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DEVICE FOR OBTAINING THE SUSTENTATION OF SUPPORTING SURFACES OF AIRCRAFT

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Fig.1

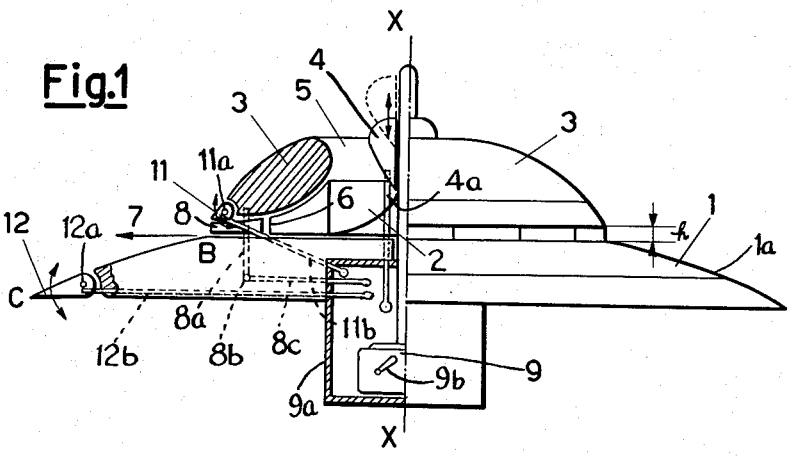
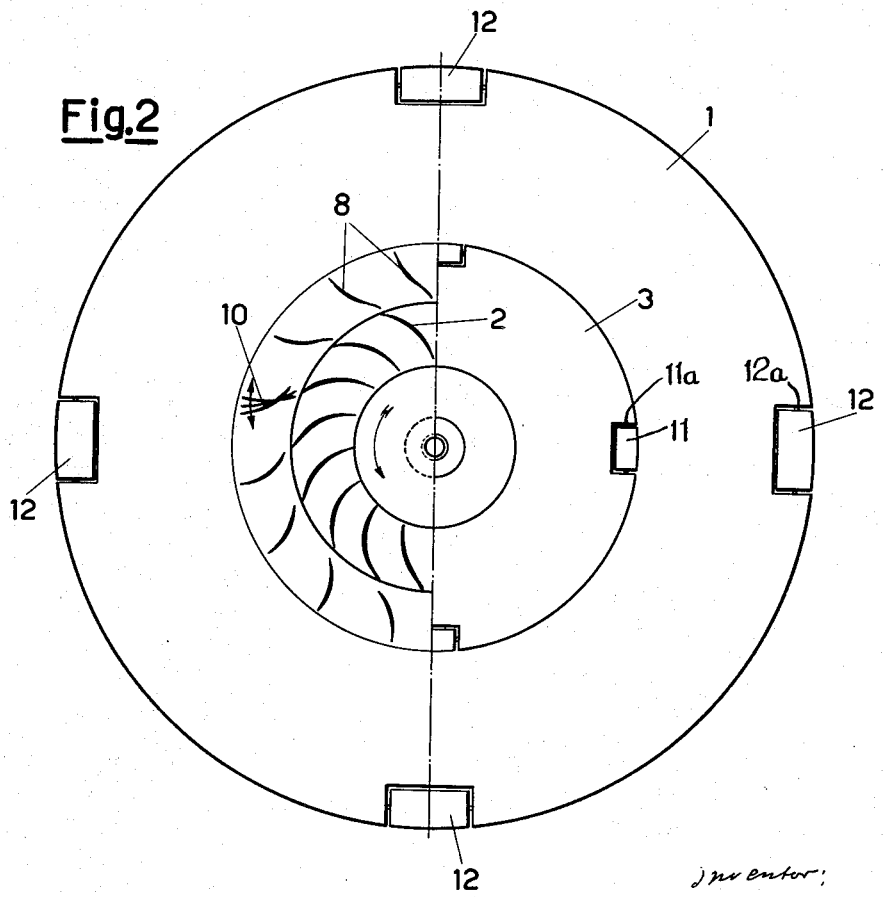


Fig.2



Inventor:
ANTONIO REBASTI

by: Michael S. Striker
Attorney

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DEVICE FOR OBTAINING THE SUSTENTATION OF SUPPORTING SURFACES OF AIRCRAFT

Antonio Rebasti, Via F. Juvara 11, Milan, Italy

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It is an object of the present invention to provide a device adapted to furnish a supporting surface for aircraft with a sustentation that is not depending either on its translation as in the case of the airplane or on its rotation as in the case of the helicopter, it being understood that the term supporting surface is intended to be the surface generated by revolution or translation of the portion of the back of a conventional wing profile, substantially comprised between the vertex of the back and the outlet border.

