J. T. THOMPSON.

TUBULAR FUSELAGE.

APPLICATION FILED JUNE 30, 1919.

1,346,993. Patented July 20, 1920.

3 SHEETS—SHEET 1.

Fig. 1.

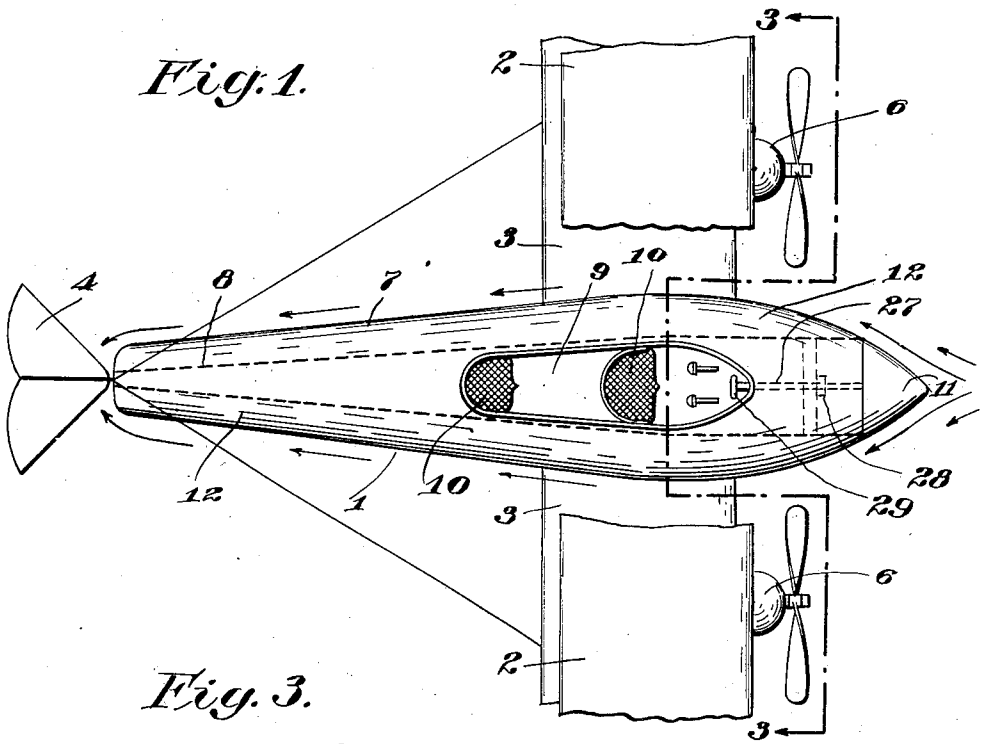


Fig. 3.

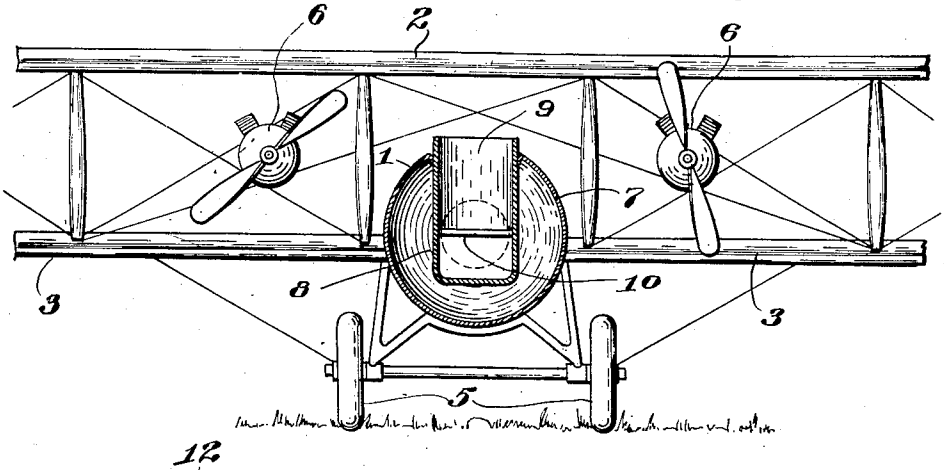
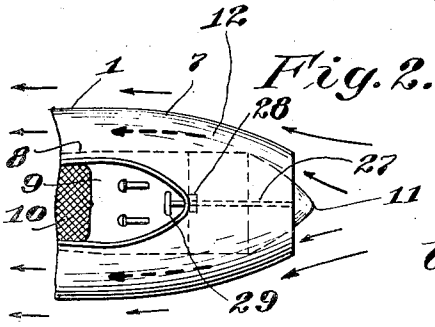


Fig. 2.



