

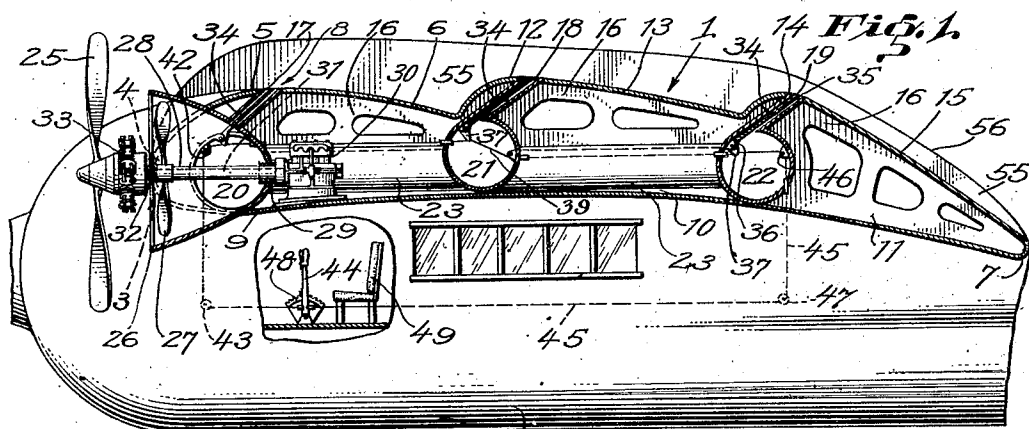
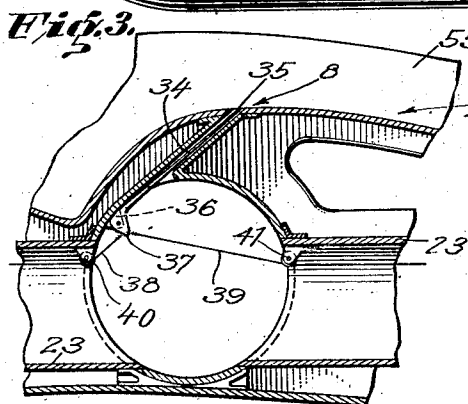
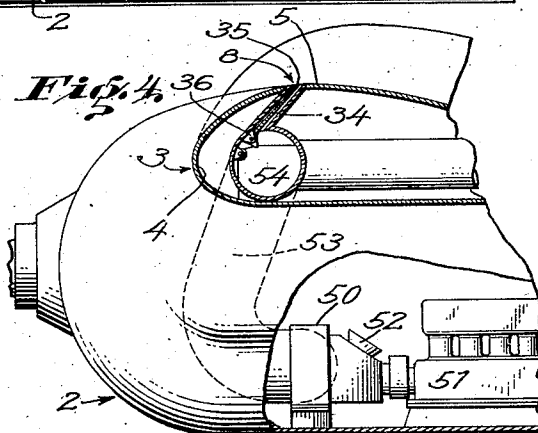
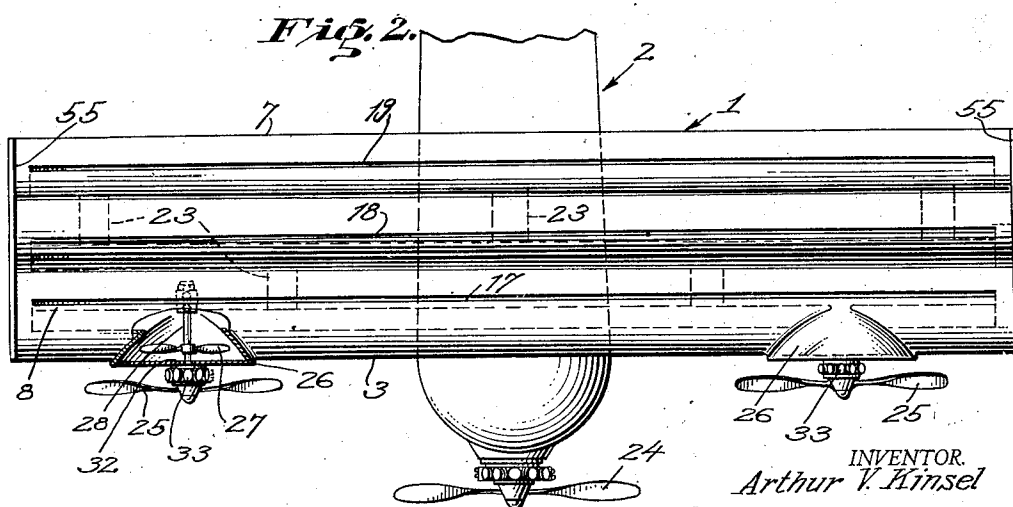
April 5, 1932.

