J. W. SMITH.

AEROPLANE.

APPLICATION FILED JULY 22, 1912.

1,136,560.

Patented Apr. 20, 1915.

3 SHEETS—SHEET 1.

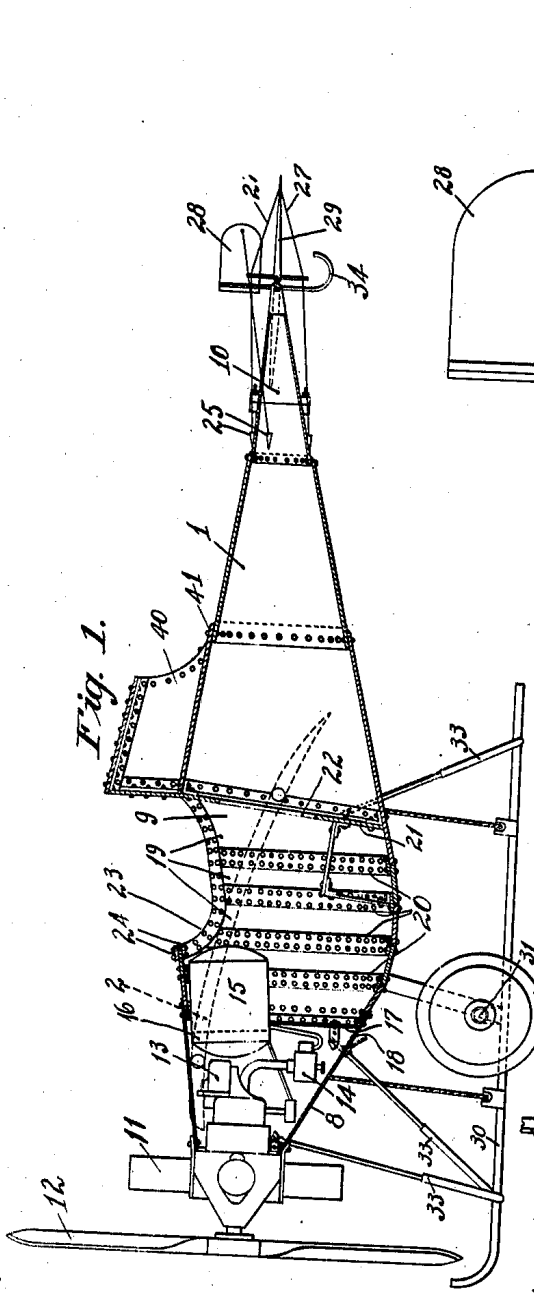

Fig. 1.

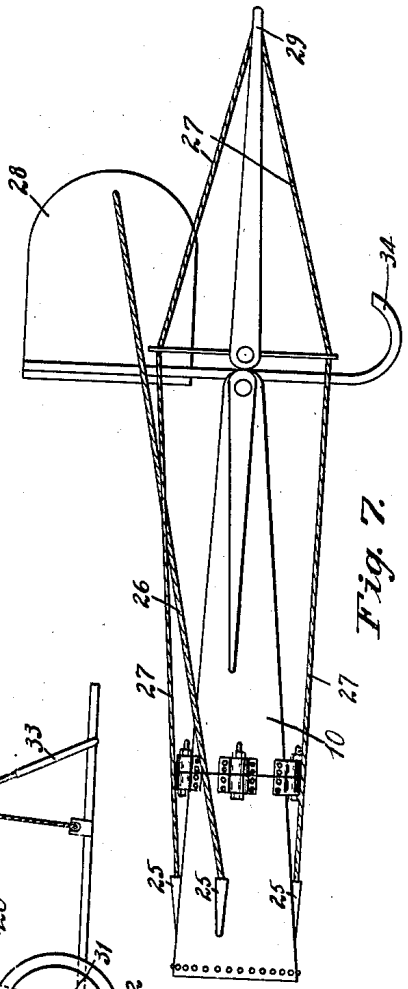

Fig. 7.