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3 SHEETS—SHEET 2.

Fig. 4.

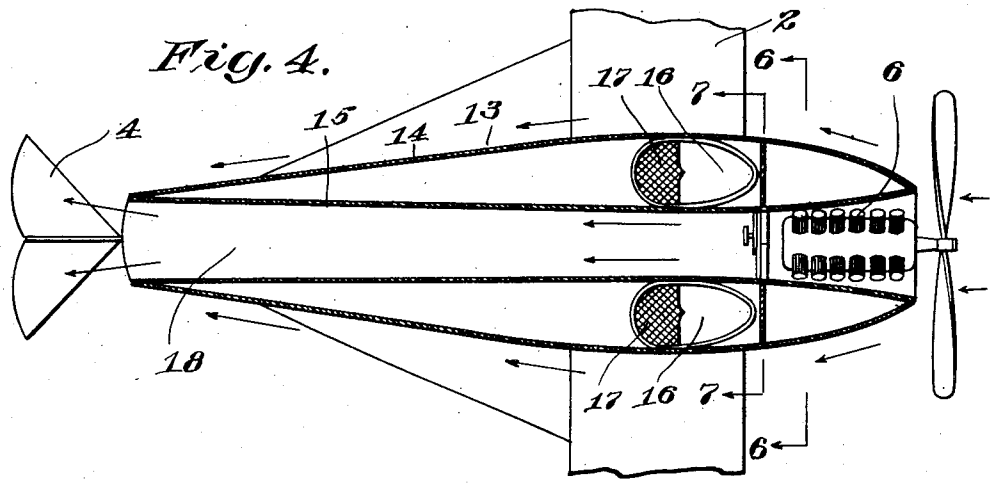


Fig. 5.

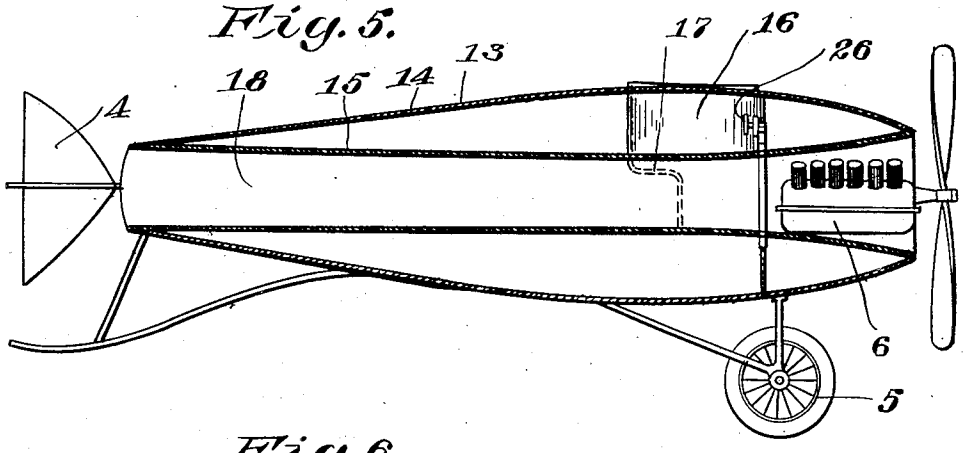


Fig. 6.

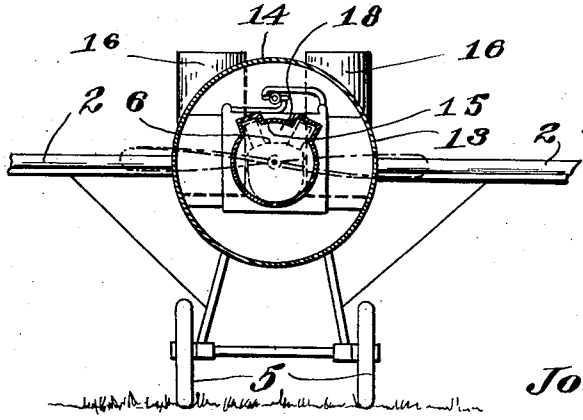
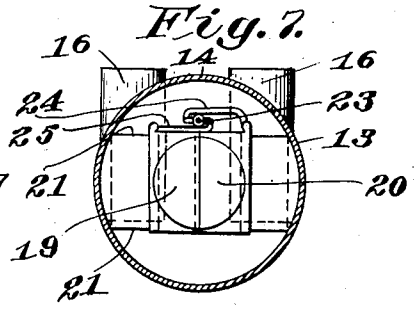


Fig. 7.