A. V. KINSEL

1,852,167

AEROPLANE

Filed April 24, 1929



INVENTOR.
Arthur V. Kinsel

BY

Lyon & Lyon

ATTORNEYS.

UNITED STATES PATENT OFFICE

ARTHUR V. KINSEL, OF LOS ANGELES, CALIFORNIA, ASSIGNOR OF ONE-HALF TO
CLARENCE K. WATTS, OF LOS ANGELES, CALIFORNIA

AEROPLANE

Application filed April 24, 1929. Serial No. 357,610.

This invention relates to aeroplanes. It is a well known fact in aviation that when an aeroplane wing is moving through the air, the downwardly inclined surface on the upper side of the wing develops a partial vacuum above the wing which assist the buoying action of the air under the wing to maintain the wing aloft. The general object of this invention is to provide means to cooperate with an aeroplane wing of this type which will assist in developing a partial vacuum over the wing, thereby increasing the lifting power of a wing of a given area.

A further object of the invention is to provide an aeroplane wing with means operating to deter lateral atmospheric air currents from flowing inwardly at the ends of the wing in such a way as to fill the partial vacuum which is created over the wing by its advance; in other words, one of my objects is to give an aeroplane wing a construction which will tend to augment the partial vacuum created over the wing.

In accomplishing the above objects in the preferred embodiment of the invention I provide a special construction of wing having its upper surface of such a form as will tend to enhance the development of a partial vacuum over the wing in a plurality of zones or areas. Preferably in my invention, I provide means for developing air blasts forward of these areas or zones tending to exclude the inrush of atmospheric air to them, and one of the objects of the invention is to construct the air ducts in such a way that substantially the same air pressure will be developed at the different points where the air blasts are generated.

A further object of the invention is to provide simple means for regulating the amount of air discharged through the air blasts, and also to improve the general construction of aeroplane wings of this general type.

Further objects of the invention will appear hereinafter.

The invention consists in the novel parts and combination of parts to be described hereinafter, all of which contribute to produce an efficient aeroplane.

A preferred embodiment of the invention is

described in the following specification, while the broad scope of the invention is pointed out in the appended claims.

In the drawings:

Figure 1 is a vertical section taken in a front and rear direction through the wing of an aeroplane embodying my invention and showing a portion of the fuselage in side elevation, broken away, the mounting for the central traction propeller being also broken away.

Figure 2 is a plan of the aeroplane shown in Figure 1 upon a reduced scale, with the rear portion of the fuselage broken away and with a portion of the forward edge of the wing broken away and shown partially in cross-section.

Figure 3 is a vertical section upon an enlarged scale taken in a front and rear direction and further illustrating details of the invention. This view is taken at an intermediate point in the wing with respect to its front and rear edges.

Figure 4 is a view similar to Figure 1, but showing only the forward part of the fuselage and wing, the rear portion being broken away. This view illustrates another embodiment of the invention in which a blower may be employed of a centrifugal type instead of a blower of open fan type illustrated in Figure 1.

In applying my invention in the construction of an aeroplane it should be understood that the wing is constructed so that the upper surface of the wing has its greatest elevation toward or at the forward edge of the wing and from this point the upper surface of the wing inclines downwardly toward the rear edge of the wing, when in flight.

While the invention can be applied to a wing of ordinary cross-section, near the forward edge of the wing, I prefer to give the wing a special cross-section operating to increase the development of a partial vacuum over the wing as it advances. According to my invention, adjacent the forward edge of the wing and on its upper side, I provide means for projecting an air blast in an upward and rearward direction, the effect of which is to increase the development of a

partial vacuum back of this point and over the wing.

I shall now describe the invention as applied to an aeroplane wing of novel type having a special construction cooperating with the air blast to increase the lifting power of the wing.

Referring particularly to Figures 1 to 3, 1 represents the wing of the aeroplane, which extends over and is secured to a fuselage 2, the said fuselage being located on the usual central line of the wing with respect to the front and rear direction.

