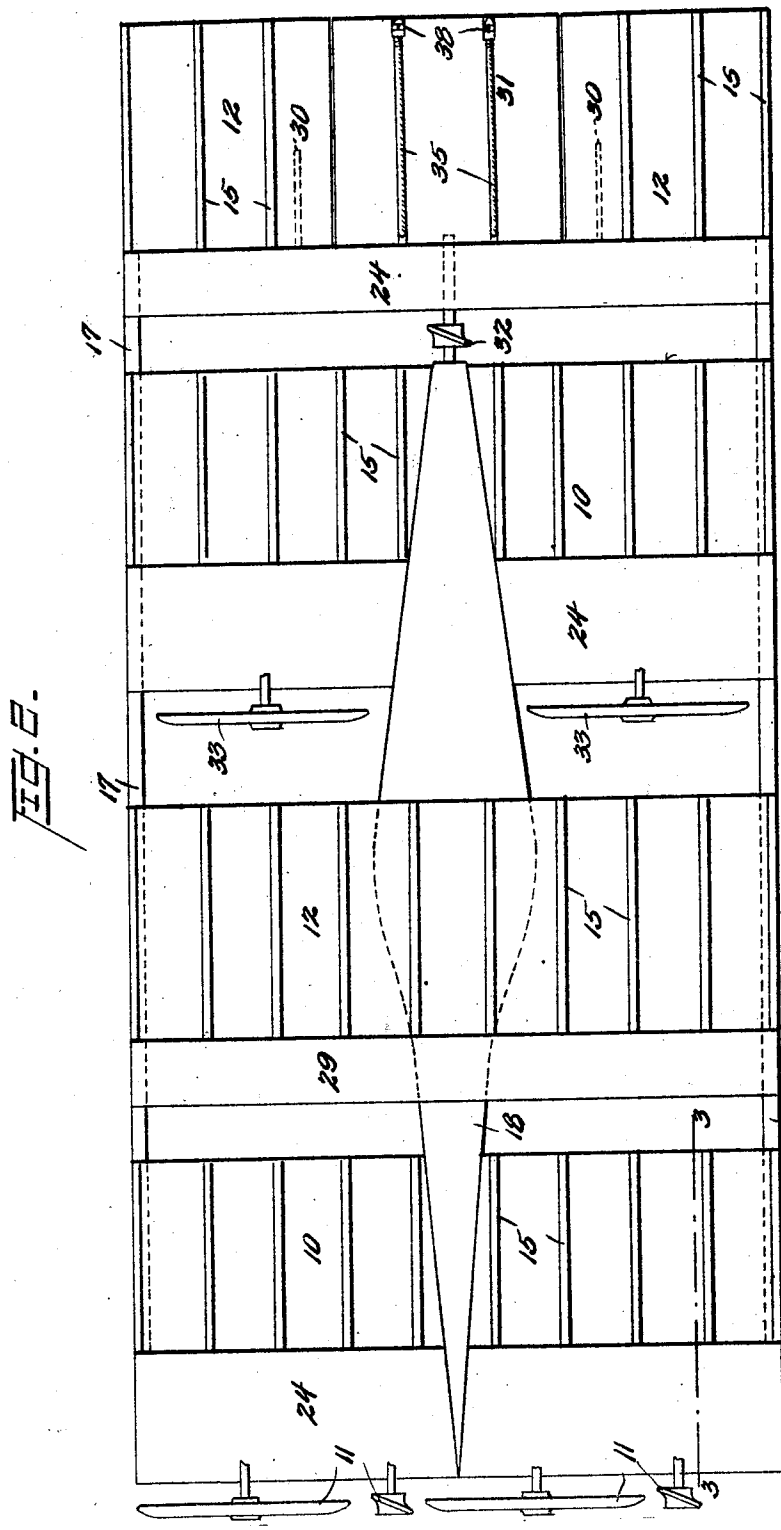


Fig. 2.

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Patented Mar. 5, 1929. 1,704,449

UNITED STATES PATENT OFFICE.

JULIUS VON WALDY, OF NEW YORK, N. Y.

FLYING MACHINE.

Application filed December 8, 1924. Serial No. 754,673.

My invention aims to improve flying machines.

In the accompanying drawing showing one illustrative embodiment of the invention,

Fig. 1 is a side elevation of my improved machine showing parts diagrammatically and parts not claimed herein being omitted;

Fig. 2 is a top plan view of Fig. 1;

Fig. 3 is a fragmentary sectional view taken on the line 3—3 of Fig. 2;

Fig. 4 is a fragmentary sectional view taken on the line 4—4 of Fig. 1 and Figs. 5 and 6 are side elevation and cross sectional views respectively of the rear central wing.

