

Search strategy

Query

(TURBINE AND FLOW AND AIR AND VORTEX)/TI/AB/CLMS AND (B64C-023/06)/IPC
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31 Documents

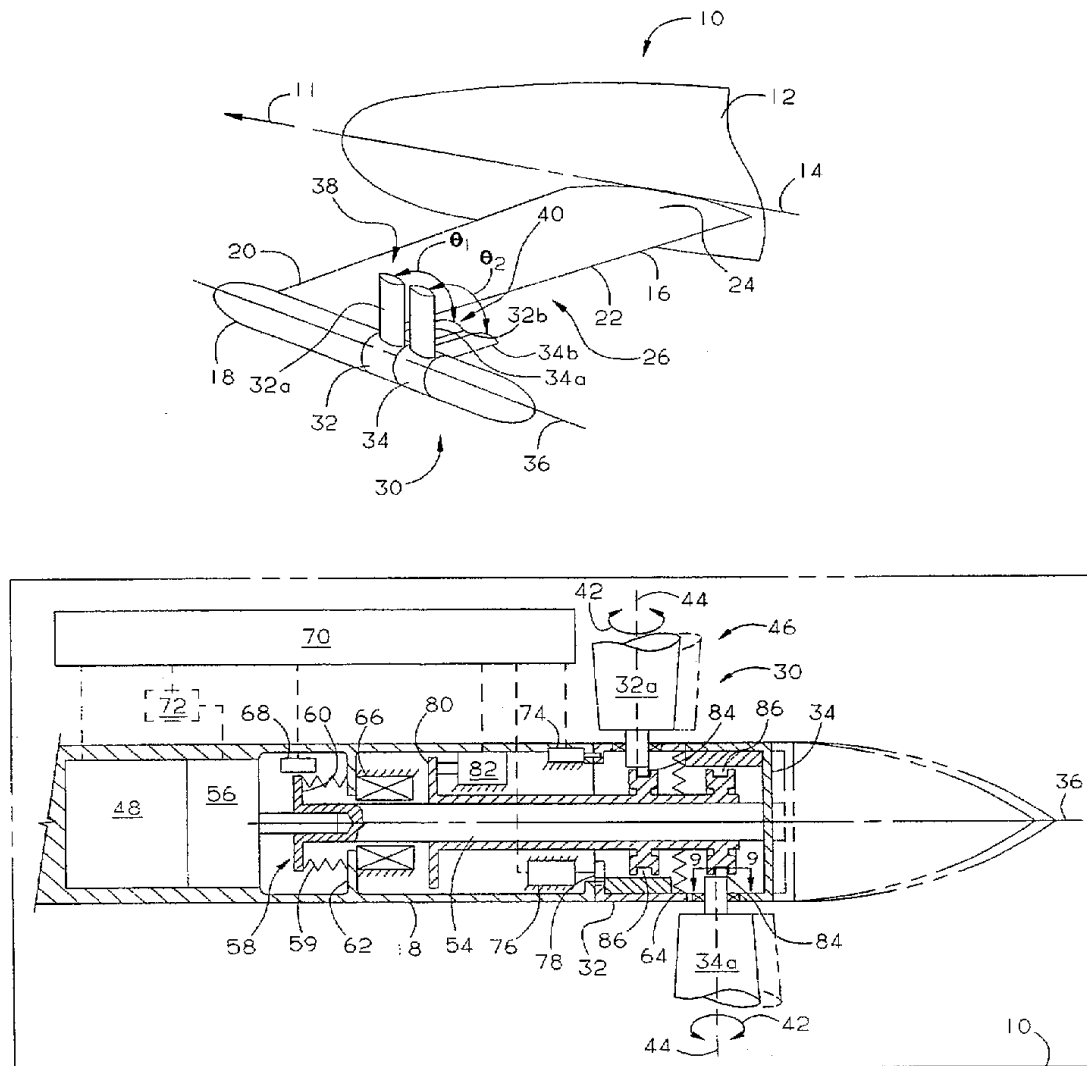
Publication numbers	Title	Current assignees
WO9640554 A1	Wingtip vortex turbine	SUNDSTRAND
EP2368036 A2	Vortex dynamics turbine	AEROVORTEX MILLS
EP2548800 A1	Method for retrofitting vortex generators on a wind turbine blade	LM WIND POWER
EP2548801 A1	Wind turbine blade comprising vortex generators	LM WIND POWER
EP2223853 A1	Fluid dynamic area with a turbine driven by the flow induced by the area subject to the flow	DEUTSCHE ZENTRUM FUER LUFT & RAUMFAHRT
US3997132 A	Method and apparatus for controlling tip vortices	GARRETT
CN103754354 A	Fluid power equipment with vortex control device and method for controlling vortex	HAN JUN
EP2948369 A1	Energy efficiency improvements for turbomachinery	IRELAND PETER, ...
WO2019239123 A1	Wing-tip device	PUNTER THOMAS JAMES, ...
WO2008108881 A2	Method and apparatus for mitigating trailing vortex wakes of lifting or thrust generating bodies	SULLIVAN STEVEN
EP-940338 A2	Gearbox breather outlet	ROLLS ROYCE
US20160229527 A1	Wingtip vortex drag reduction method using backwash convergence	DUKE JOHN HINCKS
US5598990 A	Supersonic vortex generator	UNIVERSITY OF KANSAS
EP1456081 A1	Cylindrical wing tip with helical slot	CHRISTIAN HUGUES
EP3002210 A1	Engine nacelle	ROLLS ROYCE, ...
WO201309639 A2	Supersonic compressor	DRESSER RAND
EP1529169 A1	Device for the generation of eddies and method for operation of said device	SIEMENS
EP3597902 A1	Vortex generator for a wind turbine	CORTENERGY, ...
EP-518592 A1	Vortex suppression for an eductor.	GENERAL ELECTRIC
US3090584 A	Aircraft	POWER JETS RESEARCH & DEVELOPMENT
EP3051125 A1	Vortex generator for a rotor blade	GENERAL ELECTRIC
US3525486 A	Vortex generators	HAWKER SIDDELEY AVIATION
EP2027390 A1	A wind turbine blade and a pitch controlled wind turbine	VESTAS WIND SYSTEMS
US3578264 A	Boundary layer control of flow separation and heat exchange	UNIVERSITY OF MICHIGAN
US4466587 A	Nacelle installation	GENERAL ELECTRIC
US3776363 A	Control of noise and instabilities in jet engines, compressors, turbines, heat exchangers and the like	UNIVERSITY OF MICHIGAN

Publication numbers	Title	Current assignees
DE3836673 A1	Method and arrangement for reducing the induced drag of a wing	HARRIEHAUSEN, MICHAEL, 2000 HAMBURG, DE
US20010036406 A1	Fluid flow straightening techniques	DMR HOLDING
EP2004484 A2	Aircraft with aerodynamic lift generating device	FANWING
US20060006290 A1	Vorticity cancellation at trailing edge for induced drag elimination	LOTH JOHN L
US20170029102 A1	Methods and systems for rotary wing active flow control	BOEING

Family 1/31 - FAMPAT - ©Questel

Title

(WO9640554)

Wingtip **vortex turbine****Images****Publication numbers with kind code & date**

US5702071	A	1997-12-30	US5702071
WO96/40554	A1	1996-12-19	WO9640554

**Abstract**

(WO96/40554)

An aircraft (10) including a stowable, wingtip mounted, **vortex turbine** (30) for dissipating or extracting energy from a lift induced **vortex** (28) emanating from the aircraft (10) is provided. The **vortex turbine** (30) includes a first and a second array (38, 40) of blades (32a, b) (34a, b) extending respectively from a first and a second hub section (32, 34). Hub sections (32, 34) may be independently pivoted about a common axis of rotation (36) to a stowed position for landing, take-off, or ground operation, whereat none of the blades (32a, b) (34a, b) extend below a minimum ground clearance of the aircraft, or beyond a maximum horizontal extension of the wing (16). In flight, the hub sections (32, 34) may be deployed and the pitch of the blades adjusted to maximize dissipation of the lift induced **vortex** (28), thereby minimizing drag and providing improved safety for other aircraft flying through the wake of the aircraft (10) producing the **vortex** (28). The hub sections (32, 34) may also be locked together to form a **turbine** wheel (46) having a circumferentially symmetrical array of blades. The **turbine** wheel (46) is rotatable about the axis of rotation (36) for extracting usable energy from the lift induced **vortex** (28) and/or free stream **air** passing through the **turbine** wheel (46).

Inventors

KROLL WILLIAM B

CURRAN PATRICK D

Latest standardized assignees - inventors removed

SUNDSTRAND

bubble, (3) Laminarize the **flow** over the blade or wing.

Inventors

KILARAS MICHAEL STAVROU

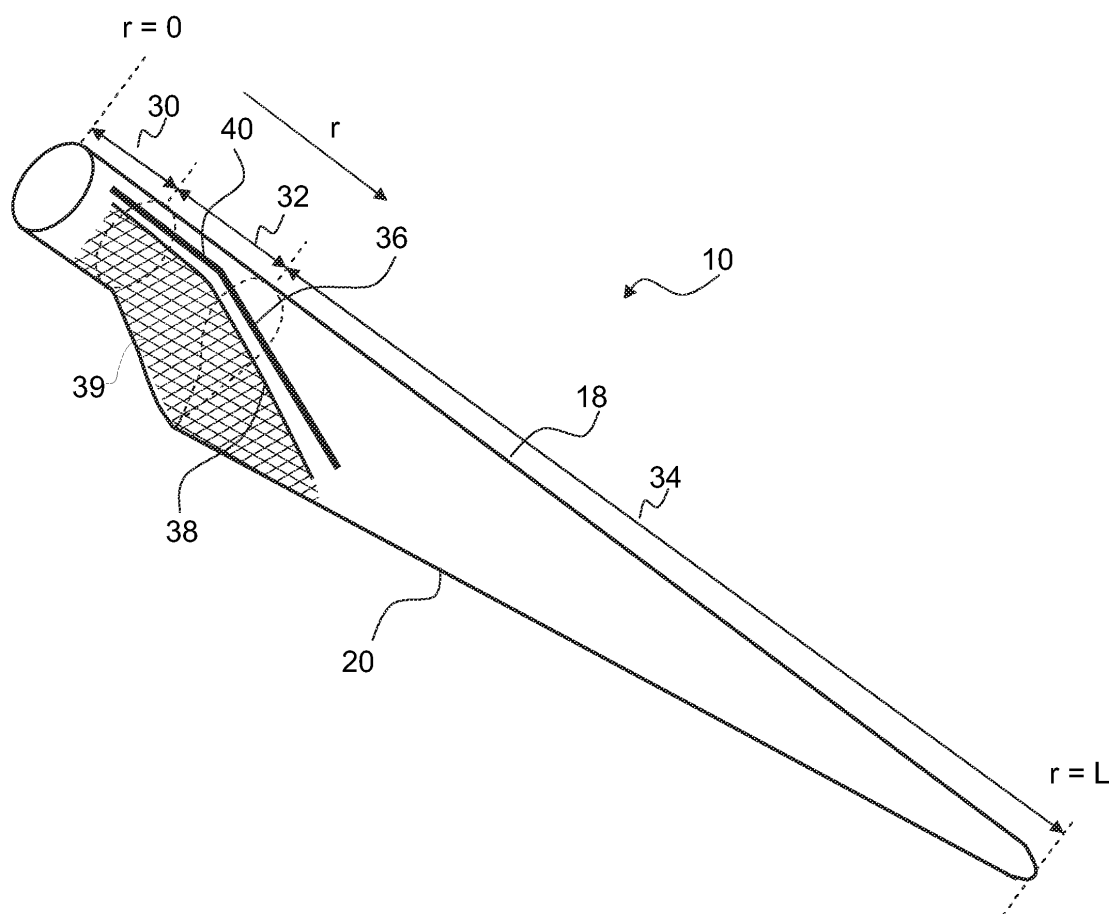
Latest standardized assignees - inventors removed

