May 9, 1939. H. COANDA 2,157,281

PROPELLING DEVICE

Original Filed Jan. 10, 1936 2 Sheets-Sheet 1

Fig. 1

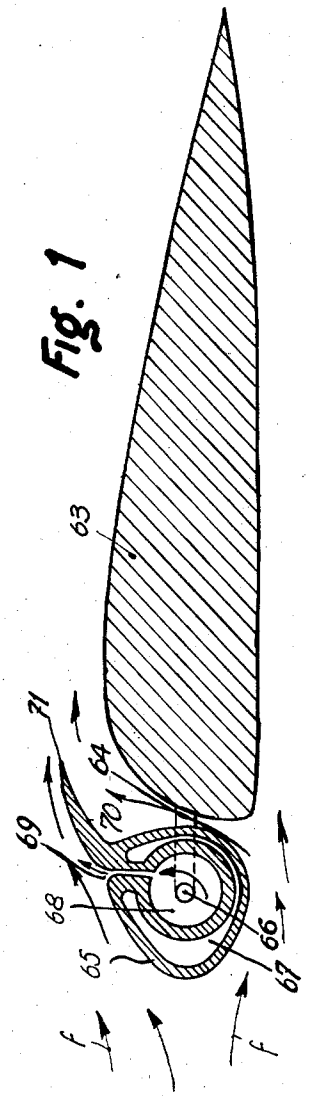
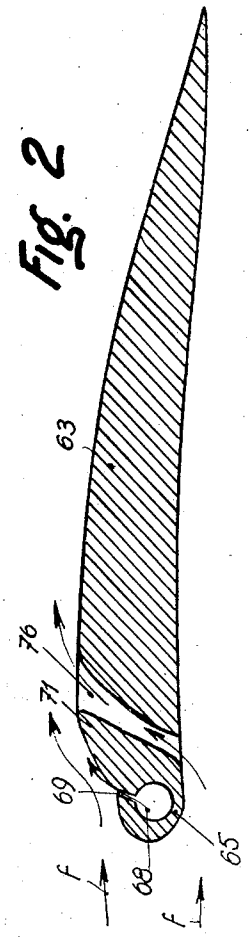


Fig. 2



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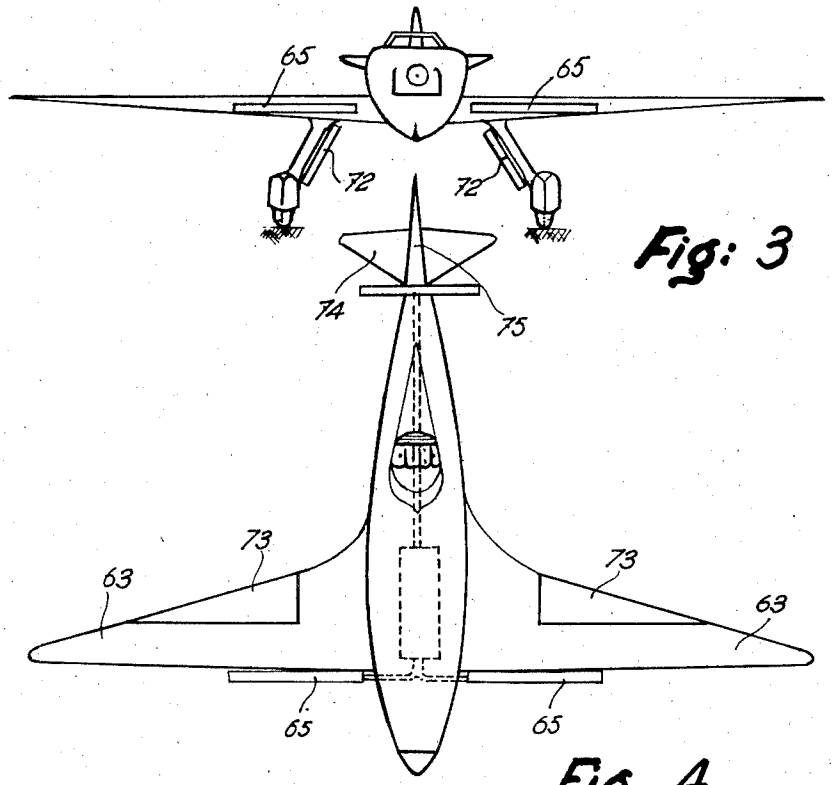