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3 SHEETS—SHEET 3.

Fig. 12.

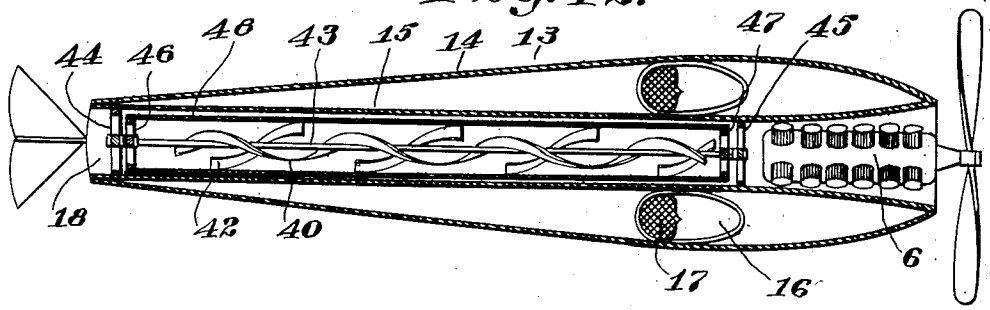


Fig. 8.

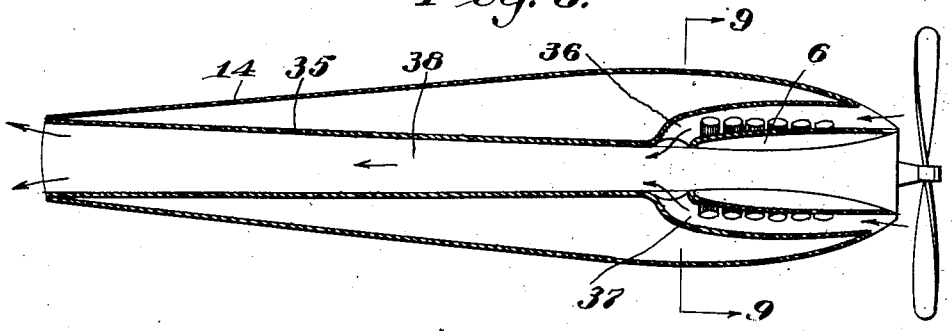


Fig. 10.

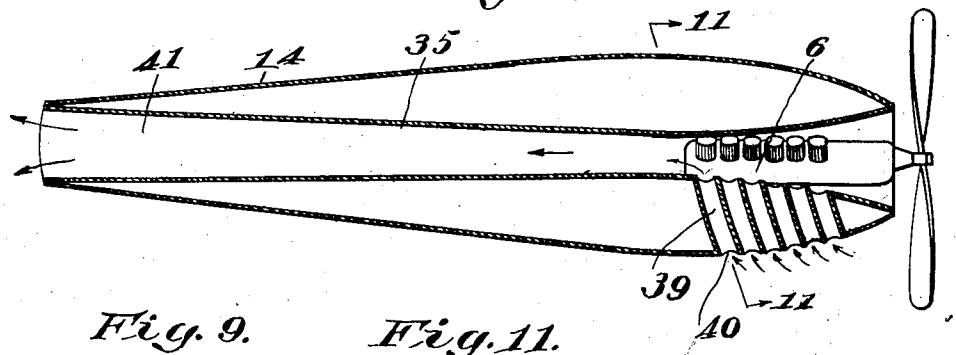


Fig. 9.

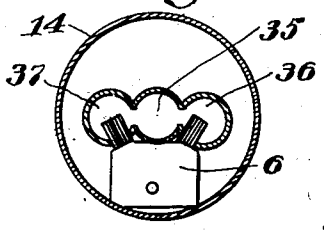
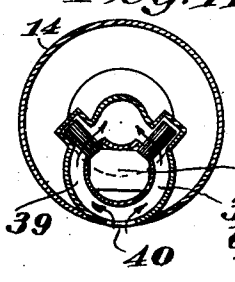


Fig. 11.



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UNITED STATES PATENT OFFICE.

JOHN TALIAFERRO THOMPSON, OF NEWPORT, KENTUCKY, ASSIGNOR OF ONE-HALF TO THOMAS F. RYAN, OF NEW YORK, N. Y.