AEROVORTEX MILLS

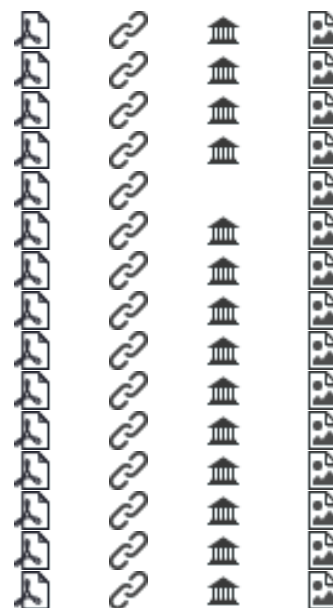
Family 3/31 - FAMPAT - ©Questel

Title

(EP2548800)

Method for retrofitting **vortex** generators on a wind **turbine** blade**Images****Publication numbers with kind code & date**

US10145357	B2	2018-12-04	US10145357
US20170363061	A1	2017-12-21	US20170363061
US9777703	B2	2017-10-03	US9777703
CN103917445	B	2016-07-06	CN103917445B
PL2739529	T3	2016-02-29	PL2739529
ES2555999	T3	2016-01-12	ES2555999
DK2739529	T3	2015-12-21	DK2739529T
EP2739529	B1	2015-09-09	EP2739529
IN0186/CHENP/2014	A	2015-01-23	IN2014CN00186
US20140241880	A1	2014-08-28	US20140241880
CN103917445	A	2014-07-09	CN103917445
EP2739529	A2	2014-06-11	EP2739529
WO2013/014080	A3	2013-09-26	WO201314080
WO2013/014080	A2	2013-01-31	WO201314080
EP2548800	A1	2013-01-23	EP2548800

**Abstract**

(EP2548800)

A method of retrofitting **vortex** generators on a wind **turbine** blade is disclosed, the wind **turbine** blade being mounted on a wind **turbine** hub and extending in a longitudinal direction and having a tip end and a root end, the wind **turbine** blade

further comprising a profiled contour including a pressure side and a suction side, as well as a leading edge and a trailing edge with a chord having a chord length extending there between, the profiled contour, when being impacted by an incident airflow, generating a lift. The method comprises identifying a separation line on the suction side of the wind turbine blade, and mounting one or more vortex panels including a first vortex panel comprising at least one vortex generator on the suction side of the wind turbine blade between the separation line and the leading edge of the wind turbine blade.

Inventors

MADSEN JESPER

Latest standardized assignees - inventors removed

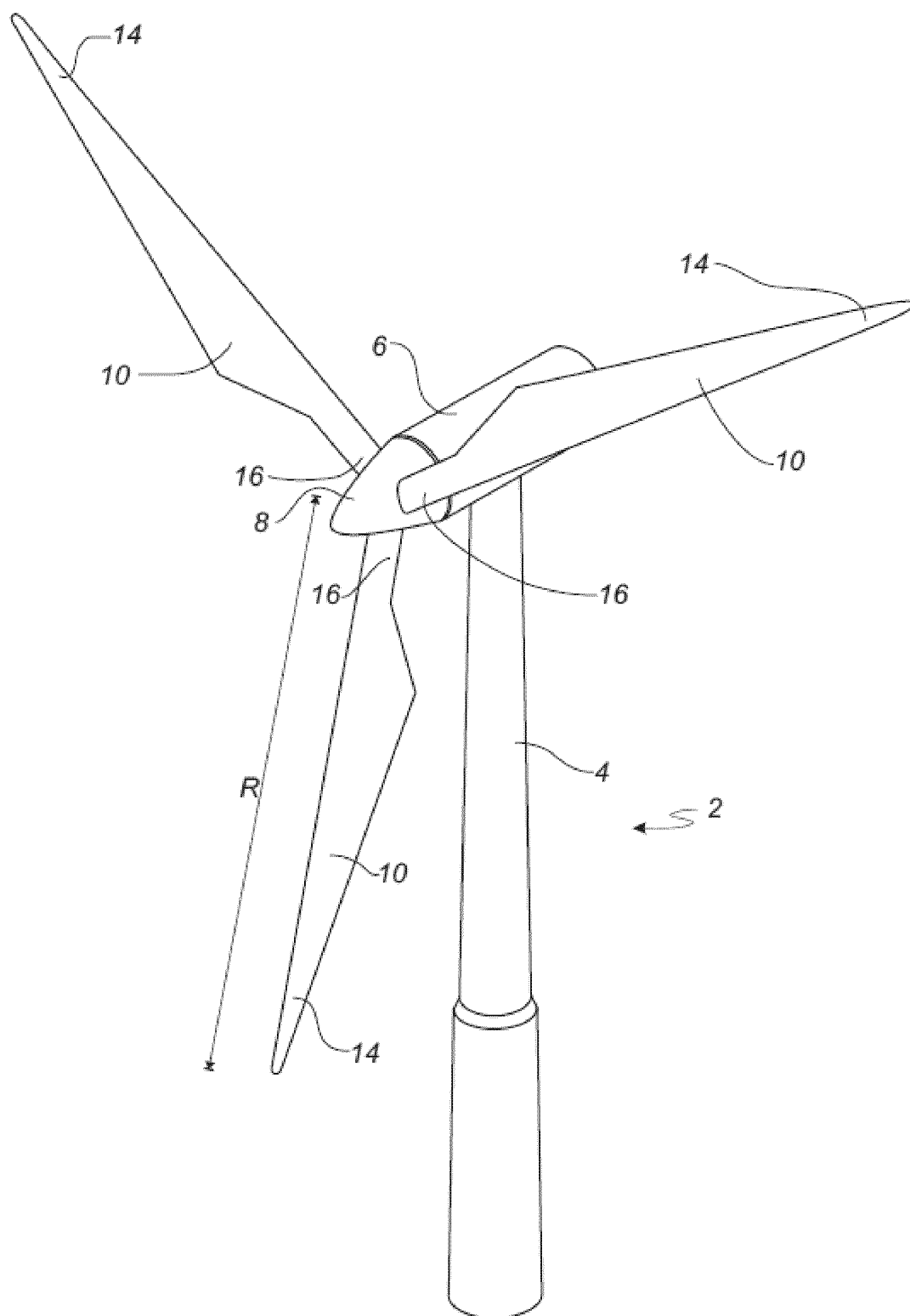
LM WIND POWER

Family 4/31 - FAMPAT - ©Questel

Title

(EP2548801)

Wind turbine blade comprising vortex generators

Images**Publication numbers with kind code & date**[ES2759027](#)

T3 2020-05-07

[ES2759027](#)[PL2739528](#)

T3 2020-03-31

[PL2739528](#)

DK2739528	T3	2019-12-09	DK2739528T				
EP2739528	B1	2019-08-28	EP2739528				
CN103974878	B	2019-07-30	CN103974878B				
IN0184/CHENP/2014	A	2015-01-23	IN2014CN00184				
US20140219810	A1	2014-08-07	US20140219810				
CN103974878	A	2014-08-06	CN103974878				
EP2739528	A2	2014-06-11	EP2739528				
WO2013/014015	A3	2013-05-02	WO201314015				
WO2013/014015	A2	2013-01-31	WO201314015				
EP2548801	A1	2013-01-23	EP2548801				

Abstract

(EP2548801)

Disclosed is a wind **turbine** blade and a method for retrofitting a wind **turbine** blade, the wind **turbine** blade extending in a longitudinal direction along a pitch axis and having a tip end and a root end as well as a blade length, the wind **turbine** blade further comprising a profiled contour including a pressure side and a suction side, as well as a leading edge and a trailing edge with a chord having a chord length extending there between, the profiled contour, when being impacted by an incident airflow generating a lift, wherein the suction side of the wind **turbine** blade is provided with a plurality of **vortex** generators positioned along a mounting line having a proximal end point nearest the root end and a distal end point nearest the tip end, wherein the mounting line is a concave line seen from the trailing edge of the wind **turbine** blade.

Inventors

MADSEN JESPER

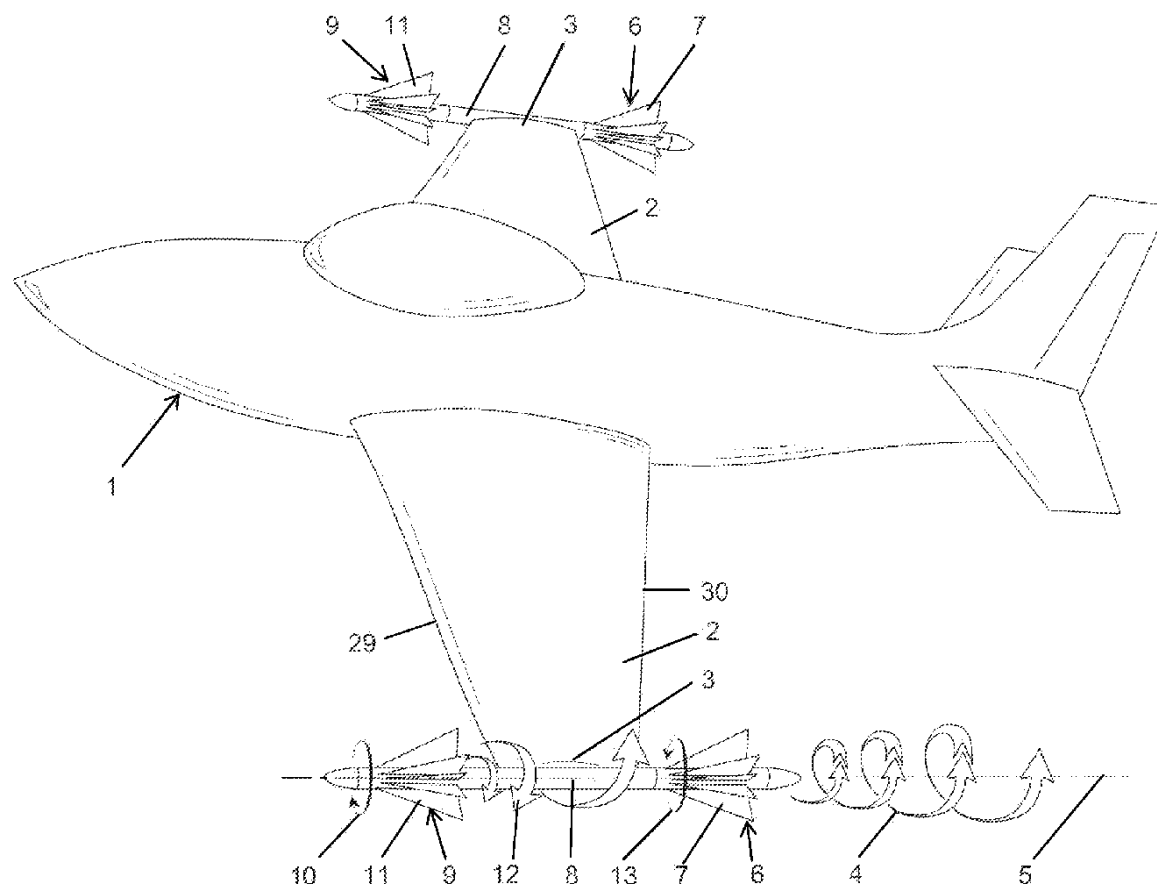
Latest standardized assignees - inventors removed

LM WIND POWER

Family 5/31 - FAMPAT - ©Questel

Title

(EP2223853)

Fluid dynamic area with a **turbine** driven by the **flow** induced by the area subject to the **flow****Images****Fig. 1****Publication numbers with kind code & date**[EP2223853](#)

A1 2010-09-01

EP2223853

**Abstract**

(EP2223853)

Flowdynamic area for e.g. aircraft, has boundary **vortex** protruding from free point of area and driving propeller arranged at free point in rotational direction opposite to boundary **vortex**

The area (2) has a front edge (29) turned toward an incident **flow** area, and a rear edge (30) averting the incident **flow** area and a free point. A **turbine** (6) is arranged at the free point, and is driven by **flow** induced by the area. A boundary **vortex** (4) protrudes from the free point of the area, and drives a propeller (9) arranged at the free point in a rotational direction (10) opposite to the boundary **vortex**.