Fig. 3

Fig. 4

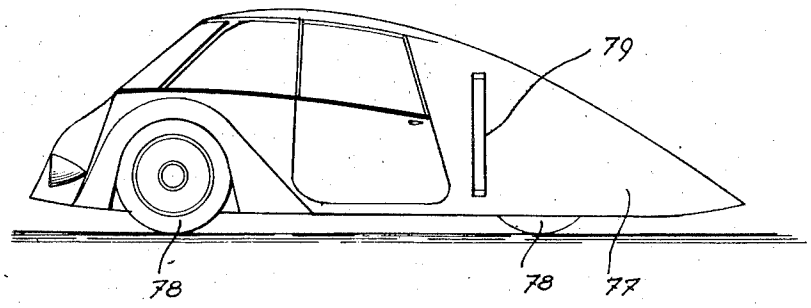


Fig. 5

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UNITED STATES PATENT OFFICE

2,157,281

PROPELLING DEVICE

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Original application January 10, 1936, Serial No. 58,471, now Patent No. 2,108,652, dated February 15, 1938. Divided and this application August 13, 1936, Serial No. 95,818. In France January 16, 1935

8 Claims. (Cl. 244—15)

This application is a division of my U. S. patent application Ser. No. 58,471, filed January 10, 1936, now Patent Number 2,108,652 issued Feb. 15, 1938.

The invention relates to the propulsion of vehicles by the direct action of a fluid under pressure escaping into the atmosphere.

The object of the invention is to provide a propelling system which is better adapted to meet the requirements of practice than those applied up to the present time.

The essential feature of the present invention consists in the provision of a cylinder adapted to be fitted along a surface of the vehicle, preferably at the front part thereof, said cylinder being hollow and fed with a fluid under pressure, and communicating with the atmosphere through an outlet narrow slot extending longitudinally, the rear edge or lip of said slot being prolonged by a convex rounded part tangent to the outlet direction of said slot, whereas the front lip makes directly a substantial angle with said direction.

Other features of the present invention will result from the following detailed description of some specific embodiments thereof.

Preferred embodiments of the present invention will be hereinafter described with reference to the accompanying drawings, given merely by way of example, and in which:

Fig. 1 shows the propelling system according to the present invention in transverse section as applied to the wing of an airplane;

Fig. 2 is a similar sectional view of a modification;

Figs. 3 and 4 show airplanes in front and top plan views, respectively, as fitted with the propelling device according to the invention;

Fig. 5 is a side elevation of an automobile vehicle fitted with the propelling device according to the present invention.

In the embodiments of Figs. 1 and 2, the propeller **65** is fixed at the front of a wing **63**, to which it is connected through any suitable means, such as **64**. This propeller is adapted to rotate about axis **66**. It consists of a cylinder **67**, preferably hollow, so as to reduce its weight, and provided with an inner chamber **68** filled with gas under pressure. This chamber **68** communicates with the atmosphere through a narrow slot **69**. The rear edge or lip of the outlet of said slot is prolonged by a convex rounded surface **70** terminating in a point **71**. On the contrary the front lip of said outlet directly makes a substantial angle with the outlet direction.

With such an arrangement, the fluid escaping through slot **69** is caused to flow along surface **70** and it creates a suction ahead of the propeller which, if a sufficient amount of gas under pressure is caused to escape at a pressure sufficiently high, can exert a driving action on the airplane wing and propel it at the desired speed.

Furthermore, a portion of the air surrounding the system is caused to flow in the direction of arrows *f*, a portion of this air passing under cylinder **67** and between said cylinder and the front edge of the wing, which creates a counter pressure under point **71**, the action of said counter-pressure being added to that of the suction created ahead of said point.

If, through any suitable means, cylinder **67** is caused to turn about its axis **66**, the direction of the suction acting upon part **70—71** can be modified. In particular, for taking off, it will be advantageous to turn part **70** in an anti-clockwise direction from the position shown by Fig. 1, in such manner that said part **70** makes with respect to the ground a much greater angle than when the airplane is flying a horizontal course.