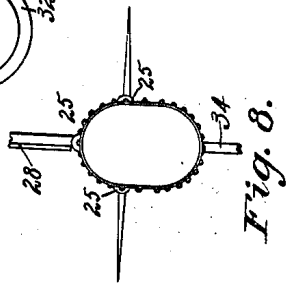

Fig. 8.

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3 SHEETS—SHEET 2.

Fig. 2.

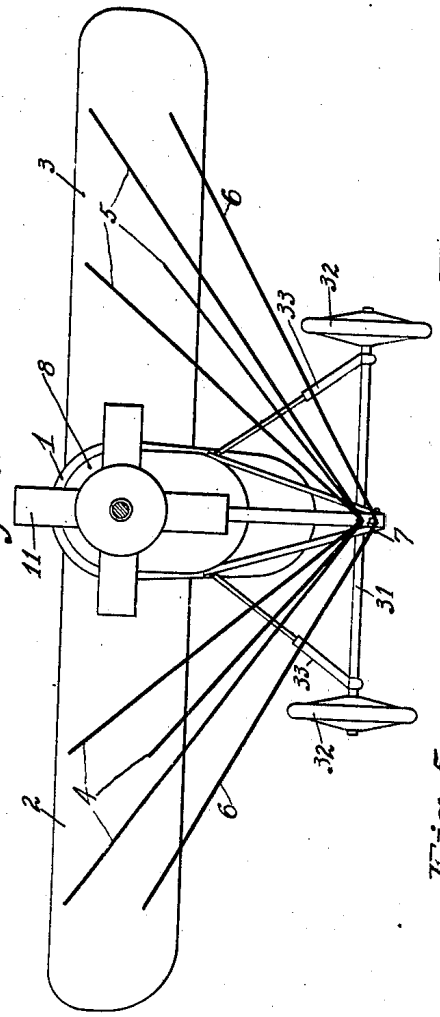


Fig. 6.

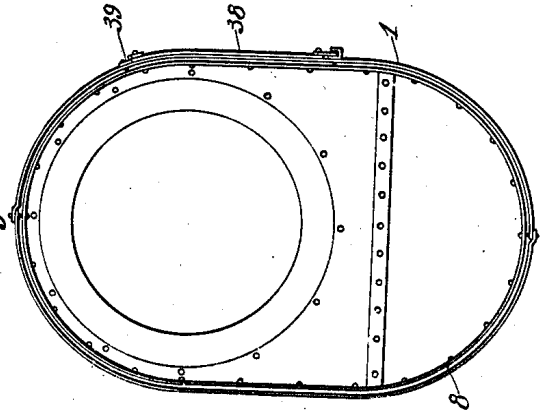
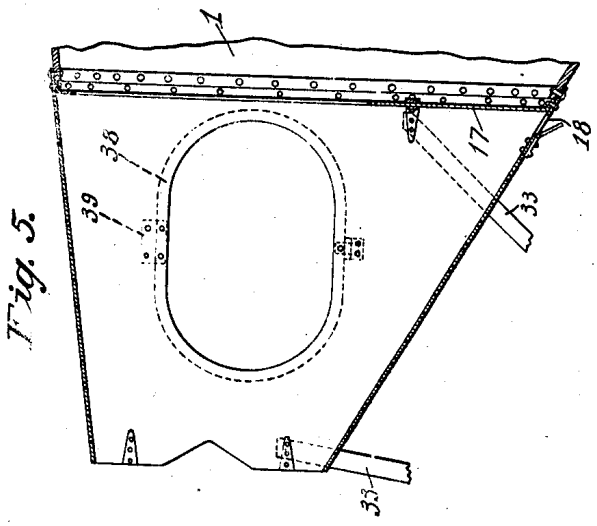


Fig. 5.



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3 SHEETS—SHEET 3.

Fig. 4.