Referring more specifically to the drawings I have shown my machine as comprising, in effect, two triple planes arranged in tandem (Fig. 1), a stationary front wing 10 being shown to produce the desired lifting effects by directing air currents from a plurality of propellers 11 in front of each front wing upon the lifting and stabilizing surfaces which comprise two pivoted wings 12 arranged one above the other, these wings being separated or each made in two sections which are independently movable on the horizontal shafts 13 to provide for lifting and stabilizing the machine by their manipulation from a suitable central control (not shown).

I have shown the wings connected by struts 14 and ribs 15 arranged in triangular formation so as to hold the front wing rigid and to permit the desired movements of the wings 12. Also the wings 12 are pivotally connected together at their rear ends by struts and the front and rear sets of wings are connected together by struts 14 and longérons 17 which are continuations of some of the ribs 15 and are preferably arranged at the ends of and between the wings, the lower or horizontal ones extending along the top of the fuselage 18 so as not to interfere with the movement of the pivoted wings 12.

I have shown the stationary front wings as extending entirely across the width of the machine and secured to the top of the fuselage. These wings are preferably made of sheet metal bent back on itself at the front edge as shown in Fig. 3 and braced by the fin-like ribs 15 which are made of tubular beams 20 separated by wooden spacer blocks 21 and embraced by sheet metal coverings 22 having flanges 23 riveted or otherwise secured to the top of the wing (see Fig. 4). These ribs are arranged so that their front ends extend under the bent back front edges of the front wings (Fig. 3.) The longérons 17 are preferably built up in like manner. These rib elements and longérons not only act as supporting and strengthening members but also act in the usual manner of vertical fins to provide stability and provide a maximum resistance against bending and, at the same time are comparatively light.

Mounted transversely adjacent the front ends of the fixed wings 10 I have shown suitable rods upon which are pivotally mounted camber wings 24 forming a continuation of the rearwardly bent front edges of said wings. It will be noted that said camber wings are relatively short to provide a large lifting area behind them on the tops of the stationary wings 10. Below the rear ends of the camber wings a transverse tubular beam 25 extends throughout the length or span of the wing 10 and within this beam I have shown a rotatably mounted rod 26 having a series of cranks 27 which cranks are connected by links 28 to the rear ends of said camber wings.

Each wing 12 is composed of a fixed front cambered section 29 and a pivoted rear section and these wings may be ribbed or braced in the same manner as described in connection with the wings 10.

A pair of vertically pivoted rear rudders 30 are shown as being mounted on certain of the vertical struts 14. These rudders are preferably triangular shaped to provide for adequate movement of the wing sections 12.

The rear wings 12 of the rear section are arranged at the ends of the spans and provide a central gap between for independently manipulatable central wing sections 31 to act as horizontal rudders. These wing sections 31 afford the usual horizontal rudder action and to render their action more efficient they are located in the slip stream of an additional propeller 32 on the rear section of the machine (Fig. 1).

It will be noted that inasmuch as the front and rear sets of planes or wings are located in the slip streams of propellers 11 and 33 respectively, there is not only a partial vacuum produced above each wing of each unit

but also a direct lifting action is produced by the direct infringement of said stream upon the lower surfaces of the pivoted sections 12. Further, the location of said pivoted sections 12 in said slip streams brings about a more efficient control of the machine when they are adjusted. The lifting effect of the partial vacuum over the front wings 10 may be accentuated by the proper adjustment of the camber wings 24. The camber wings 24 act to direct the stream of air from the propellers upon the lower surfaces of and above the upper wings 12 to produce both direct and vacuum lifting effects.

Figs. 5 and 6 show respectively side elevational and cross-sectional views of rear central wing 31. Said wing is shown as having a series of longitudinal depressed portions (Fig. 6). Intermediate a pair of upper and lower depressions is arranged a filler block 34, the upper and lower edges of which are arcuate in shape. A tension member 35, preferably a steel cable is located in each depressed portion and is provided at its ends with means for putting tension thereon. Said means comprises a perforated lug 36 having a sleeve-like extension which is slipped over and permanently connected to one cable end. A threaded rod 37 having a sleeve-like end is connected to the other cable end and after said rod is passed through the perforation in lug 36 a nut 38 is run onto rod 37 so as to place a tension in cable 35 thereby forcing depressed portions against the filler blocks. If a fabric plane covering is used, no depressed portions need be provided since cable 35 will force said fabric against said filler blocks. Furthermore, a metallic plane surface may be forced against the filler blocks in the same manner.