Near the forward edge 3 of the wing, which edge is rounded in profile as indicated by the dotted line 4 in Figure 1, the most elevated point 5 of the wing is located. From this point the upper surface 6 of the wing extends downwardly in an inclined direction toward the rear edge or trailing edge 7 of the wing. According to my invention, I provide means for delivering an air blast at the point 8 near the point 5 of greatest elevation of the upper surface of the wing. In the present instance the wing is composed of three sections, namely, a forward section 9, an intermediate section 10 and a rear section 11, these sections being disposed one behind the other, as shown in Figure 1. The intermediate section 10 has substantially the same outline in cross-section as the leading section 9, being provided with an upper surface that has its most elevated point 12 disposed forwardly and presenting an inclined rearward extension 13 that inclines downwardly toward the rear. The rear section 11 is similarly provided with an upper surface that has its most elevated point 14 disposed toward the front and has a rearwardly and downwardly inclining portion 15 that forms the rear part of the entire wing.

The inclined upper surfaces of these sections and the curved forward edges of the same may be mounted on truss frames 16 that extend in a front and rear plane (see Figure 1).

Any suitable means may be employed for projecting air blasts upwardly and rearwardly at the points 8, 12 and 14. In the present instance I prefer to provide the wing with long slots or ports 17, 18 and 19 at these points. These slots or ports communicate with air ducts 20, 21 and 22 which correspond to the three sections of the wing and extend longitudinally of the sections. These ducts 20, 21 and 22 are all connected together by staggered tubular connections 23 that extend in a front and rear direction (see Figure 2). These tubular connections are of sufficient size to maintain a substantial pressure of air in all of the ducts; in other words, although the air may be supplied from a blower to the forward duct 20, these connections 23 are of such area in cross-section that the flow of air to the ducts 21, 22 will be ample to main-

tain substantially the same pressure in them as in the forward duct 20.

The aeroplane may be driven forward by a main traction propeller 24 (see Figure 2) and, if desired, auxiliary propellers 25 may be employed. In the present instance the propellers 25 are located at the forward edge of the wing just forwardly of air intakes 26 in the form of open mouths that present themselves to the atmosphere as the aeroplane advances. In each intake a fan 27 is located to operate as a blower and to force the air rearwardly in the intake so that the air will pass back into the foremost air duct 20. These intakes 26 are of considerable diameter so that the lower edge of the intake may project below the under face 9 of the wing. These intakes are formed of sheet metal and are of substantially conical form, being built into the forward edge 3 of the wing.

Each fan 27 may be mounted on a tubular shaft 28 that extends rearwardly and passes through the rear wall 29 of the air duct 20, at which point a small motor 30 may be provided to rotate the shaft.

The tubular shaft 28 may be mounted on an inner shaft 31 the forward end of which is attached to the center of a spider 32 formed in the front end of the intake and supporting the engine 33 that drives the auxiliary traction propeller 25.

Referring again to the slots 17, 18 and 19, these slots incline upwardly and rearwardly from their corresponding air ducts and each slot is provided with means for regulating the discharge of an air blast through the slot. In the present instance this means is in the form of a tilting vane or shutter 34 having its free edge 35 located at the point where the slot or port emerges on the upper face of the wing. At its forward and lower edge each vane or shutter 34 is pivotally mounted on suitable brackets 36. Each vane is formed with a short arm 37 (see Figure 3) for the attachment of controlling cords or wires 38 and 39. The cords 38 extend forwardly over suitable guide pulleys 40, respectively, and the cords 39 extend rearwardly over suitable guide pulleys 41, respectively. These cords 38 and 39 connect all of the vanes in a system so that the vanes can be all held in substantially the same position as regards the degree of opening of the slots.

In this connection it should be understood that the cord 38 that extends forward from the foremost vane 34 passes around a guide pulley 42 (see Figure 1) and thence downwardly around a guide pulley 43, the end of the cord being attached to the forward side of a control lever 44. A similar cord 45 attaches to the short arm 37 of the rearmost vane and passes around guide pulleys 46 and 47, the forward end of the cord being attached to the rear edge of the lever 44. The lever 44 is mounted so as to cooperate with a

quadrant 48 and is in convenient reach of the seat 49 for the aviator within the fuselage.

It should be noted that at the forward edges of the rear vanes 34, the vanes are rounded on a radius from the pivotal axis of the vane so as to prevent air from passing into the port over the forward edge of the vane.

Instead of taking the air for the ducts 20, 21 and 22 through the forward edge of the wing, I may provide for supplying the air to these ducts from any other point. Such construction is illustrated in Figure 4, in which 50 represents a blower driven by a motor 51 and having an air intake 52 back of the blower. The air taken in through this intake passes into the blower 50, which may be of centrifugal type. From this blower a breeching 53 passes upwardly and connects to the forward air duct 54. When a blower of this type is employed, the intake mouths 26 of the type illustrated in Figures 1 and 2 may be omitted. If desired, centrifugal blowers may be mounted in the intake mouths instead of the fans 27.