Inventors

SCHUELEIN DR ERICH

Latest standardized assignees - inventors removed

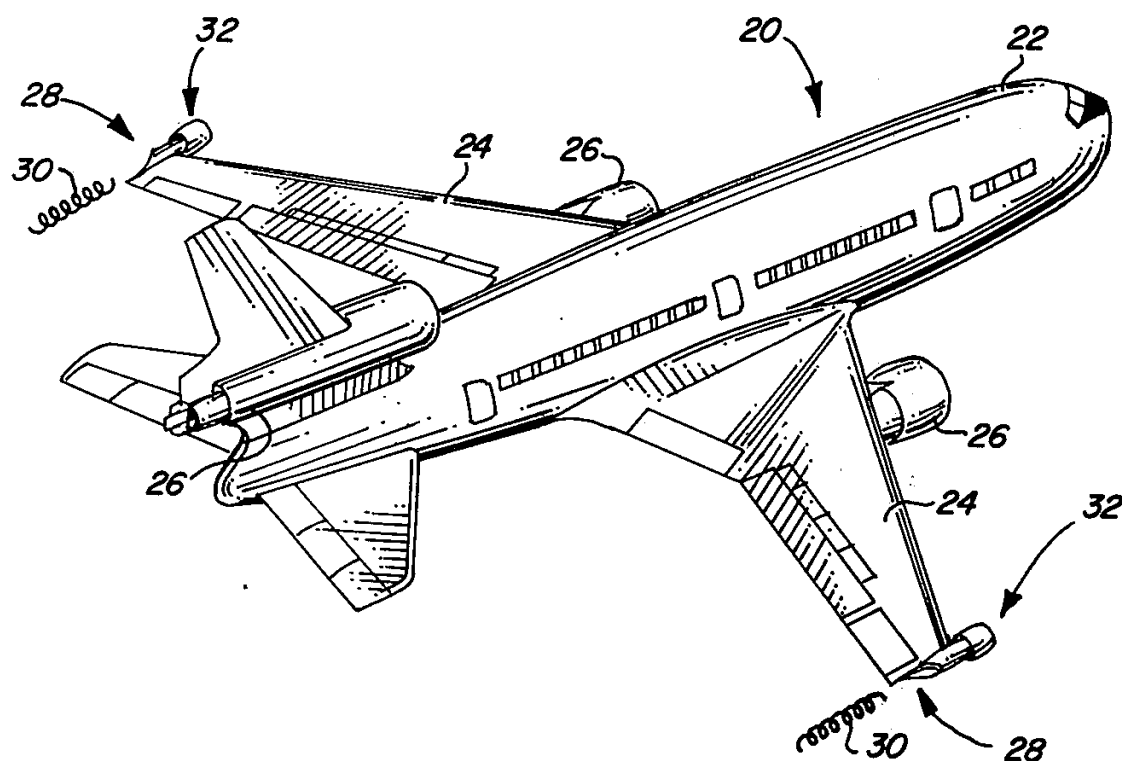
DEUTSCHE ZENTRUM FUER LUFT & RAUMFAHRT

Family 6/31 - FAMPAT - ©Questel

Title

(US3997132)

Method and apparatus for controlling tip vortices

Images**Publication numbers with kind code & date**

FR2294085	B1	1980-02-08	FR2294085
GB1529885	A	1978-10-25	GB1529885
GB1529886	A	1978-10-25	GB1529886
US3997132	A	1976-12-14	US3997132
FR2294085	A1	1976-07-09	FR2294085

**Abstract**

(US3997132)

A jet engine disposed at and preferably in front of the tip end of an airplane wing with exhaust **flow** intercepting and rotating counter to tip **vortex flow** to reduce **vortex** induced drag, the angle of rotation of exhaust **flow** being cyclically variable to dissipate the **vortex flow**. The tip engine assists in powering the aircraft.

Inventors

ERWIN JOHN R

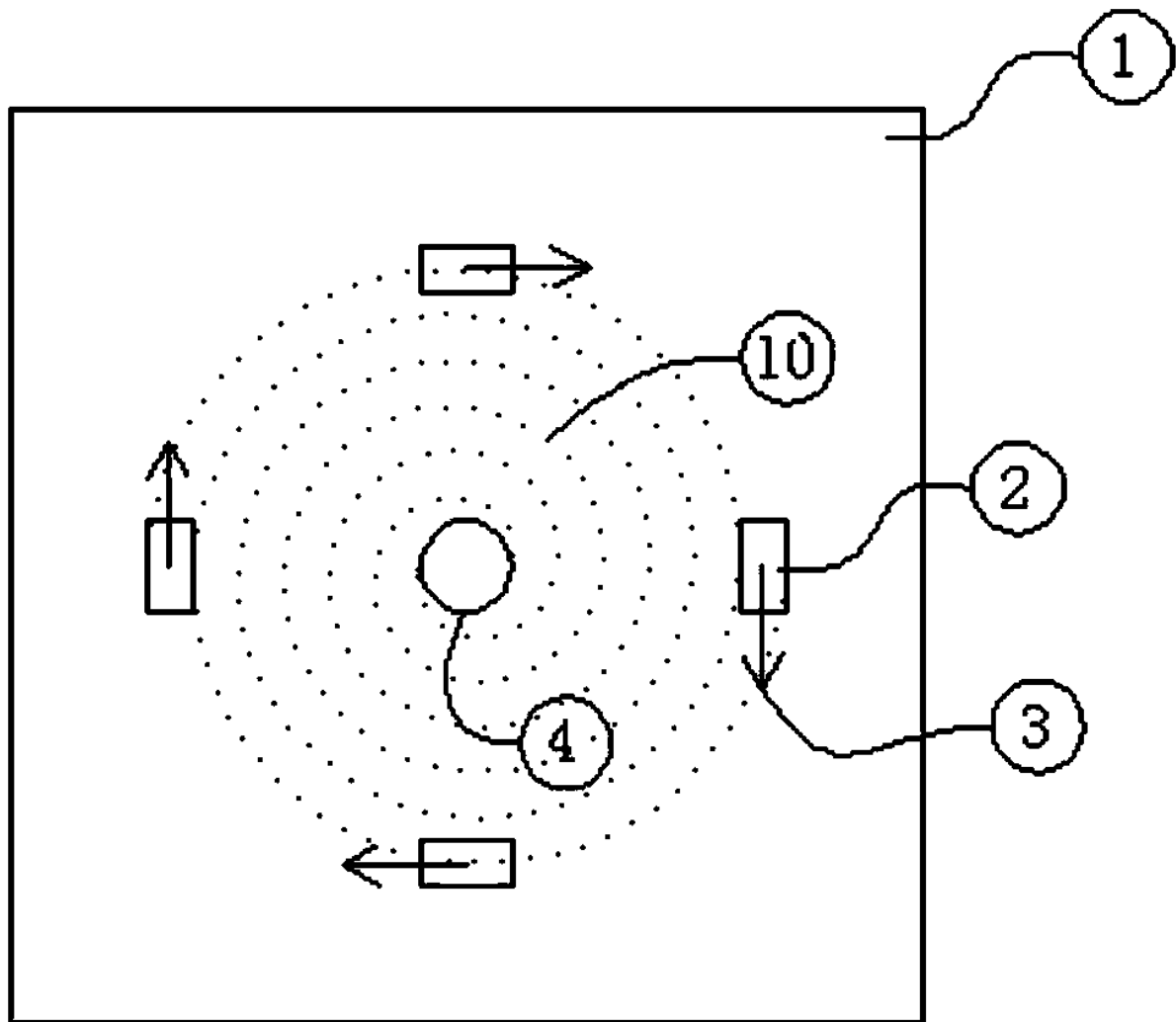
Latest standardized assignees - inventors removed

GARRETT

Family 7/31 - FAMPAT - ©Questel

Title

(CN103754354)

Fluid power equipment with **vortex** control device and method for controlling **vortex****Images****Publication numbers with kind code & date**

CN103754354

A

2014-04-30

CN103754354

**Abstract**

(CN103754354)

The invention discloses fluid power equipment which comprises at least one attachment surface and a fluid driving device, wherein a fluid channel is formed in the attachment surface; the fluid driving device is used for driving a fluid to **flow**; a flowing direction of the fluid is perpendicular to a direction pointing to a **vortex** center; the fluid flows to the fluid channel so as to generate a **vortex** which is attached to the attachment surface; the fluid power is provided by the changes of the fluid pressure on the attachment surface. Based on a bird flying principle and a tornado principle, the fluid is pumped away from the **vortex** center after the generation of the **vortex** is induced, so that a **vortex** structure with a high strength can be formed in short time by the **vortex** fluid. Thus, the velocity circulations at the inner side and the outer side of the **vortex** are equal; the pressure at the inner side of the **vortex** is rapidly decreased; two ends of the **vortex** are closed on the **vortex** attachment surface, so that the energy consumption of the **vortex** is less and the **vortex** is stabilized for a long time. Therefore, the fluid power is stronger. The fluid power equipment is suitable for flight equipment which is not provided with wings and a reverse impulsion device and is heavier than the **air**.

Inventors

HAN JUN

HAN ZIFEI

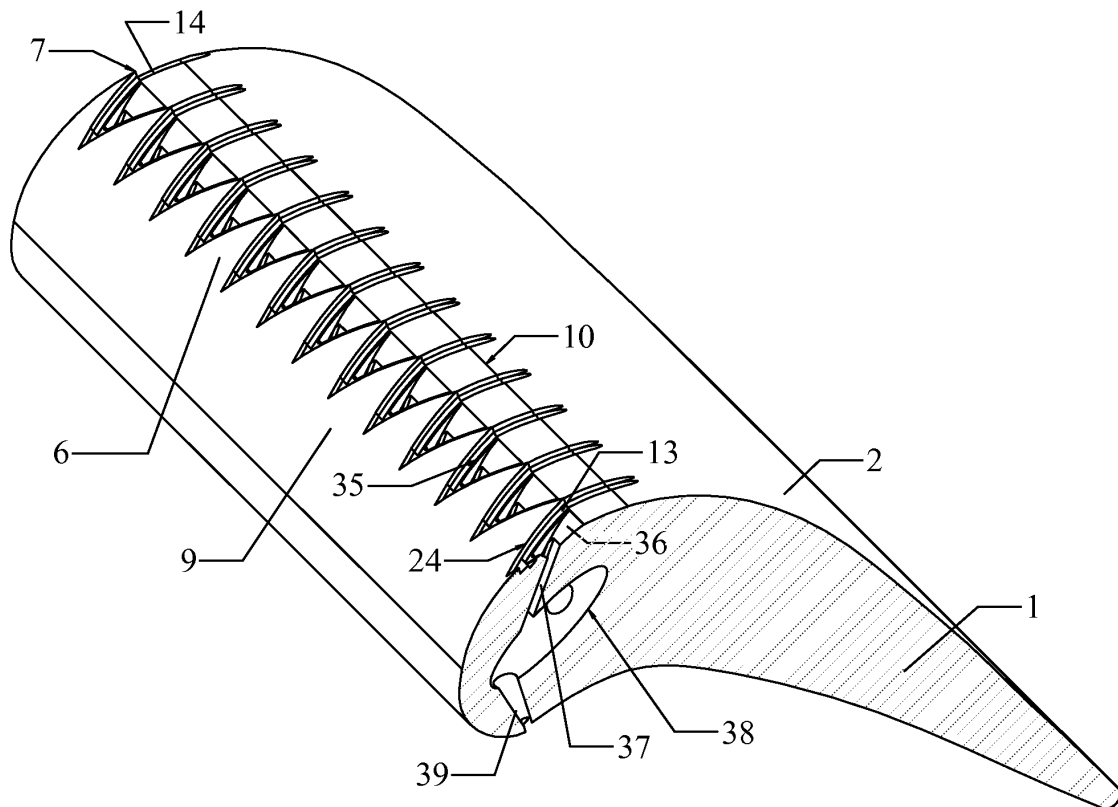
Family 8/31 - FAMPAT - ©Questel

Title

(EP2948369)