In the embodiment of Fig. 2, chamber **68** is formed directly in the wing. In this position of member **70**, the suction will be directed in an upward direction, thus increasing the lift. The paths of the fluid and air are substantially the same as in the preceding embodiment

Figs. 3 and 4 show two different applications of this propelling device to an airplane. In both cases, propellers **65** are fixed to the leading edge of the wings. But in the embodiment of Fig. 3, similar propellers are also fixed to the uprights of the landing gear, at **72**. The control of the airplane is ensured by means of the ailerons and rudders **73**, **74**, **75**, operated in the usual manner.

Fig. 5 shows a motor car body **77**, of streamline shape, with fairings for the wheels **78**.

In this embodiment of the invention, a propeller of the kind of that shown by Fig. 1 is fitted vertically on the outer wall of the body, for instance at **79**, or at the front.

In a general manner, while I have, in the above description, disclosed what I deem to be practical and efficient embodiments of the present invention, it should be well understood that I do not wish to be limited thereto as there might be changes made in the arrangement, disposition and form of the parts without departing from the principle of the present invention as comprehended within the scope of the accompanying claims.

What I claim is:

1. In a body member adapted to be propelled in a given forward direction having an elongated

hollow leading edge transversely disposed with respect to said direction, and there being two spaced slots running within said leading edge in general parallelism therewith, the combination of features consisting in that the hollow leading edge is adapted interiorly to be fed with a fluid under pressure which issues through the foremost slot and is of rounded exterior section of less size than the general section of the body member but practically tangent with the lower surface thereof, in that said first slot is narrow, unalterable, communicates upwardly in a direction directly transverse to said given forward direction and terminates within the hollow interior of the leading edge, in that the second slot passes entirely through said body member in an upward and unalterably rearwardly inclined manner, and in that the rear lip of the first slot between both slots curves upwardly and rearwardly in rigidly unalterable manner from the opening of said first slot so as to arch rearwardly to at least the full section of said body member.

2. In a body member adapted to be propelled in a given forward direction and having an elongated hollow leading edge transversely disposed with respect to said direction, and there being two spaced slots running within said leading edge in general parallelism therewith, the combination of features consisting in that the hollow leading edge is adapted interiorly to be fed with a fluid under pressure which issues through the foremost slot and is of rounded exterior section of less size than the general section of the body member but extends a distance downwardly toward the lower surface thereof, in that said first slot is narrow, unalterable, communicates upwardly in a direction generally transverse to said given forward direction and terminates within the hollow interior of the leading edge, in that the second slot passes entirely through said body member in an upward and unalterably rearwardly inclined manner, and in that the rear lip of the first slot between both slots curves upwardly and rearwardly from the opening of said first slot so as to arch rearwardly to at least the full section of said body member.

3. In connection with a body member adapted to be propelled in a given forward direction and having an elongated part transversely disposed with respect to said direction, a propeller which comprises, in combination, a hollow cylinder carried by said body in parallel spaced relation to said elongated part, said cylinder being adapted to be fed interiorly with a fluid under pressure and being formed, for the purpose of allowing said fluid to issue to the atmosphere, with an unalterable narrow outled slot extending along a generatrix of said cylinder and located in a plane transverse to said forward direction, a short front lip for said slot and a relatively longer rear lip for said slot which is rigid with said cylinder and has a rounded shape starting tangentially to said transverse plane with its convexity turned toward the front and curving gradually so as ultimately to become substantially tangential to said direction, the front lip of said outlet slot directly making an angle with said transverse plane, and said cylinder being located at a distance from the elongated part of said body so as to leave between said cylinder and said body a free space for the flow of air from the front of said cylinder to the space at the rear or underside of said lip.

4. In connection with a body member adapted to be propelled in a given forward direction and having a front or leading edge transversely disposed with respect to said direction, a propeller which comprises, in combination, a hollow cylinder carried by said body in parallel spaced relation to said front or leading edge, said cylinder being adapted to be fed interiorly with a fluid under pressure and being formed, for the purpose of allowing said fluid to issue to the atmosphere, with an unalterable narrow outlet slot extending along a generatrix of said cylinder and located in a plane transverse to said forward direction, a short front lip for said slot and a relatively longer rear lip for said slot which is rigid with said cylinder and has a rounded shape starting tangentially to said transverse plane with its convexity turned toward the front and curving gradually so as ultimately to become substantially tangential to said direction, the front lip of said outlet slot directly making an angle with said transverse plane, and said cylinder being positioned at a distance from the front or leading edge of said body so as to leave between said cylinder and said body a free space for the flow of air from the front of said cylinder to the space at the rear or underside of said lip.