TUBULAR FUSELAGE.

1,346,993. Specification of Letters Patent. Patented July 20, 1920.

Application filed June 30, 1919. Serial No. 307,740.

To all whom it may concern:

Be it known that I, JOHN TALIAFERRO THOMPSON, a citizen of the United States, and resident of Newport, in the county of Campbell and State of Kentucky, have invented new and useful Improvements in Tubular Fuselages, of which the following is a specification.

This invention relates to a fuselage for an aeroplane and more particularly to a fuselage for high speed aeroplanes.

While heretofore aeroplane fuselages have been designed with stream lines for the purpose of cutting down the head resistance and decreasing the retarding effects of the air upon the shell of the fuselage, I am not aware that it has been possible to decrease to any appreciable degree the compression of air at the nose of the fuselage or the vacuum formed at the tail. Both the compression at the nose and the vacuum at the tail have a strong retarding action which multiplies rapidly with the speed of the aeroplane.

One of the principal objects of my invention therefore is to improve the construction and design of aeroplane fuselages whereby aeroplanes may be operated at greater speed, with greater economy, and with greater safety. A further object of the invention is to provide adequate means for air-cooling aeroplane engines and for governing the amount of such cooling in accordance with temperature and altitude conditions. A still further object of the invention is to provide means for stabilizing aeroplanes during flight.

In one aspect the invention involves the provision of a fuselage for an aeroplane which is tubular in construction. The fuselage is formed with an inner and outer shell, the space between these shells serving as an annular air duct extending from the nose of the fuselage to the tail. The navigator's and observer's seats are positioned within the inner shell. The pointed nose of the fuselage is formed separately and may be moved longitudinally within the inner tubular shell, closing the nose of the fuselage and thereby directing all air currents around the fuselage when the nose is extended, and permitting a portion of the air currents to flow through the annular air duct of the fuselage when the nose is drawn inwardly. The adjustable nose thus acts as a brake and provides a means for governing the speed of the aeroplane for landing or other maneuvers within limits.

In another aspect the invention involves the provision of a fuselage for an aeroplane having an axial air duct extending from the nose to the tail of the fuselage which may serve as a means for conducting air currents past the engine for keeping it cool and as a housing for stabilizing means. To enable the duct to be closed for the purpose of reducing the speed of the machine or for cutting off the cooling air currents from the engine when flying in high altitudes, gates are provided which may be operated from the navigator's cockpit.

In order that the nature of my invention may be more clearly understood, I have illustrated certain embodiments thereof in the accompanying drawings, in which—

Figure 1 is a plan view of an embodiment of my invention showing a tubular fuselage having an annular air duct extending from the nose to the rear end, and an adjustable nose;

Fig. 2 is a detail of the fuselage illustrated in Fig. 1 showing the nose drawn inwardly to open the annular air duct;

Fig. 3 is a section on line 3—3 of Fig. 1 showing the position and arrangement of the navigator's cockpit within the fuselage;

Fig. 4 is a horizontal section through a fuselage constructed in accordance with a further embodiment of the invention;

Fig. 5 is a vertical section through the fuselage shown in Fig. 4;

Fig. 6 is a transverse section taken on line 6—6 of Fig. 4;

Fig. 7 is a partial section taken on line 7—7 of Fig. 4;

Fig. 8 is a horizontal section through a modified form of fuselage showing another arrangement for drawing cooling air currents past the engine;

Fig. 9 is a transverse section taken on line 9—9 of Fig. 8;

Fig. 10 is a vertical section through a further modified form of fuselage;

Fig. 11 is a transverse section taken on line 11—11 of Fig. 10; and

Fig. 12 is a longitudinal section of a fuselage in which gyro-stabilizers are mounted.

In Figs. 1 to 3 inclusive an aeroplane is

illustrated having a fuselage 1, wings 2 and 3, tail 4, landing wheels 5 and engines 6. The fuselage is tubular in form having an outer stream-line shell 7 and an inner shell or tube 8. The inner and outer shells are suitably interconnected to form a unified rigid structure extremely resistant to longitudinal and lateral stresses which thereby permits a lighter design for the same strength and weight of parts. The inner shell 8 may be covered with treated cloth, thin light metal, wood or any suitable material. Located within the inner tube 8 is a cockpit 9 provided with seats 10.