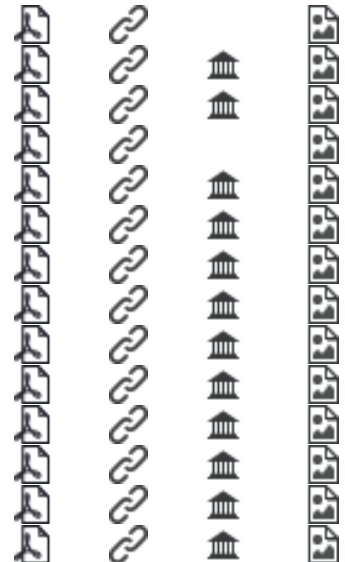
Energy efficiency improvements for turbomachinery

Images



Publication numbers with kind code & date

RU2642203	C2	2018-01-24	RU2642203
NZ710406	A	2017-11-24	NZ-710406
BR112015017808	A2	2017-07-11	BR112015017808
RU2015131056	A	2017-02-28	RU2015131056
EP2948369	A4	2017-01-18	EP2948369
JP2016509651	A	2016-03-31	JP2016509651
US20160052621	A1	2016-02-25	US20160052621
CN105307931	A	2016-02-03	CN105307931
IN6881/DELNP/2015	A	2015-12-11	IN2015DN06881
EP2948369	A1	2015-12-02	EP2948369
AU2013375126	A1	2015-08-13	AU2013375126
BR112015017808	A1	2015-08-11	BR112015017808
CA2899238	A1	2014-07-31	CA2899238
WO2014/114988	A1	2014-07-31	WO2014114988



Abstract

(EP2948369)

A method and apparatus are disclosed that allow Conformal **Vortex** Generator art to improve energy efficiency and control capabilities at many points in a turbomachine or device processing aero/hydrodynamic Newtonian fluid-flows.

Inventors

IRELAND PETER S

IRELAND ANTHONY

Latest standardized assignees - inventors removed

IRELAND PETER

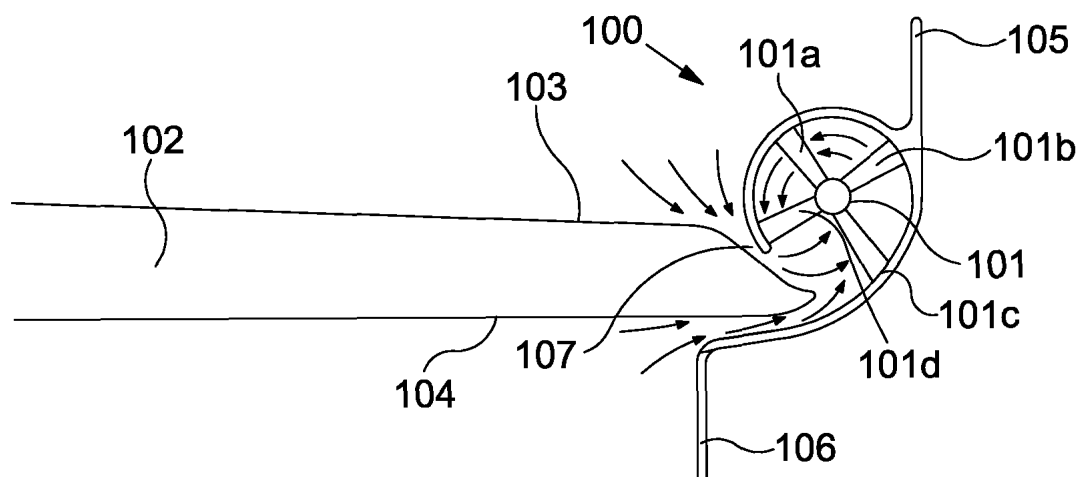
MIKRON INDUSTRIES

Family 9/31 - FAMPAT - ©Questel

Title

(WO2019239123)

Wing-tip device

Images**Fig. 1a****Publication numbers with kind code & date**

GB2570170	B	2020-03-04	GB2570170
WO2019/239123	A1	2019-12-19	WO2019239123
GB2570170	A	2019-07-17	GB2570170
GB201809838	D0	2018-08-01	GB201809838

**Abstract**

(WO2019/239123)

A wing tip device comprising a shroud arranged to at least partially surround a wing tip of a wing. The shroud provides a longitudinal **air** channel, wherein the **air** channel is substantially parallel to the direction of movement of the wing. The shroud is arranged to provide open side portions at an upper surface of the wing and at a lower surface of the wing to allow **air** inflow into the **air** channel from the upper surface of the wing and from the lower surface of the wing. A stationary propeller is mounted within the **air** channel, the stationary propeller comprising a plurality of blades.

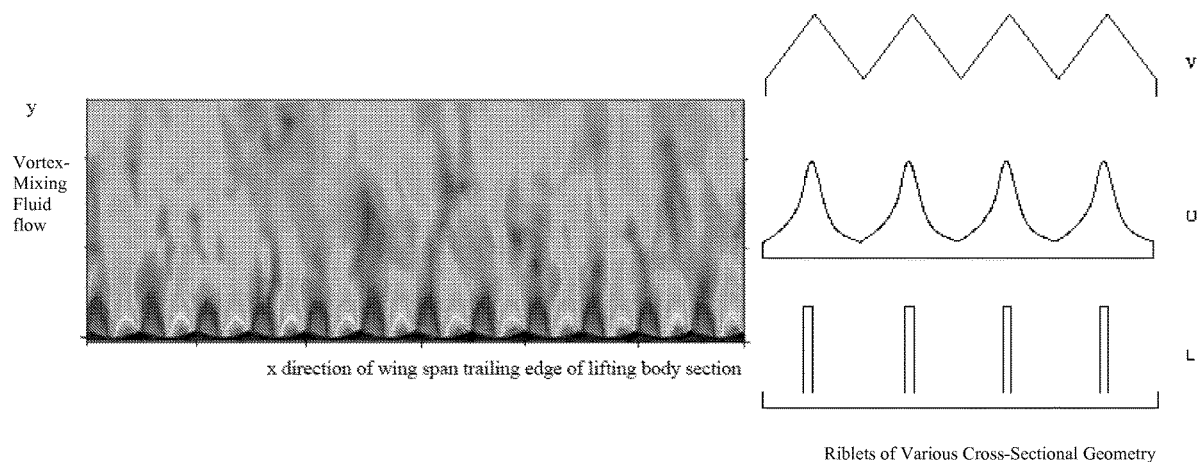
Inventors

PUNTER THOMAS JAMES

Family 10/31 - FAMPAT - ©Questel

Title

(WO2008108881)

Method and apparatus for mitigating trailing **vortex** wakes of lifting or thrust generating bodies**Images****Publication numbers with kind code & date**

US10611468	B2	2020-04-07	US10611468
WO2008/108881	A3	2008-12-11	WO2008108881
WO2008/108881	A2	2008-09-12	WO2008108881
US20080061192	A1	2008-03-13	US20080061192

**Abstract**

(WO2008/108881)

This patent provides for a method and apparatus for mitigating the formation of concentrated wake **vortex** structures generated from lifting or thrust-generating bodies and maneuvering control surfaces wherein the use of contour surface geometries promotes **vortex**-mixing of high and low **flow** fluids. The method and apparatus can be combined with various drag reduction techniques, such as the use of riblets of various types and/or compliant surfaces (passive and active). Such combinations form unique structures for various fluid dynamic control applications to suppress transiently growing forms of boundary layer disturbances in a manner that significantly improves performance and has improved control dynamics.

Inventors

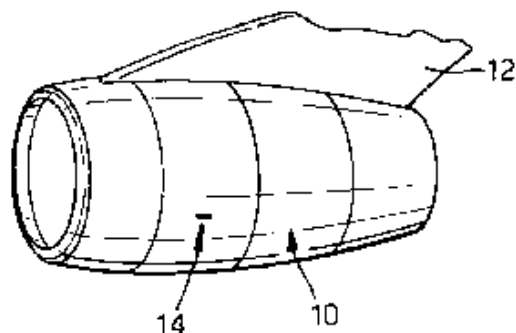
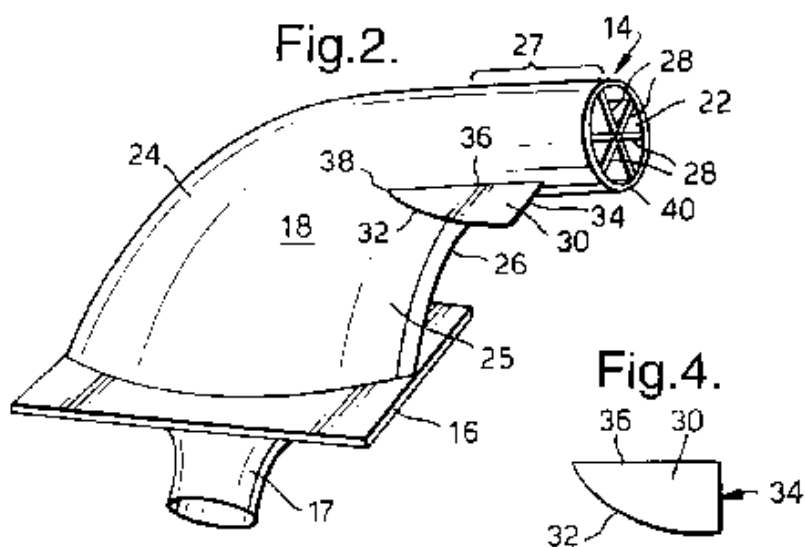
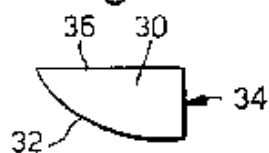
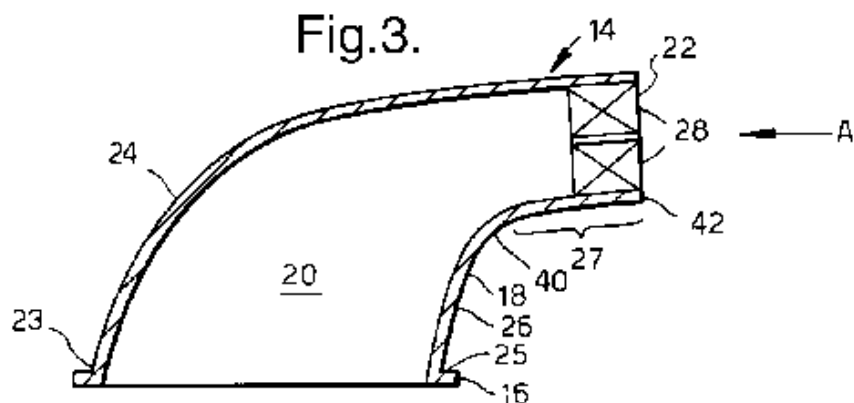
SULLIVAN STEVEN

Family 11/31 - FAMPAT - ©Questel

Title

(EP-940338)

Gearbox breather outlet

Images**Fig.1.****Fig.2.****Fig.4.****Fig.3.****Publication numbers with kind code & date**

DE69907054	T2	2003-11-06	DE69907054
DE69907054	D1	2003-05-28	DE69907054
EP0940338	B1	2003-04-23	EP-940338
EP0940338	A3	2002-03-13	EP-940338
US6116015	A	2000-09-12	US6116015