It will be noted that with this form for the upper side of the wing, the advance of the wing tends to produce a partial vacuum at three different points over the wing, namely, over the rear portion of the forward section and over the rear portion of the intermediate section, and over the rearmost section of the wing. The air blasts are projected from the wing just forward of these three points.

In order to cut off lateral atmospheric air currents which would naturally tend to develop in such a way as to relieve the partial vacuum formed at the different points referred to on the upper side of the wing, I provide special means. In the present instance this means is in the form of an upwardly projecting baffle or flange 55 formed at each end of the wing. It will be evident that this upwardly projecting flange assists in forming the partial vacuum pockets over the wing and in this way increases the lifting power of the wing. If desired, this flange 55 may have a rear extension 56 extending all the way back to the rear edge 7 of the rearmost section of the wing.

From the above specification it will be evident that my invention includes means for increasing the natural partial vacuum that is formed above a wing as it advances in flight.

One of the advantages of the sectional construction of the wing in combination with the transverse ducts for the air is that I give increased depth to the truss frames 16 thereby increasing the stiffness and strength of the wing.

Furthermore the tubular form of the air ducts gives them considerable strength and this also increases the strength of the wing considered as a beam extending transversely

to the axis of the fuselage. The increase in weight due to the increased depth and the presence of the tubular ducts is compensated for by the increased lifting power due to the profile of the upper side of the wing.

One of the advantages of my invention is that by increasing the buoyancy of the wing, the aeroplane becomes dirigible at slower speeds and this increases the safety in landing because it will not be necessary to land at such high speeds as 60 miles an hour or thereabouts, as is now necessary.

What I claim is:

1. An aeroplane having a wing with a plurality of sections disposed one behind the other and extending transversely of the aeroplane, each section having an upper surface elevated toward the forward edge of the aeroplane and inclining downwardly toward the trailing edge of the aeroplane, said sections having means for permitting the escape of air rearwardly and upwardly, located aft of the most elevated point of the elevated forward portion of the inclined upper surface of each section and baffle means at the ends of the wing for cutting off atmospheric air currents flowing in laterally from the ends of the wing.

2. An aeroplane having a wing with a plurality of sections disposed one behind the other and extending transversely of the aeroplane, each section having an upper surface elevated toward the forward edge of the aeroplane and inclining downwardly toward the trailing edge of the aeroplane, said sections having means for permitting the escape of air rearwardly and upwardly, located aft of the most elevated point of the elevated forward portion of the inclined upper surface of each section, and an upwardly projecting flange at each end of the aeroplane operating to cut off inflowing atmospheric air currents.

3. An aeroplane having a wing with a plurality of sections disposed one behind the other and extending transversely of the aeroplane, each section having an upper surface elevated toward the forward edge of the wing and inclining downwardly toward the trailing edge of the wing, an air-duct extending along the forward edge of each section having an outlet for directing an air blast upwardly and rearwardly located aft of the most elevated point of the forward edge of each section, and means located adjacent the outlets for regulating the escape of the air blast therethrough.

4. An aeroplane having a wing with a plurality of trussed frames extending in a fore and aft direction, said wing being formed with three sections disposed one behind the other and extending transversely of the aeroplane, each section having an upper surface elevated toward the forward edge of the aeroplane and inclining downwardly toward the trailing edge of the aeroplane, the middle sec-

tion of said three sections having its most elevated point slightly elevated above the most elevated point of the forward section, lateral air ducts extending respectively under the said elevated points of the said sections, a blower for supplying air to said air ducts, and outlets on the upper side of said ducts extending upwardly and rearwardly with respect to the direction of advance of the aeroplane, and emerging on the upper sides of said upper surfaces just aft of the most elevated points.

5. An aeroplane having a wing with a plurality of trussed frames extending in a fore and aft direction, said wing being formed with three sections disposed one behind the other and extending transversely of the aeroplane, each section having an upper surface elevated toward the forward edge of the aeroplane and inclining downwardly toward the trailing edge of the aeroplane, the middle section of said three sections having its most elevated point slightly elevated above the most elevated point of the forward section, lateral air ducts extending respectively under the said elevated points of the said sections, a blower for supplying air to said air ducts, and outlets on the upper side of said ducts extending upwardly and rearwardly with respect to the direction of advance of the aeroplane and emerging on the upper sides of said upper surfaces just aft of the most elevated points, the said section lying aft of the middle section having its most elevated point slightly lower than the most elevated point of the middle section.

Signed at Los Angeles, California, this 15th day of April, 1929.

ARTHUR V. KINSEL.