The device according to the present invention is characterized in fact in that it comprises essentially at least one supporting surface as above defined, blowing means adapted to generate a jet of air leaving, in normal flying conditions, at a pressure smaller than the ambient pressure along and in the proximity of, the border generated by the vertex of the back of the profile of the supporting surface, in the direction of the tangent to the profile of said vertex at the side of the outlet border, drive means for actuating said blowing means and means for adjusting the height of the vein of leaving air.

With the above device the supporting effect of the surface is due to the upward thrust generated depending on the depression which the jet of air creates above the surface without translation or rotation thereof being necessary.

It is evident that the generation of the jet of air may be effected with blowing means of different kinds and in different ways serving the supporting surface; but it is preferable to employ blowing means sucking the air from top because the depression which they create upwards contribute to elevating the lift of the device.

Also the profile of the supporting surface may have different shapes and forms according to the performance requested from the aircraft to which the device is applied.

According to one of the preferred embodiments of the invention the device comprises a supporting surface generated by revolution of the back of a conventional wing profile (part comprised between the vertex of the back and the outlet border) about a central vertical axis, and blowing means constituted by a centrifugal fan rotating on said axis in a shell made rigid with the supporting surface and having its suction mouth axially open upwards and its annular outlet mouth opening in correspondence with the circular border generated by the vertex of the supporting profile; said fan having such profiles of blades as to furnish to the sucked air only increments of speed and not of pressure, in such a way that the air, in normal flying condition, leaves in substantially radial direction with pressure lower than the pressure of surrounding air.

To make the invention more fully clear, reference is made hereinafter to an embodiment illustrated merely by way of example without limitation, in the accompanying drawing, wherein:

FIGURE 1 shows diagrammatically the device in side view partly in section and

FIGURE 2 shows diagrammatically the device in plan view.

The device includes a wing member **1** having an annular supporting top surface **1***a* obtained by revolution around a central axis X—X of the portion of top surface BC of a conventional wing profile. A blower is mounted on the central portion of the wing member and includes

a centrifugal impeller **2** which rotates around the axis X—X in a stator **3** fixed to the supporting surface and having the inlet mouth **5** for air sucked at top and a lateral outlet mouth formed by an annular slot **6** opening on the annular surface. The blades of the impeller and the inner profiles of the stator are such as to supply the air entering in depression only with speed increments and not with pressure increments, in such a way that the air leaving from the circular outlet slot **6** has in normal flying conditions a pressure smaller than that of the surrounding air.

At the outlet of the impeller there are provided vanes **8** fixed to the stator for guiding the air in radial direction and to avoid a reaction couple which in the absence of the blades would be caused by the tangential component of the outflow speed of said air.

In that way the air leaves the blades in the direction and sense of the tangent **7** along the circle B.

The impeller is kept in rotation by a suitable motor indicator diagrammatically at **9** and having speed control means **9***b*. In order to enable variation of the lift developed by the device it is possible to vary individually or simultaneously the speed of rotation of the impeller, the pressure of air at the entry by throttling the mouth **5** by raising or lowering a streamlined member **4**, and the height *h* of the outlet by means of turnable deflectors **11** having pivot means **11***a*.

The device also permits to create a horizontal force component with consequent translation of the unit, by unevenly distributing the lift over the surface, which is obtained in practice by varying in non-uniform manner the height *h* of outlet G along the circumference of the wing member **1** by operation of some of the deflectors **11**.

The device also permits to cause a rotation of the unit around a vertical axis, by producing a tangential component in the air. This is obtained in practice by turning the blades **8** in the airstream of the impeller, about vertical axes as indicated diagrammatically at **10** in FIG. 2.