[EP0940338](#)

A2 1999-09-08

EP-940338

[GB9804807](#)

D0 1998-04-29

GB9804807

**Abstract**

(EP0940338)

A breather outlet (14) for the gearbox of a gas **turbine** engine comprises a mast (18) which extends from the nacelle (10) of the gas **turbine** engine. The mast (18) contains a breather duct (20) which interconnects the interior of the gearbox with an exhaust outlet (22). The mast (18) has an aerodynamic main portion (25) and a sub portion (27) extending rearwardly from the main portion (25). The exhaust outlet (22) is in the sub portion (27) and is arranged to direct oil and **air** in a downstream direction. The exhaust outlet (22) is spaced from the trailing edge (26) of the main portion (25), the sub portion (27) has guide vanes (28) in the breather duct (20) to straighten the oil and **air flow** and **vortex** generators (30) are provided on the mast to avoid oil staining of the nacelle (10). <IMAGE>

Inventors

TAYLOR KATHRYN VICTORIA

MYLEMANS IAN JOHN

HYDE STEPHEN PAUL

DAWS GRAHAM PHILLIP

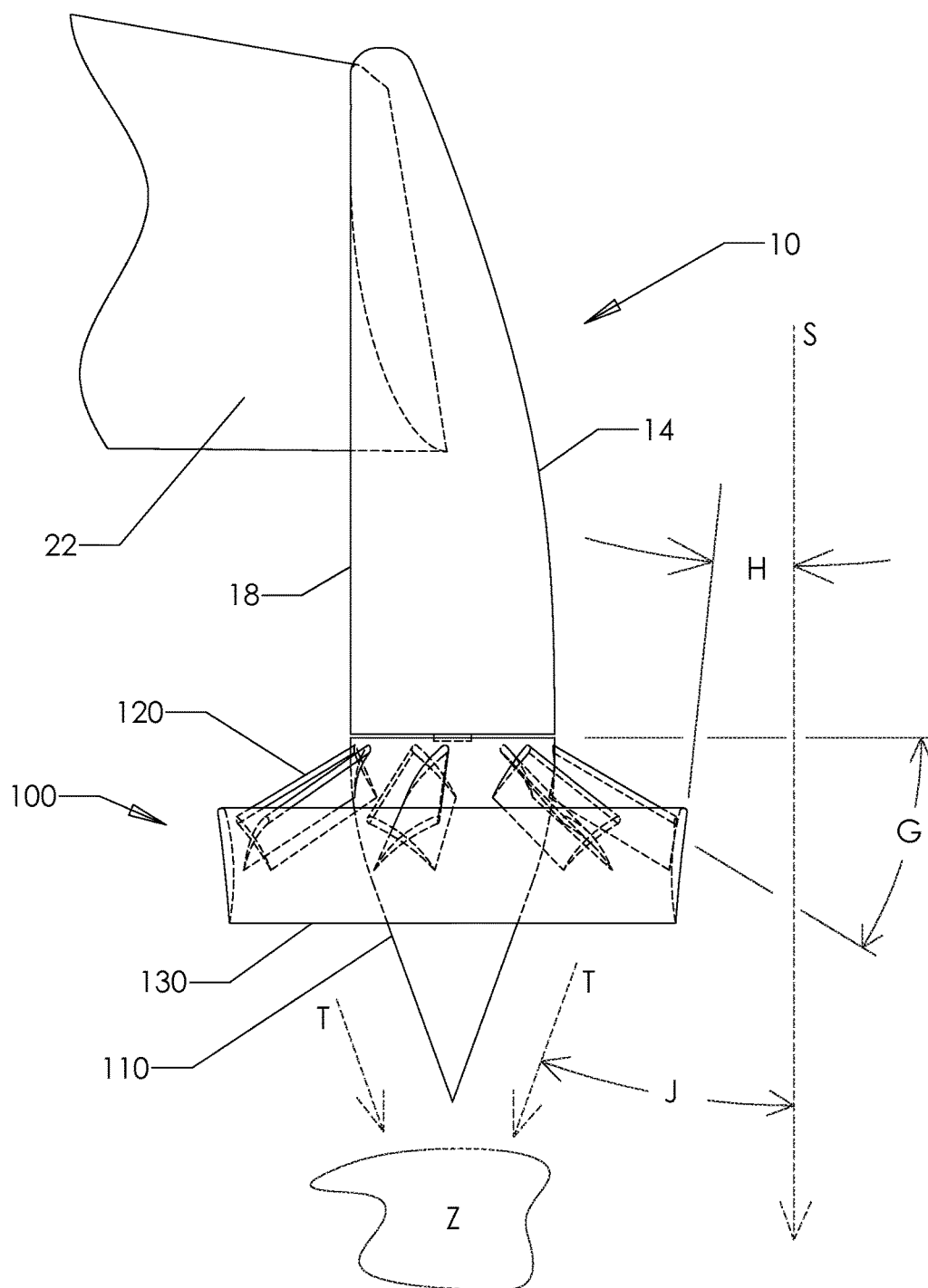
Latest standardized assignees - inventors removed

ROLLS ROYCE

Family 12/31 - FAMPAT - ©Questel

Title

(US9776710)

Wingtip **vortex** drag reduction method using backwash convergence**Images****Publication numbers with kind code & date**[US9776710](#)

B2 2017-10-03

US9776710

[US20160229527](#)

A1 2016-08-11

US20160229527

**Abstract**

(US20160229527)

A fuel efficient aircraft propulsion system comprises a wingtip mounted ducted pusher fan with convergent backwash and a skewed conical engine nacelle. The system both mitigates wingtip **vortex** drag and converts a portion of **vortex** energy into propulsion force and lift force. The forward-tapering nacelle skews both downward and inward, so the lower nacelle surface

is flush with the lower wing surface and the inboard nacelle surface does not alter **flow** over the upper wing surface. This firstly preserves lift at the outboard wing end. Secondly, **air** displacement by the nacelle accelerates **flow** only on the outboard and upper nacelle surfaces, and because the nacelle occupies the core of the nascent wingtip **vortex**, rotational **air** velocity is greatest on the upper nacelle surface. The resultant pressure drop on the upper nacelle surface contributes to aircraft lift. And because the nacelle surface tapers forward, this pressure drop does not exert backward-acting drag on the aircraft. Aft of the nacelle, the pusher fan hub surface conforms with the aft nacelle surface and tapers aft. Propulsion foils project from the forward portion of the pusher fan hub at an outward-aft angle, which directs convergent high pressure backwash **flow** along the aft tapering hub surface. This isolates aft-facing hub surfaces from drag-inducing **vortex** core pressure drop. Downstream fan backwash convergence then forms a central volume of high pressure **flow** where the low pressure trailing **vortex** core would otherwise develop. This is an efficient means to dissipate the cyclonic structure of the **vortex**, because **vortex** persistence requires low pressure core persistence. The direction of pusher fan rotation opposes the direction of wingtip **vortex** rotation as described in the prior art. This cross-**flow** interaction increases the effective power of the fan and also further counters **vortex** formation. An integral peripheral duct links the outer ends of the fan propulsion foils to provide thrust efficiency similar to that of a high bypass fanjet engine, but without the internal **air** friction within a bypass channel. In an alternative horizontal axis wind **turbine** embodiment, the same nacelle form supports secondary power-takeoff turbines mounted in high energy density **flow** at the **turbine** blade tips.

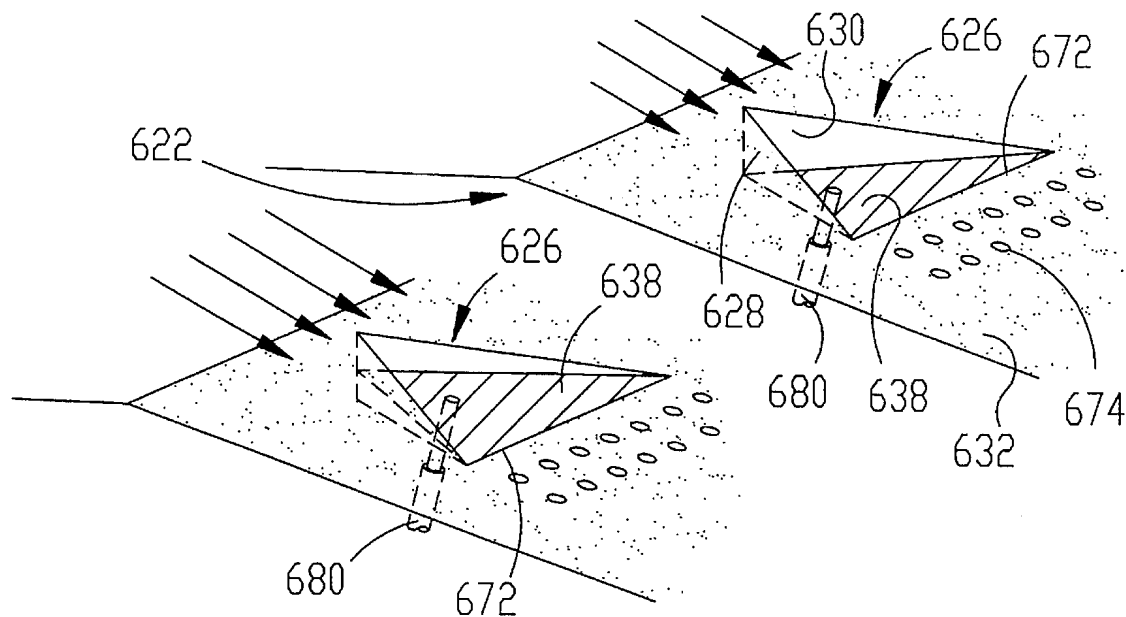
Inventors

DUKE JOHN HINCKS

Family 13/31 - FAMPAT - ©Questel

Title

(US5598990)

Supersonic **vortex** generator**Images****Publication numbers with kind code & date**[US5598990](#)

A

1997-02-04

US5598990

**Abstract**

(US5598990)

A **vortex** generator for attenuating **flow** separation which occur during supersonic **flow** of **air** over structure such as an aircraft airfoil, its fuselage, surfaces forming a part of a jet propulsion unit, **turbine** or compressor blades, or similar surfaces subjected to supersonic airflow. A series of **vortex** generators are provided each of which comprises a cavity in the component over which the supersonic **air** is flowing that is configured to generate a spiral **vortex** which attenuates **flow** separation and weight drag resulting from the supersonic airflow. Each cavity is of generally triangular configuration defined by two side walls which diverge in a direction away from the apex of the triangular cavity, and a flat bottom wall joined to the side walls. In an alternate embodiment, means is provided for selectively shifting the bottom wall from a retracted inner position, to an outer location essentially flush with the surface over which the supersonic airflow is occurring.