It will be noted that as shown in dotted lines that said depressed portions are deeper at the lower portion of the leading wing tip at which point the edges of the filler block are made to extend out to be in line with the major wing surface, whereby a camber may be given to the lower wing surface and the pressure of the tension element is bearing on the filler block for its full length.

In the operation of the machine the wing sections 12 are lowered into such position that the vertical component of the forces produced by the air currents from the propellers is sufficient to produce a direct lifting of the machine in conjunction with the partial vacuum which formed above the planes. For forward propulsion the wings are raised to such position as will afford the desired speed and the camber wings 24 are, at the same time lowered to their normal position. To check the speed of the machine it is only necessary to lower the wings 12 and raise the camber planes 24, thereby counteracting the forward driving force without sacrificing the lifting and stabilizing effects. In this way the speed may be reduced to such an extent that the machine may be made to hover in mid air.

Having thus described one illustrative embodiment of my invention, but without limiting myself thereto, what I claim and desire to secure by Letters Patent is:

1. In a flying machine, a fuselage, front and rear sets of wings arranged in tandem, each set comprising a fixed wing and a plurality of superposed wings in rear thereof, each of said superposed wings comprising a fixed front portion and a movable rear portion said last named wings being arranged in pairs with the wings of each pair mounted on opposite sides of said machine.

2. In a flying machine, a pair of transversely arranged longitudinally spaced fixed wings, a plurality of superposed wings intermediate said fixed wings, a single transverse beam member for supporting each wing, longérons joining said fixed wings to the lowermost one of said superposed wings and inclined struts extending from each fixed wing beam to the transverse beam of the uppermost one of said superposed wings.

3. In a flying machine, a transversely arranged fixed wing, a plurality of superposed wings in rear of said fixed wing said latter wings each composing a vertically movable portion, each of said fixed wings comprising a lower surface and a vertically movable surface pivoted at its forward edge to said lower surface, and a series of tractor propellers located in advance of said wings whereby the slip stream thereof is concentrated on said wings.

4. In a flying machine a fixed wing and a pair of superposed wings in rear of said fixed wing each superposed wing having a pivoted rear section and a vertical bar pivoted to each rear section, said fixed wing comprising a fixed lower surface and a rounded anterior edge, a movable surface pivoted adjacent said anterior edge and extending rearwardly above said lower surface, and means for adjusting said movable surface.

5. In a flying machine a plurality of transverse fixed wings each comprising a lower surface and a plurality of fin-like ribs extending upwardly from said lower surface; a movable surface pivotally mounted above the front half of said lower surface and a propeller arranged in front of each of said wings whereby the air stream thereof impinges said movable surface and said fin-like ribs.

6. In a flying machine a fuselage, a fixed transverse wing mounted above said fuselage, a single transvere supporting beam for said wing vertical fin-like ribs arranged on the upper surface of said wing, each rib comprising upper and lower members, a fill-

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er block intermediate said members and side plates for connecting said members.

7. In a flying machine, a transversely mounted wing comprising a lifting surface, a plurality of fin-like ribs extending vertically from said surface, a vertically movable camber plane pivoted adjacent the anterior edge of said lifting surface, portions of said ribs in rear of said camber plane being exposed to and in contact with the air flow to provide stabilization.

8. In a flying machine, front and rear sets of wings arranged in tandem, each set comprising a fixed wing and a pair of superposed wings, the superposed wings of said front set mounted in pairs, one wing of each pair arranged in opposite sides of the machine, the superposed wings of the rear set each comprising a central pivoted section and a lateral pivoted section at each side of said central section.

9. In a flying machine, a wing combination comprising a fixed plane and a pair of superposed planes in rear of said fixed plane, a propeller mounted intermediate said planes, vertical struts extending between said superposed planes, said latter planes comprising portions pivotally mounted for vertical movement and triangular vertical rudders mounted on said struts, said pivoted portions and said rudders being positioned in the slip stream of said propeller.

10. In a flying machine, a wing construction having opposite inwardly depressed portions, ribs having grooves receiving said depressed portions, a tension element located in said depressed portions and means for applying tension to said tension element.

11. In a flying machine a fixed transverse wing, a plurality of ribs arranged on said wing, each rib comprising upper and lower members, a substantially U-shaped sheet metal plate embracing said members and a filler block intermediate said members to which the plate is secured.

12. In a flying machine a beam element, comprising upper and lower longitudinal stiffening members, a filler block intermediate said members and U-shaped sheet metal plates joining said members, said plate having means to secure it to the wing surface.

JULIUS VON WALDY.