The nose 11 of the fuselage is separate from the outer shell 7 and movable longitudinally with respect thereto, being slidable within the inner tube 8 as indicated by dotted lines in Figs. 1 and 2. The nose 11 may for example be adjusted from the cockpit by means of an axial shaft 27 having threaded engagement with nut 28 carried by the nose 11 and turned by hand wheel 29. In Fig. 1 the nose 11 has been shown in its extended position in which the nose 11 and outer shell 7 of the fuselage form a continuous smooth surface and in which the annular air duct 12 through the fuselage formed between the inner and outer shells is closed. In Fig. 2 the nose 11 has been shown as retracted within the tube 8 thereby opening the air-duct 12. The direction of air currents through and past the fuselage when the aeroplane is in flight have been illustrated by arrows in Figs. 1 and 2. In Fig. 1 with nose 11 extended all air currents are directed around the fuselage and in Fig. 2 with the nose retracted the air currents pass both around and through the fuselage. It is therefore obvious that when the nose is retracted as shown in Fig. 2 and air is allowed to flow unrestrictedly through the annular air duct 12, the fuselage offers much less resistance to the air and the speed of the aeroplane is consequently increased. This arrangement reduces the head resistance and relieves the condensation of air at the nose and the vacuum at the tail of the fuselage.

In Figs. 4 to 7 inclusive, I have shown my invention applied to a different type of aeroplane. 13 designates the fuselage of an aeroplane to which wings 2, tail 4, landing wheels 5 and engine 6 are attached in the usual manner. The fuselage 13 is provided with an outer shell 14 having the usual stream-lines and with an inner tubular shell 15 suitably connected together to form a unified, strong structure. The inner shell 15 is substantially cylindrical throughout its length but flares outwardly at its forward end to afford space for the engine 6 which has its cylinders located within the tubular shell 15. The tube is enlarged around the engine to such an extent as to make the effective cross section of the tube substantially constant throughout its length. The fuselage 1 is provided with two cockpits 16 on either side of the tube 15 and extending between the inner and outer shells of the fuselage. These cockpits may have the usual seats 17 and house the usual control mechanism.

The inner tube or shell 15 serves as an air duct 18 for permitting air currents to flow past the cylinders of engine 6 and through the fuselage, thereby cutting down to a considerable extent the head resistance of the aeroplane, reducing the vacuum normally existing at the tail of the fuselage and affording means for cooling the engine.

At times it may be desirable to close the air duct 18 as when operating the machine in high altitudes or when the temperature is low in order not to cool the engine below a proper operating temperature. This I accomplish by providing oppositely movable gates 19 and 20, shown in Fig. 7, slidable on the tracks 21 and 22 and conjunctively operated by a rock shaft 23 connected to the gates by links 24 and 25. The rock shaft may be conveniently operated from one of the cockpits by a hand wheel 26. The gates are shown in their closed position in Fig. 7, by full lines, and in their open position, by dotted lines. In addition to serving as means for shutting off the stream of cooling air from the engine, the gates also serve as a brake for retarding the speed of the aeroplane as the air is rapidly condensed in front of the gates and within the forward end of the air duct 18.

In Figs. 8 to 11 inclusive I have shown other arrangements of the engine within the fuselage further illustrative of the genus of my invention. As illustrated the engine 6 is positioned within the outer shell 14 and below the inner shell 35 with its cylinders extending upwardly on either side of the shell 35.

In Figs. 8 and 9 the inner shell 35 is formed as a Venturi tube 38 and provided with two branches 36 and 37 connected thereto at the throat and extending forwardly to the nose of the fuselage inclosing the engine cylinders. Air rushing rearwardly through the tube 38 thus sucks air through the branches 36 and 37 past the engine cylinders.

Instead of branches such as 36 and 37 each cylinder may be provided with an individual duct such as 39 extending rearwardly from an opening 40 in the bottom of the fuselage up around the cylinder and connecting with the central duct 41. The forward motion of the aeroplane forces air rearwardly through the ducts 39 past the engine cylinders and upwardly against the upper wall of the central duct 41. The upward movement of the air not only cools

the engine but due to its upper pressure against the duct 41 aids in sustaining the aeroplane.