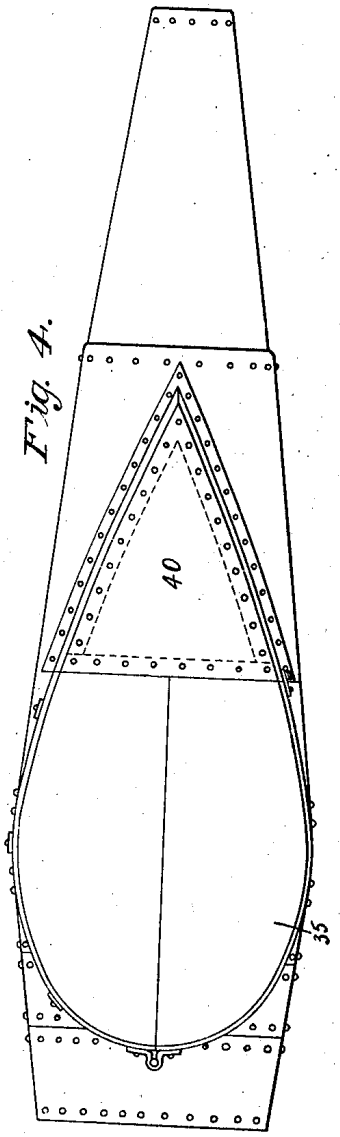
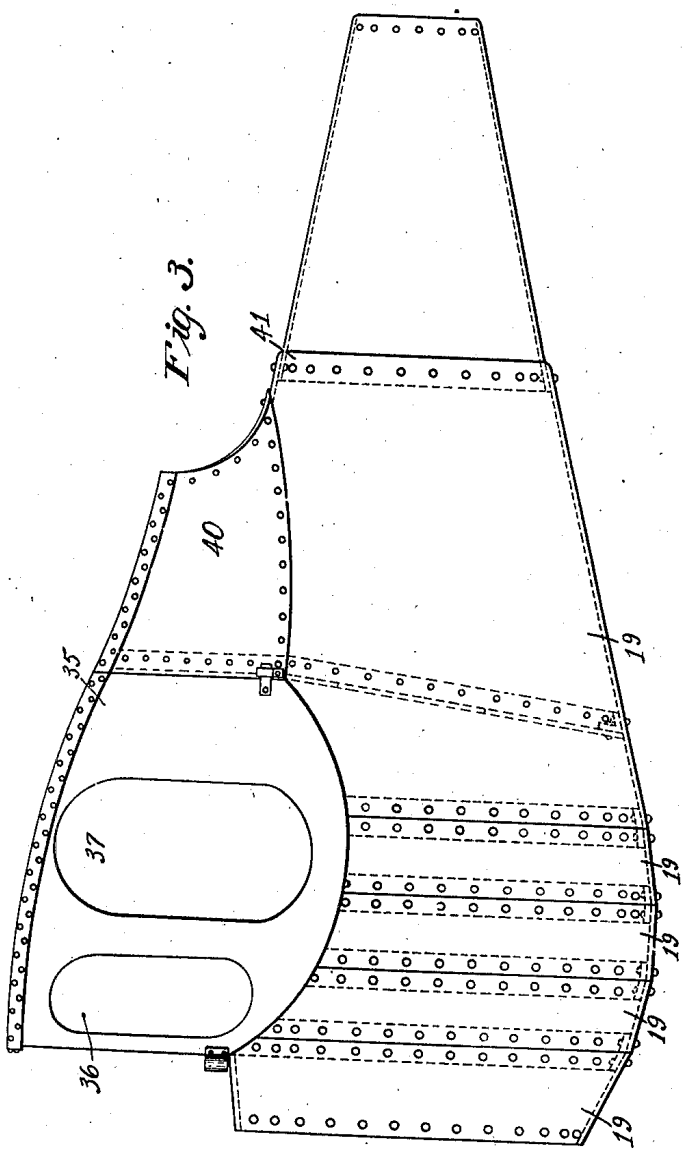


Fig. 3.



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UNITED STATES PATENT OFFICE.

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AEROPLANE.

1,136,560. Specification of Letters Patent. Patented Apr. 20, 1915.

Application filed July 22, 1912. Serial No. 710,747.

To all whom it may concern:

Be it known that I, JOHN W. SMITH, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Aeroplanes, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to an improved form of fuselage construction for aeroplanes and is particularly adapted for use in connection with monoplane construction.

By my invention I provide an aeroplane with a built-up inclosed body or fuselage, composed of several sections securely joined together in such a manner that the entire structure is a continuous shell for containing the propelling mechanism, the operator, and the controlling mechanism, such shell being constructed so as to have efficient "stream lines," as a result of which the motion of the body through the air will meet with as little resistance as possible.