Inventors

FAROKHI SAEED

TAGHAVI RAY R

Latest standardized assignees - inventors removed

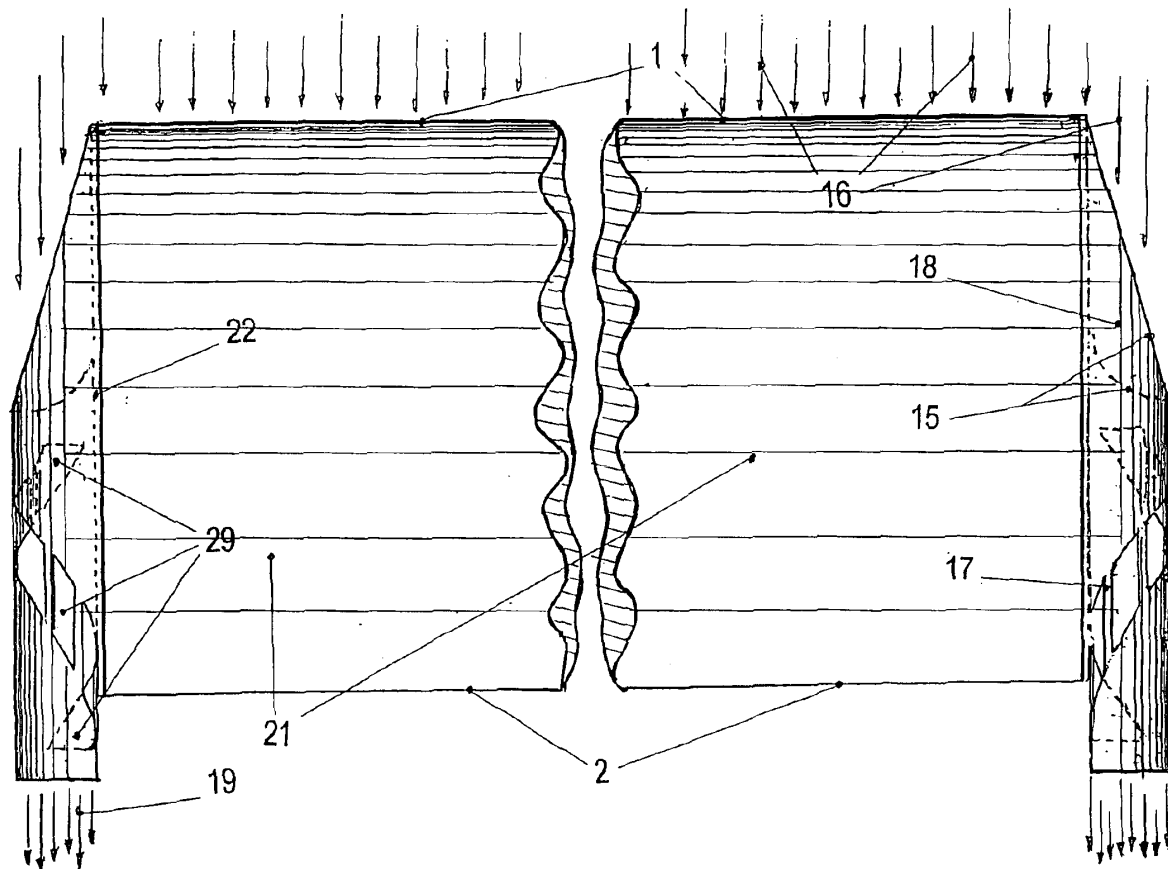
UNIVERSITY OF KANSAS

Family 14/31 - FAMPAT - ©Questel

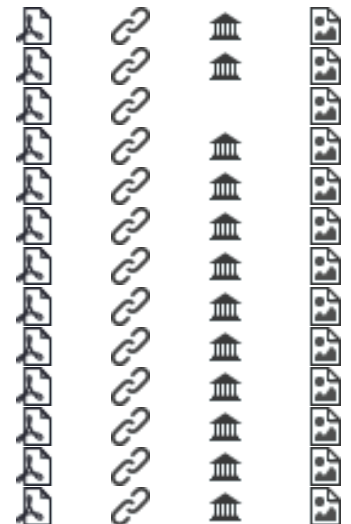
Title

(EP1456081)

Cylindrical wing tip with helical slot

Images**Publication numbers with kind code & date**

IL158327	B	2009-09-22	IL-158327
DE60232462	D1	2009-07-09	DE60232462
AT432213	T	2009-06-15	ATE432213
EP1456081	B1	2009-05-27	EP1456081
CA2443940	C	2009-01-13	CA2443940
US6892988	B2	2005-05-17	US6892988
US20040195461	A1	2004-10-07	US20040195461
EP1456081	A1	2004-09-15	EP1456081
IL158327	A	2004-05-12	IL-158327
FR2823541	B1	2003-05-23	FR2823541
CA2443940	A1	2002-10-24	CA2443940
WO02/83497	A1	2002-10-24	WO200283497
FR2823541	A1	2002-10-18	FR2823541

**Abstract**

(EP1456081)

The invention concerns a device having the shape of a spiral and/or helical slot cylindrical cavity (15) for reducing induced drag, tip **vortex** and to increase lift-drag ratio. The device securely fixed to the wing tip (10) or securely articulated to said wing tip, can be adapted to all profiles, in particular to aeroplane wings, to gliders, to helicopter blades and to driving, pusher or propelled airscrew tips such as wind **turbine** blades or for craft such as boats or submarines using lift or steering in their three-axis movement, vertical, horizontal and yawing. For existing rates of efficiency, the invention enables the use of low traction systems, longer and faster trips while consuming less energy or while producing more as with wind turbines for example, the use of greater loads, the increase and approach of aerodrome or airport transit/landing/take-off traffic

more safely. When used in reverse (active surface/passive surface) on high-speed land vehicles or racing cars, said device fixed to each wing tip, produces a result inversely proportional to its speed. The faster the vehicle runs the less drag it produces and the more it adheres to the ground.

Inventors

HUGUES CHRISTIAN

Latest standardized assignees - inventors removed

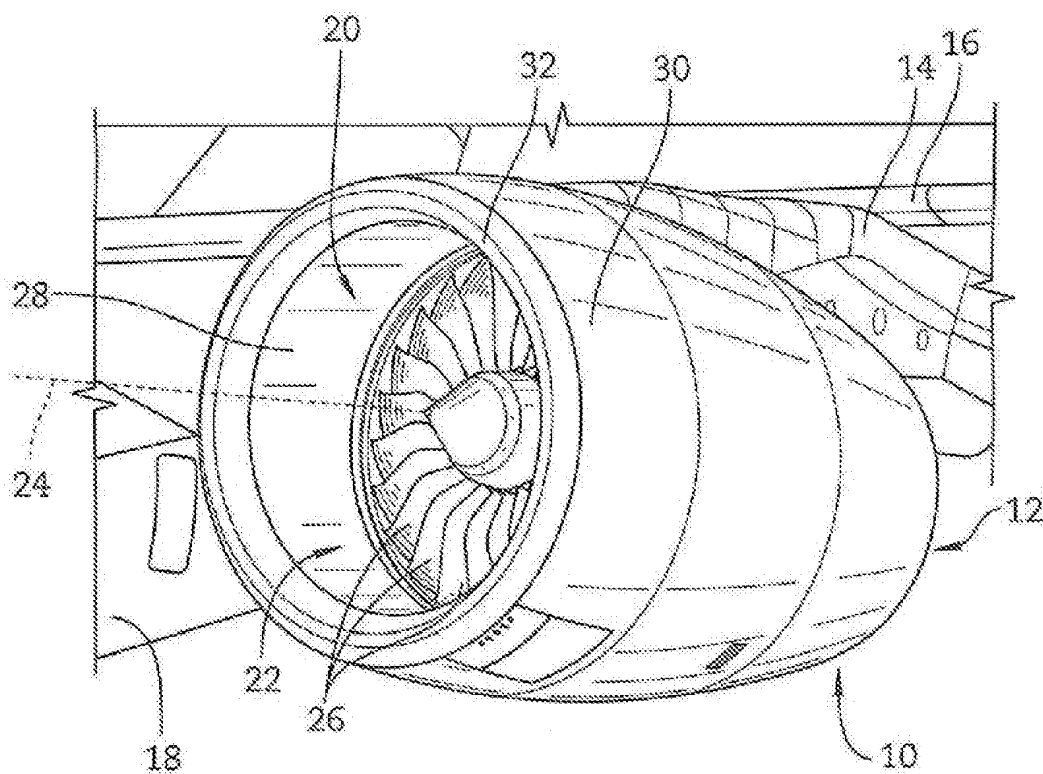
CHRISTIAN HUGUES

Family 15/31 - FAMPAT - ©Questel

Title

(EP3002210)

Engine nacelle

Images**Publication numbers with kind code & date**

EP3002210	B1	2019-12-18	EP3002210
US10072511	B2	2018-09-11	US10072511
US20160097290	A1	2016-04-07	US20160097290
EP3002210	A1	2016-04-06	EP3002210

**Abstract**

(EP3002210)

A nacelle for a gas **turbine** jet engine (10) for an aircraft includes **flow** disruptors (42, 46, 48, 64) to provide boundary layer turbulence when the engine is exposed to **air flow** that is obtuse to direction of travel of the engine.

Inventors

FULAYTER ROY DAVID

SMITH III CRAWFORD F

Latest standardized assignees - inventors removed

ROLLS ROYCE

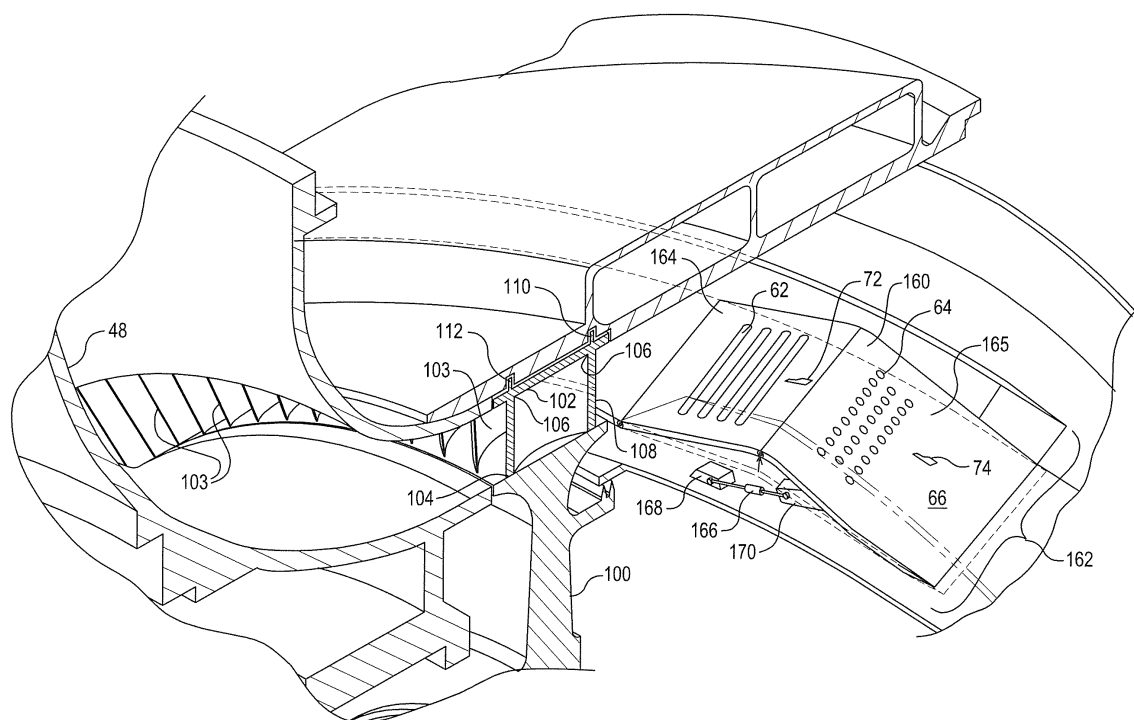
ROLLS ROYCE NORTH AMERICAN TECHNOLOGIES

Family 16/31 - FAMPAT - ©Questel

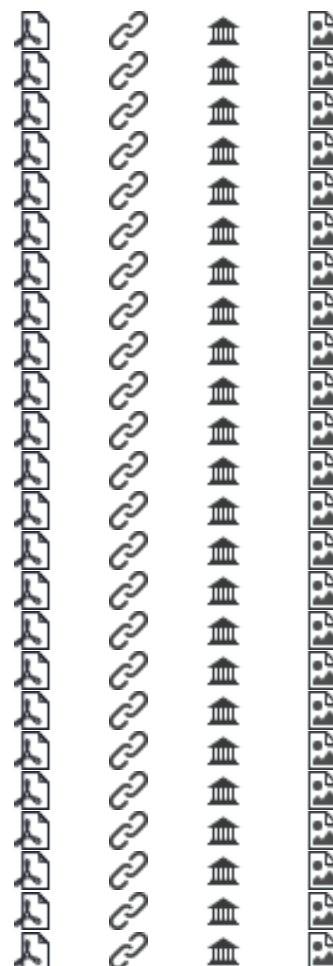
Title

(WO201309639)