It is also possible to act upon the movable planes (elevons, stabilizers, tail planes) or ailerons (balancing flaps) **12** which turnable about horizontal axes **12***a*.

The deflector means **11** are operated by a linkage **11***b* extending into the chamber means **9***a* in which motor **9** is located which has speed control means **9***b*. The throttle member **4** can be moved up and down by a linkage **4***a*. The ailerons **12** are turned about pivots **12***a* by linkage **12***b*. The vanes **8** are individually secured to cranks having a pivot portion **8***a* and a transverse portion **8***b* to which a linkage **8***c* is secured so that the cranks turn with the vanes **8** when the linkage is operated.

Stability can be corrected with systems analogous to those of the helicopter such as for example with flywheels and shock-absorbers in stationary flight or with a stabilizing plane and fin in translatory flight. It should be noted that the blow of air can also be obtained with systems other than the centrifugal fan; for instance, it is possible to employ axial fans with one or more stages, piston or rotary blowers, and finally also compressed gas in gas flasks with direct outflow or with air suction from outside through a suitable ejector system before leaving on the back of the supporting surface. In this latter case the compressed fluid may even be constituted by fuel which after having sucked air burns to expand then on the back of the supporting surface.

Among the advantages afforded by the instant device, the following ones should be remarked:

(*b*) Minimum translatory speed equal to zero as for the helicopter, hence with the possibility of vertical take-off and stationary flight.

(*b*) Maximum speed attainable without the limitations well-known with helicopters.

(c) A weight-to-power ratio considerably greater than that of helicopters of equal potentiality.

(d) Space requirement considerably reduced as compared with that of helicopters of equal weight.

(e) Considerably reduced vibrations.

I claim:

1. An aircraft comprising, in combination, a wing member having a continuous circular top surface and a circular bottom surface, said top surface including a center surface portion, and an annular outer lifting surface portion having an aerodynamic outwardly and downwardly curving profile bounded by a peripheral circular edge; blower means mounted on said wing member above said center surface portion and having a circular outlet means intermediate said surface portions for outwardly blowing air only over said annular lifting surface portion in substantially tangential direction to said profile, and in substantially radial direction with respect to said center surface portion and at a pressure smaller than atmospheric pressure whereby a lifting force is created; and deflector means located in the region of said outlet means and being movable for varying the cross section of said outlet means.

2. An aircraft as set forth in claim 1 wherein said blower means includes an annular stator in the region of said center surface portion and having a circular peripheral portion; and wherein said deflector means include a plurality of individually turnable deflectors, each deflector being turnable about an axis substantially tangential to said circular peripheral portion of said stator means.

3. An aircraft as set forth in claim 1 and including a plurality of blades located in said outlet means and being turnable about an axis transverse to said center surface portion, said blades normally extending in radial direction.

4. An aircraft as set forth in claim 1 and including a plurality of turnable ailerons arranged spaced along said circular edge.

5. An aircraft comprising, in combination, a wing member having a continuous top surface and a bottom surface joined along a peripheral circular portion, said top surface including a center surface portion, and a circular outer lifting surface portion having an aerodynamic outwardly and downwardly curving profile corresponding to a surface of revolution created by the top surface of a conventional wing profile; a motor mounted on said wing member below the top surface thereof and including means for adjusting the rotary speed thereof; blower means mounted on said wing member and including an annular stator means above said center surface portion, and an impeller within said stator and driven by said motor, said stator defining with said top surface an annular outlet intermediate said center surface portion and outer lifting surface portion so that said impeller blows air only over said annular lifting surface portion in substantially tangential direction to said profile and at a pressure smaller than atmospheric pressure whereby a lifting force is created; and a throttle member located within said annular stator and being adjustable for varying the amount of air flowing through said stator to said impeller.

6. An aircraft as set forth in claim 5 and including a plurality of individually adjustable turnable deflector means mounted on said stator in the region of said outlet for varying the cross-section of said outlet and thereby the amount of air passing over said lifting surface portion whereby a lateral force is created when only selected deflector means are turned.

7. An aircraft as set forth in claim 6 and including a plurality of blades arranged in a circle in said outlet means and being turnable for varying the direction of the air passing through said outlet means.

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