My improved fuselage construction consists of three parts, each having its special purpose, which parts are so related and joined together that they together constitute the continuous and complete shell referred to. The first portion is what may be termed the nose of the fuselage and is in the form of a cone of elliptical cross-section. This nose portion is constructed preferably of sheet steel and is given sufficient strength to support the engine and its associated parts, as well as the tanks for fuel oil and lubricating oil which are required for a structure of this kind. The nose is so constructed that all of the propelling mechanism is mounted within or upon it, the construction being such that a closed receptacle is formed which is entirely separated from the fuel connection so that in case of leak or accident the oil cannot have access to the operator's compartment. The rear end of the nose section is provided with a sheet steel bulkhead which, besides giving the necessary strength to the nose portion of the structure, serves to form a rigid and effective means for securely connecting the operator's compartment to the nose. The operator's compartment consists preferably of a wall of sheet fiber or similar material, which is sufficiently strong to be intact when the rest of the structure is demolished, thus protecting the operator from being injured.

Although the structure referred to is exceedingly strong, it is no heavier than former types of frame-work covered with canvas.

Sheet fiber here referred to is a vegetable fiber prepared with chemical reagents. The chemical process combines the compound into a strong homogeneous mass, and the chemicals are afterward removed by soaking in water. Most of the water is finally dried out. The amount of water in fiber varies with atmospheric conditions, even when coated with varnish. Fiber is unlike wood in that it expands in length, breadth and thickness with an increase of moisture, and contracts in all directions when dried. For this reason a special method of construction is employed which is hereafter brought out in the specification and claims.

The operator's compartment is preferably constructed of strips extending circumferentially around the compartment rather than longitudinally of the same, and these strips are connected together by riveting to ribs similarly disposed within the operator's compartment. In this way the necessity for longitudinal ribs is avoided. An advantage secured by having the strips and ribs both run circumferentially around the body portion is that when they are formed and riveted together the parts coact in a manner which tends to keep them in shape and prevent change of the shape of the parts on account of the ribs being of smaller radius than the strips. A circumferential seam with a liberal lap may serve to dispense with some of the ribs. This feature will be hereinafter taken up in detail. In this way a very rigid and strong structure results.

The operator's compartment is provided with a bulkhead for affording a convenient means for attaching parts of the aeroplane and also for reinforcing and stiffening the operator's compartment. The top of the compartment is provided with an opening for receiving the operator and this opening is provided around its edge with a facing of fiber securely riveted to the strips and this, for the reason pointed out above owing to

the difference in curvature between it and the strips, also serves to form a very stiff and strong structure.

The operator's compartment extends rearwardly a sufficient distance to support the tail mounting which I have shown as built up of steel sheets in a manner to support the rudders of the aeroplane. The tail mounting is securely bolted to the rear end of the operator's compartment and this mounting is in the form of a cone of elliptical cross-section and, being of steel, it permits the reduction of the tail end of the fuselage to a small dimension and at the same time affords a rigid and positive support for the rudders. The controlling cords for the rudders enter the fuselage through suitable openings provided therefor in the tail mounting.

In carrying out my invention, the supporting plane or planes are rigidly secured to the fuselage and may be warped, if desired, in order to control in some measure the operation of the machine. I prefer, however, to connect the outer and rear flexible portions of the supporting planes by an equalizing cable so that any undue pressure exerted upon the rear portion of one end of the supporting plane or planes will automatically displace the corresponding portion of the other end so as to tend to restore the equilibrium of the machine.

The several drawings illustrating my invention are as follows:

Figure 1 shows in longitudinal sectional view a monoplane provided with my construction of fuselage. Fig. 2 shows a front end view of the parts seen in Fig. 1, the propeller being removed to more clearly show the rest of the structure. Fig. 3 is a side view of the operator's compartment of the fuselage alone without any of the other parts of the device. Fig. 4 is a top view of the parts shown in Fig. 3. Fig. 5 is a side view of the nose portion of the fuselage. Fig. 6 is a rear end view of the parts shown in Fig. 5. Fig. 7 is a side view of the tail mounting of the fuselage. Fig. 8 is a front end view of the parts shown in Fig. 7.