5. In connection with a body member adapted to be propelled in a given forward direction and having a front or leading edge transversely disposed with respect to said direction, a propeller which comprises, in combination, a hollow cylinder carried by said body in advance thereof and in parallel spaced relation to said front or leading edge, said cylinder being adapted to be fed interiorly with a fluid under pressure and being formed, for the purpose of allowing said fluid to issue to the atmosphere, with an unalterable narrow outlet slot extending along a generatrix of said cylinder and located in a plane transverse to said forward direction, a short front lip for said slot and a relatively longer rear lip for said slot which is rigid with said cylinder and has a rounded shape starting tangentially to said transverse plane with its convexity turned toward the front and curving gradually so as ultimately to become substantially tangential to said direction, the front lip of said outlet slot turning sharply at about a right angle to said transverse plane toward the front, and said cylinder being positioned at a distance from the front or leading edge of said body so as to leave between said cylinder and said body a free space for the flow of air from the front of said cylinder to the space at the rear or underside of said lip.

6. In connection with a body member adapted to be propelled in a given forward direction and having a front or leading edge transversely disposed with respect to said direction, a propeller which comprises, in combination, a hollow cylinder carried by said body in advance thereof and in parallel spaced relation to said front or leading edge, said cylinder being adapted to be fed interiorly with a fluid under pressure and being formed, for the purpose of allowing said fluid to issue to the atmosphere, with an unalterable narrow outlet slot extending along a generatrix of said cylinder and located in a plane transverse to said forward direction, a short front lip for said slot and a relatively longer rear lip for said slot which is rigid with said cylinder and has a rounded shape starting tangentially to said transverse plane with its convexity turned toward the front and curving gradually so as ultimately to become substantially tangential to said direction, the front lip of said outlet slot forming a sharp angled edge, said cylinder being positioned

at a distance from the front or leading edge of said body so as to leave between said cylinder and said body a free space for the flow of air from the front of said cylinder to the space at the rear or underside of said lip.

7. In connection with a body member adapted to be propelled in a given forward direction and having a front or leading edge transversely disposed with respect to said direction, a propeller which comprises, in combination, a hollow cylinder adjustably carried by said body member so as to be capable of being turned about an axis parallel to said front or leading edge and disposed in parallelism with said edge, said cylinder being adapted to be fed interiorly with a fluid under pressure and being formed, for the purpose of allowing said fluid to issue to the atmosphere, with an unalterable narrow outlet slot extending along a generatrix of said cylinder and located in a plane transverse to said forward direction, a short front lip for said slot and a relatively longer rear lip for said slot which is rigid with said cylinder and has a rounded shape starting tangentially to said transverse plane with its convexity turned toward the front and curving gradually so as ultimately to become substantially tangential to said direction, the front lip of said outlet slot forming a sharp angled edge, said cylinder being positioned at a distance from the front or leading edge of said body so as to leave between said cylinder and said body a free space for the flow of air from the front of said cylinder to the space at the rear or underside of said lip.

8. A self-propelled wing which comprises, in combination, a hollow front element forming the leading edge and adapted to be fed interiorly with a gas under pressure, and a rear element carrying the trailing edge of said wing, with a space between these two elements forming a slot extending toward the rear from the underside of the wing to the upper side thereof, said front element being formed for the purpose of allowing said gas to issue to the atmosphere, with an unalterable narrow outlet slot extending along at least a portion of said leading edge and located in a plane transverse to the fore and aft direction of the wing and substantially at right angles to the chord thereof, a short front lip and a relatively longer rear lip for said outlet slot, said rear lip of said slot starting tangentially to said transverse plane and curving gradually backward so as to form a prolongation of the rear upper face portion of said front hollow element, and said front lip of said outlet slot forming a sharp angled edge.

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