Supersonic compressor

Images**Publication numbers with kind code & date**

US20160281722	A1	2016-09-29	US20160281722
US9309893	B2	2016-04-12	US9309893
CN203146362	U	2013-08-21	CN203146362U
CN203146419	U	2013-08-21	CN203146419U
US20130164120	A1	2013-06-27	US20130164120
US20130164121	A1	2013-06-27	US20130164121
CN202991533	U	2013-06-12	CN202991533U
CN202991534	U	2013-06-12	CN202991534U
US20130142632	A1	2013-06-06	US20130142632
CN202937553	U	2013-05-15	CN202937553U
WO2013/009646	A3	2013-05-02	WO201309646
CN103047154	A	2013-04-17	CN103047154
CN103032345	A	2013-04-10	CN103032345
WO2013/009644	A3	2013-04-04	WO201309644
WO2013/009643	A3	2013-03-28	WO201309643
WO2013/009642	A3	2013-03-21	WO201309642
WO2013/009639	A3	2013-03-07	WO201309639
US20130039748	A1	2013-02-14	US20130039748
WO2013/009639	A2	2013-01-17	WO201309639
WO2013/009642	A2	2013-01-17	WO201309642
WO2013/009643	A2	2013-01-17	WO201309643
WO2013/009644	A2	2013-01-17	WO201309644
WO2013/009646	A2	2013-01-17	WO201309646
CN102865234	A	2013-01-09	CN102865234



[CN102865247](#)

A

2013-01-09

CN102865247

[CN102865274](#)

A

2013-01-09

CN102865274

Abstract

(WO2013/009639)

A supersonic compressor including a rotor to deliver a gas at supersonic conditions to a diffuser. The diffuser includes a plurality of aerodynamic ducts that have converging and diverging portions, for deceleration of gas to subsonic conditions and then for expansion of subsonic gas, to change kinetic energy of the gas to static pressure. The aerodynamic ducts include **vortex** generating structures for controlling boundary layer, and structures for changing the effective contraction ratio to enable starting even when the aerodynamic ducts are designed for high pressure ratios, and structures for boundary layer control. In an embodiment, aerodynamic ducts are provided having an aspect ratio of in excess of two to one, when viewed in cross-section orthogonal to **flow** direction at an entrance to the aerodynamic duct.

Inventors

ROBERTS WILLIAM BRYRON

LAWLOR SHAWN P

BREIDENTHAL ROBERT E

Latest standardized assignees - inventors removed

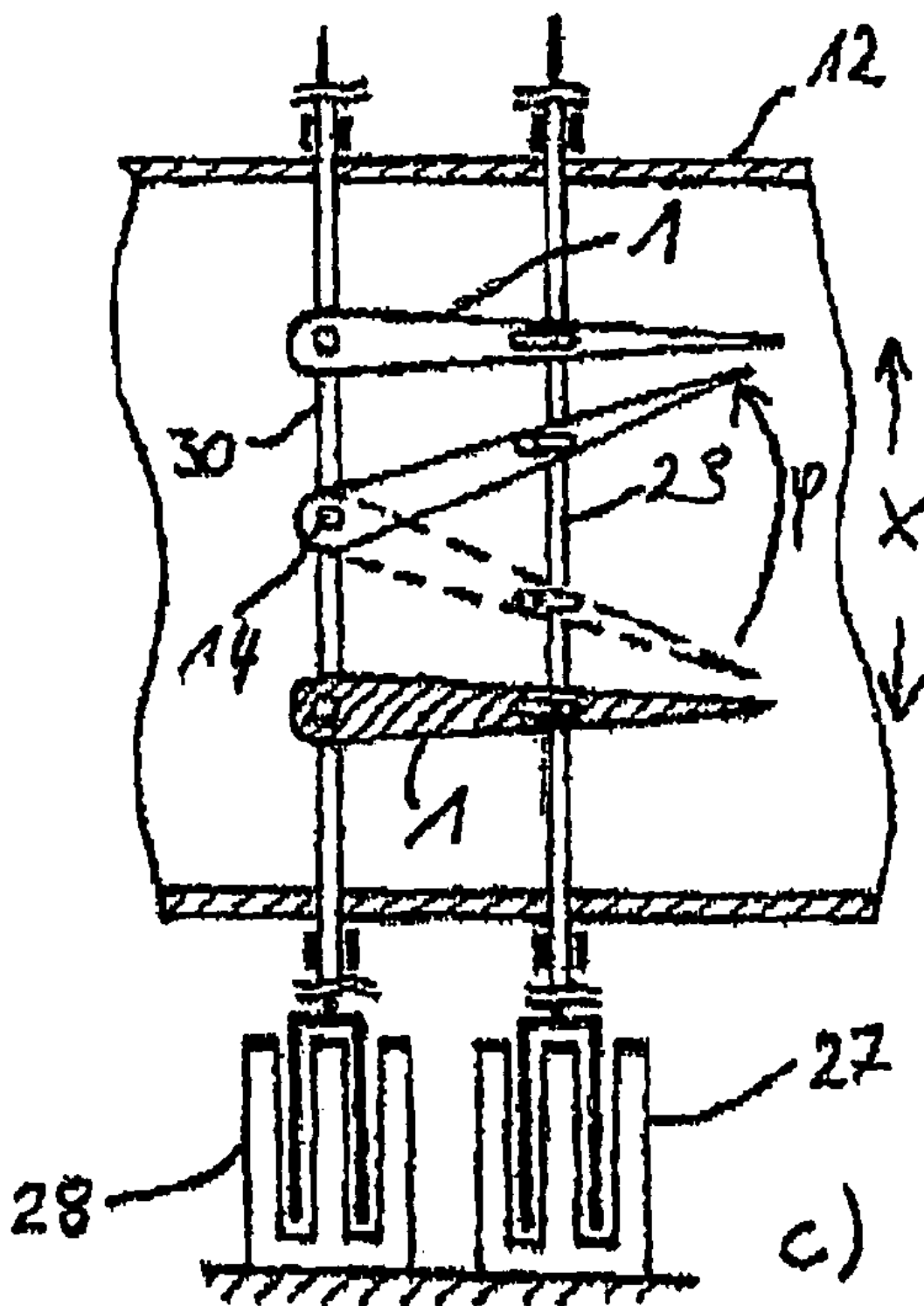
DRESSER RAND

Family 17/31 - FAMPAT - ©Questel

Title

(EP1529169)

Device for the generation of eddies and method for operation of said device

Images**Publication numbers with kind code & date**

ES2326219	T3	2009-10-05	ES2326219
DE50311668	D1	2009-08-13	DE50311668
EP1529169	B1	2009-07-01	EP1529169
US7431244	B2	2008-10-07	US7431244



CN1325807	C	2007-07-11	CN1325807C				
US20060102799	A1	2006-05-18	US20060102799				
CN1668853	A	2005-09-14	CN1668853				
EP1529169	A1	2005-05-11	EP1529169				
WO2004/020841	A1	2004-03-11	WO200420841				
DE10237341	A1	2004-02-26	DE10237341				

Abstract

(EP1529169)

According to the invention, a device for the generation of eddies creates or destroys eddies in a flowing medium (S) in a particularly simple manner, with particularly low energy requirement with the lowest possible pressure drop, whereby the device comprises one or more profiles (1), for the flowing medium (S) to **flow** around, which are provided with an external drive for a periodic movement relative to the flowing medium (S) with an angular frequency O. The profiles (1) are thus periodically displaced with an angular frequency O by an external drive.

Inventors

LIEBE ROLAND

LIEBE WOLFGANG

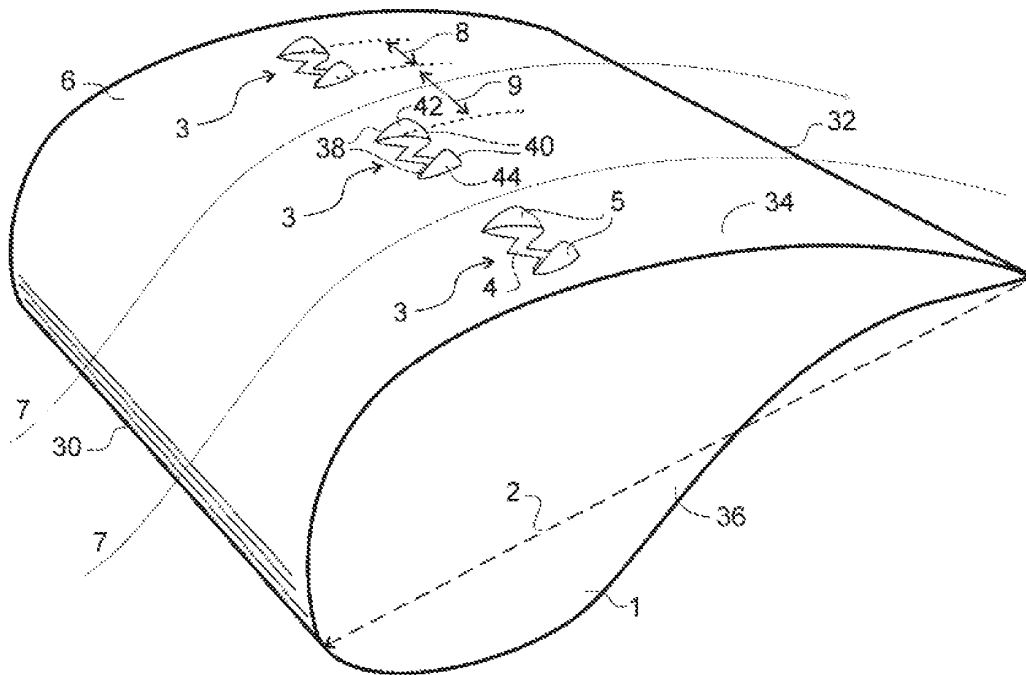
Latest standardized assignees - inventors removed

SIEMENS

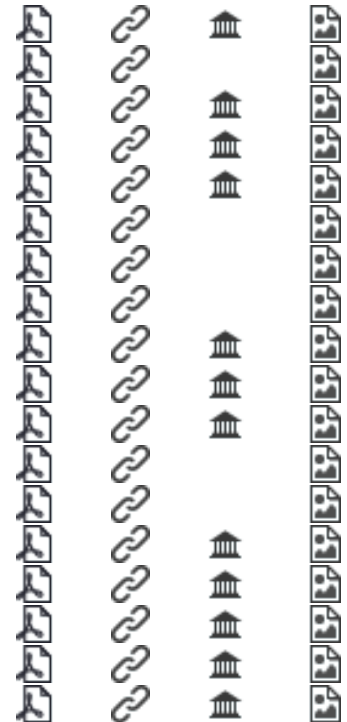
Family 18/31 - FAMPAT - ©Questel

Title

(EP3597902)

Vortex generator for a wind **turbine****Images****Publication numbers with kind code & date**

CN105556114	B	2020-06-05	CN105556114B
HUE046566	T2	2020-03-30	HUE046566
ES2742414	T3	2020-02-14	ES2742414
EP3597902	A1	2020-01-22	EP3597902
US20200018285	A1	2020-01-16	US20200018285
PL3042073	T3	2019-12-31	PL3042073
SI3042073	T1	2019-12-31	SI3042073T
HRP20191399	T1	2019-11-15	HRP20191399
PT3042073	T	2019-10-30	PT3042073T
US10443562	B2	2019-10-15	US10443562
DK3042073	T3	2019-10-14	DK3042073T
LT3042073	T	2019-10-10	LT3042073
RS59138	B1	2019-09-30	RS--59138
EP3042073	B1	2019-07-31	EP3042073
US20160215758	A1	2016-07-28	US20160215758
EP3042073	A1	2016-07-13	EP3042073
CN105556114	A	2016-05-04	CN105556114
WO2015/030573	A1	2015-03-05	WO201530573

**Abstract**

(EP3597902)

The invention concerns a blade for a wind **turbine** comprising an airfoil with a thickness of at least 20% and in particular at least 25% comprising a **vortex** generator pair between chordwise position 20%c and 70%c, said **vortex** generator pair comprising 2 not directly connected fins and a base which interconnects said fins and where said fins are placed under opposite angles of attack, characterized in that said fins are cambered by at least 1% in particular by at least 2% and more

particularly by a least 3% of the fin chord. According to an embodiment of the invention the base of the **vortex** generator pair is W-shaped, the fins of a pair are designed to generate contrarotating vortices and the distance between the suction sides of the fins is approximately 150% of that between the pressure sides and the trailing part of the fins is rounded so that non- concentrated vortices are generated.