Similar numerals refer to similar parts throughout the several views.

As shown in Figs. 1 and 2, the monoplane consists of a fuselage 1 to which the planes 2 and 3 are secured as indicated. The inner ends of the planes are secured to the fuselage by any suitable means and the outer ends are braced to the framework of the machine by cables 4 and 5. The flexible rear portions of the planes 2 and 3 are connected together by a cable 6 which passes over a small pulley 7 supported by the framework, so that when any undue pressure is exerted upon one end of either of the planes 2 and 3, the corresponding portion of the other plane is pulled downward by the cable 6 and thus exerts an upward thrust tending to maintain the equilibrium of the aeroplane. The fuselage 1 is composed of three portions, first, the nose 8, second, the operator's compartment 9, and, third, the tail mounting 10. The nose 8 has mounted in its front end an engine 11 provided to drive the propeller 12. The engine is provided with a magneto 13 and carbureter 14, the latter being supplied with fuel oil from the tank 15. The tank 15 has mounted upon its front end a separate compartment or tank 16 for containing lubricating oil for the engine. The tank 15 is rigidly supported in a bulk-head 17 of steel constituting the rear wall of the nose 8 and, since all of the parts of this nose are made of sheet steel, the resulting structure is extremely stiff and strong. Furthermore, with the exception of the side doors shown more particularly in Figs. 5 and 6, the nose 8 is wholly inclosed and, therefore, it is impossible for any of the gasolene or oil that may be used to reach the operator's compartment. If for any reason there should be a leak, an opening 18 is provided in the bottom of the nose just in front of the bulkhead 17 to permit the oil to escape from the nose directly to the outside of the machine.

The operator's compartment 9 is made up of a plurality of strips or sheets of fiber 19, which extend circumferentially around the fuselage, being connected together by ribs 20 similarly disposed and conformed. It is practically impossible to form this material in circular curved shapes and it must, therefore, be made in strips or sheets which are straight in one direction, although they may be curved in a second direction, and the resulting structure is, therefore, a succession of conical surfaces so joined and related as to form in effect a continuous curved surface having stream lines which afford a ready passage of the machine through the air with a minimum amount of resistance. The ribs 20 and strips or sheets 19 are preferably secured together by copper rivets, as indicated.

A fiber bulkhead 21 is provided in the operator's compartment to stiffen the structure and provide a convenient means for connecting parts of the framework and supporting planes to the structure. As these connections are made to a rigid member, they are extremely strong and reliable. The bulkhead 21 is provided with an opening or hole 22 which, besides reducing the weight of the parts, affords communication to the inside of the rear end of the operator's compartment to adjust the controlling mechanism. The operator's compartment is provided at its forward end with an opening 23 for receiving the operator and this opening is provided with a double facing 24 of fiber strips which are bent to conform to the corresponding surfaces of the strips 19

and are securely riveted thereto. The strips 19 and ribs 20, as well as the facings 24, when thus bent and riveted in place, serve to reinforce each other and prevent the parts springing from their curved position to straighter position, since the different curvatures of the ribs and facing from the associated parts serve to prevent any relative displacement between them when they are securely riveted together, as indicated. The tail mounting 10 of the fuselage is made detachable by use of bolts, as shown more clearly in Figs. 7 and 8, and consists of sheets of steel riveted together in conical form of elliptical cross-section. The fuselage is provided with a number of guiding openings 25 for leading the controlling cables 26 and 27 from the rudders 28 and 29, respectively, through the openings 25 to the inside of the fuselage, from which they extend to the operator's compartment, and are actuated in any suitable manner, not shown, so as to control these rudders. Controlling devices are not shown for the engine, since this may be done in a manner well-known in the art and it forms no part of the present invention.

The fuselage is provided with a skid 30 to which an axle 31 is connected carrying the wheels 32, said axle being braced to the fuselage as indicated by braces 33. Each one of the braces 33 as shown in Figs. 1 and 2 may consist of two telescoping tubes. Within the larger tube is disposed a spring, not shown, which acts as a shock absorber. The tail mounting is provided with a guard support 34 for protecting the rudders if the tail end of the machine should come into engagement with the ground.