In Fig. 12 I have shown a tubular fuselage of substantially the same type as disclosed in Figs. 4 and 5 but provided in addition with helical screws 41 and 42 mounted for rotation within the axial air-duct which extends from the nose to the tail of the fuselage. The screw 41 is provided with a shaft 43 extending axially through the air-duct 18 which is journaled in spiders 44 and 45 secured to the walls of the duct at either end thereof. Journaled upon the shaft 32 by webs 46 and 47 is a drum 48 of slightly less diameter than the diameter of the duct 18. The drum is provided upon its inner surface with an annular spiral screw 42 pitched oppositely to the screw 41 and having an inside diameter slightly larger than the outside diameter of screw 41. The screws being oppositely pitched are caused to rotate one within the other in opposite directions when currents of air rush through the duct 18, and therefore conjointly act as a stabilizer for the machine. If desired the screws may be geared to the engine and driven thereby, and if driven at a sufficient speed would then serve both as stabilizers and as propellers.

It is therefore apparent that I have provided a tubular fuselage which permits air currents to pass therethrough thereby appreciably cutting down the head resistance of the aeroplane, reducing the vacuum at the tail and increasing the sustaining power of the aeroplane. In consequence a decreased consumption of gasolene results for the same or even greater speeds or where it is not desirable to increase the speed, a smaller engine may be employed. As a further consequence the increased sustaining power which results from the employment of my tubular fuselage enables the reduction of the wing areas.

The air currents which pass through the fuselage may be caused to cool the engine in their passage or due to their high velocity caused to act as a stabilizer for the aeroplane thereby rendering the aeroplane less susceptible to sudden gusts of air. Where additional stabilization is desired the air-duct may be further employed, as I have disclosed to house mechanical stabilizers driven either by the air currents or by direct connection with the engine.

While I have shown an adjustable nose associated only with the embodiment illustrated in Fig. 1 it is apparent that such a nose could also be employed in connection with the embodiments illustrated in Figs. 8 to 11. Similarly the mechanical stabilizer disclosed in Fig. 12 might also be mounted in the air duct of the embodiments of my invention disclosed in Figs. 8 to 11.

While I have described my invention as applied to air-planes, it is applicable to fast moving vehicles operatable either in the air, on land, on or under water, as for example, dirigibles, automobiles, motor-boats, submarines, etc.

I claim:

1. In an air-craft, a fuselage comprising an outer shell, and an inner shell, said shells being so arranged as to provide a longitudinal air-duct through said fuselage, and a cockpit disposed in the space between said shells.

2. In an air-craft, a fuselage comprising an outer shell having a stream line contour, and an inner shell, said shells being so arranged as to provide a longitudinal air-duct through said fuselage, and a cockpit disposed on each side of said inner chamber in the space between the shells.

3. In an air-craft, a fuselage comprising an outer shell having a stream line contour, an inner shell, said shells being so arranged as to provide a longitudinal air-duct through said fuselage, and means located at the forward end of the fuselage for opening and closing said air-duct.

4. In an air-craft, a fuselage comprising an outer shell having a stream line contour, an inner shell secured therein, said shells being so arranged as to provide a longitudinal air-duct through said fuselage, and means for opening and closing said air-duct and simultaneously changing the contour of said outer shell.

5. In an air-craft, a fuselage comprising an outer shell, an inner shell secured therein, said shells being so arranged as to provide a longitudinal air-duct, and an adjustable nose for said fuselage which in its extended position completes the outer shell of the fuselage closing said air-duct, and which in its retracted position opens said air-duct.

6. In an air-craft, a fuselage comprising an outer shell, an inner shell secured therein, said shells being so arranged as to provide a longitudinal air-duct, and a nose for said fuselage longitudinally adjustable within said inner shell, which in its extended position completes the outer shell of the fuselage closing said air-duct, and which in its retracted position opens said air-duct.

7. In an air-craft, a fuselage having a longitudinal air-duct therethrough, and a stabilizing means mounted therein comprising oppositelv rotatable stabilizers.

8. In an aeroplane, a fuselage having a longitudinal air-duct therethrough, and a stablizing means mounted therein comprising oppositely rotatable helices.

9. In a vehicle of the character referred to, a body having an engine chamber, a plurality of air-ducts extending obliquely through the side of said body to admit air to said chamber, and a longitudinal duct ex-

tending rearwardly from said chamber to exhaust the air.

10. In a vehicle of the character referred to, a body having an engine chamber, a plurality of air-ducts extending obliquely through the lower side of said body to admit air to said chamber, and a longitudinal duct extending rearwardly from said chamber to exhaust the air.

11. In an aircraft, a fuselage having a longitudinal air-duct therethrough, and a plurality of rotatory air-screws disposed in said duct, the vanes of said screws being pitched in opposite directions.

Signed by me at Boston, Massachusetts this 26th day of June 1919.

JOHN TALIAFERRO THOMPSON.