Figs. 3 and 4 show in detail views somewhat more clearly than Figs. 1 and 2 the shape and construction of the operator's compartment of the fuselage. As shown in these figures, the operator's compartment may be provided with a wind shield 35 of fiber having transparent windows 36 convenient to afford the operator an uninterrupted view. Entrance openings 37 are provided in either side, so that the operator may enter the operator's compartment without difficulty. The wind shield 35 is correctly formed so that it will have stream lines of efficient operation as the machine passes through the air. The bulkhead 21 extends preferably to the top of the wind shield when the latter is used.

As shown in Figs. 5 and 6, the nose portion of the fuselage is provided with side doors 38 hinged at 39 so that the operator may have ready access to the engine for inspection and repair. Securely riveted to the fusilage and disposed back of the wind shield 35 is the stream line projection 40. This projection tapers to the rear as clearly shown in Fig. 4.

In some instances a circumferential seam with a liberal lap serves to dispense with the ribs 20. Such a seam is indicated at 41. Either method of securing the fiber strips together may be used as desired.

While I have shown my invention in the particular embodiment herein described, I do not, however, limit myself to this particular construction, as I may employ many equivalents without departing from the spirit of my invention.

What I claim is:

1. A fuselage for an aeroplane consisting of a metal nose for mounting the engine, an operator's compartment, and a metal tail mounting, said operator's compartment comprising a built-up structure of circumferential fiber strips and similarly disposed fiber ribs riveted together to constitute with the nose and tail mounting a continuous inclosing shell.

2. A fuselage for an aeroplane consisting of a metal nose for mounting the engine, an operator's compartment, a metal tail mounting, said operator's compartment comprising a built-up structure of circumferential fiber strips and similarly disposed fiber ribs riveted together to constitute with the nose and tail mounting a continuous inclosing shell, and a bulkhead extending transversely across the operator's compartment thus formed.

3. A fuselage for an aeroplane consisting of a metal nose for mounting the engine, an operator's compartment, and a metal tail mounting, said operator's compartment comprising a built-up structure of circumferential fiber strips and similarly disposed fiber ribs riveted together to constitute with the nose and tail mounting a continuous inclosing shell, said nose having a bulkhead at its rear end for reinforcing the structure and separating the propelling mechanism from the operator's compartment.

4. A fuselage for an aeroplane consisting of a metal nose for mounting the engine, an operator's compartment, a metal tail mounting, said operator's compartment comprising a built-up structure of circumferential fiber strips and similarly disposed fiber ribs riveted together to constitute with the nose and tail mounting a continuous inclosing shell, and a bulkhead extending transversely across the operator's compartment thus formed, said operator's compartment having a transverse fiber bulkhead provided with an opening therethrough for reinforcing the operator's compartment and providing access to the interior of the rear of the same.

5. An operator's compartment for an aeroplane, comprising a shell constructed of fiber sheets, a metal nose reinforcing said compartment.

6. An operator's compartment for an aeroplane, comprising a shell formed of

strips of fiber circumferentially disposed and secured together and held in place by similarly disposed ribs of fiber riveted to their inner surfaces, each rib serving to secure together two adjacent strips of the shell.

7. An operator's compartment for an aeroplane, comprising a shell formed of strips of fiber circumferentially disposed and secured together and held in place by similarly disposed ribs of fiber riveted to their inner surfaces, each rib serving to secure together two adjacent strips of the shell, and a fiber bulkhead extending transversely across the shell for reinforcing the same.

8. An operator's compartment for an aeroplane, comprising a shell formed of strips of fiber circumferentially disposed and secured together and held in place by similarly disposed ribs of fiber riveted to their inner surfaces, each rib serving to secure together two adjacent strips of the shell, said shell being provided with an entrance opening, and facing strips of fiber riveted to the shell around the opening.

In witness whereof, I hereunto subscribe my name this 20th day of July, A. D., 1912.

JOHN W. SMITH.

Witnesses:
MARY A. COOK,
ALBERT G. MCCOBB.