Inventors

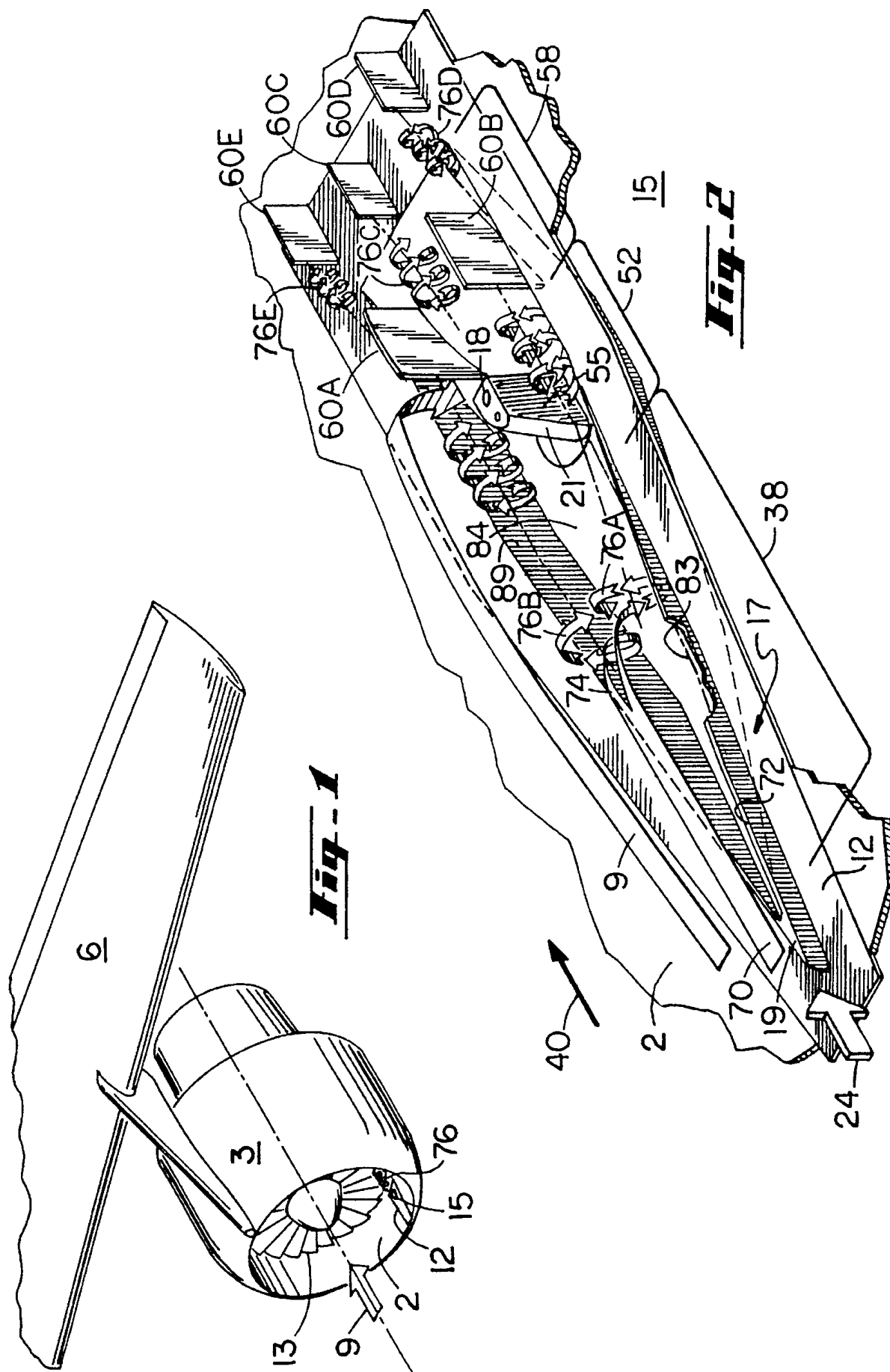
CORTEN GUSTAVE PAUL

Latest standardized assignees - inventors removed

CORTENERGY

WOBBEN PROPERTIES

Images



Publication numbers with kind code & date

US5517865	A	1996-05-21	US5517865
JP05187960	A	1993-07-27	JP05187960
EP0518592	A1	1992-12-16	EP-518592
CA2068110	A1	1992-12-14	CA2068110

**Abstract**

(EP0518592)

A **vortex** suppressing **flow** eductor apparatus having a **vortex** filament producing **flow** eductor (17) is provided with corresponding **vortex** destroying plates (60) positioned and extending sufficiently downstream from a point within educted **flow** and deep enough into the **vortex** filament (76) so as to essentially destroy the **vortex** filament. A particular embodiment provides a freestream sensor scoop (21), for use in an aircraft gas **turbine** engine inlet (2), having an eductor diffusing channel (38) and a fairing (19) surrounding a forward portion of the diffusing channel. A sensor supporting mast (21) is provided for helping to measure freestream **air** characteristics. **Vortex** destroying plates (60) are provided for suppressing **vortex** filaments generated by the channel, fairing, and mast. <IMAGE>

Inventors

WISLER DAVID CHARLES

SHIN HYOUN-WOO

Latest standardized assignees - inventors removed

GENERAL ELECTRIC

Family 20/31 - FAMPAT - ©Questel

Title

(US3090584)

Aircraft

Images

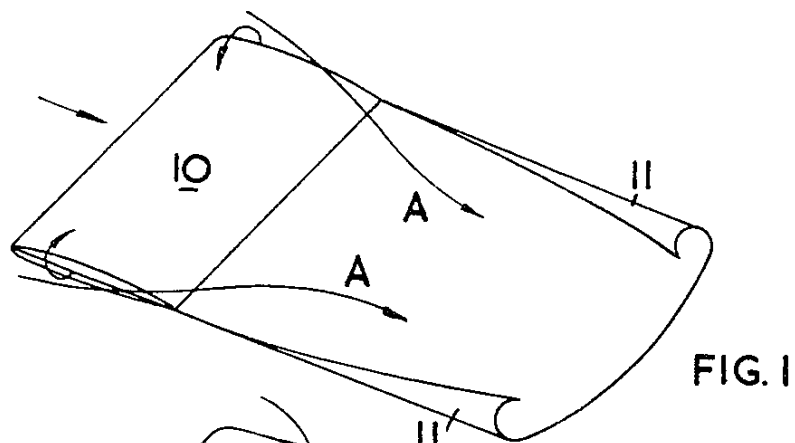


FIG. 1

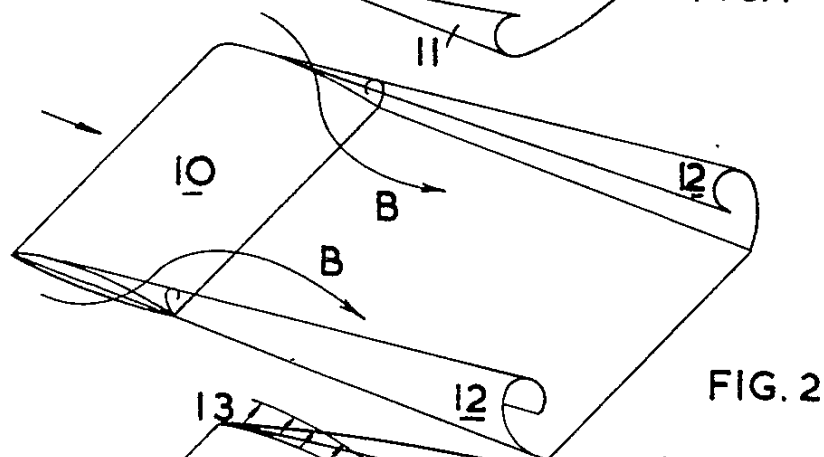


FIG. 2

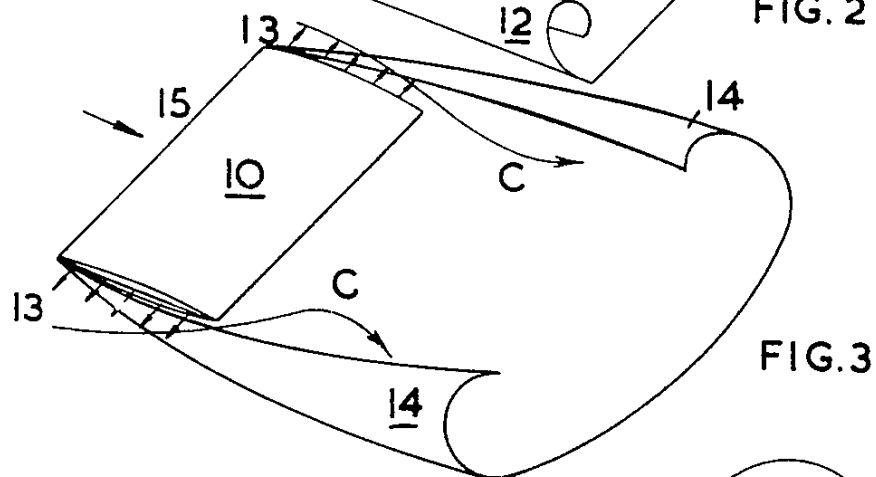


FIG. 3

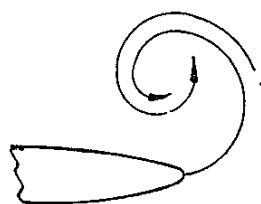


FIG. 5

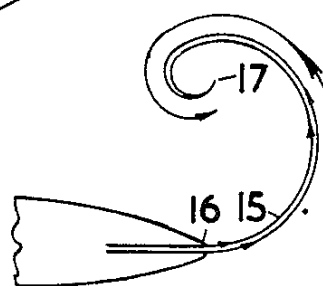


FIG. 4

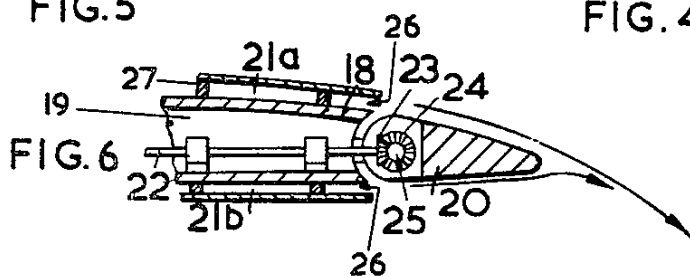


FIG. 6

Inventors
Dietrich Kuchemann,
Geoffrey M. Lilley & Eric C. Maskell
By Stevens, Davis, Miller & Mosher
Attorneys

Publication numbers with kind code & date

[US3090584](#) A 1963-05-21 US3090584

**Inventors**

DIETRICH KUCHEMANN

MICHAEL LILLEY GEOFFREY

CYRIL MASKELL ERIC

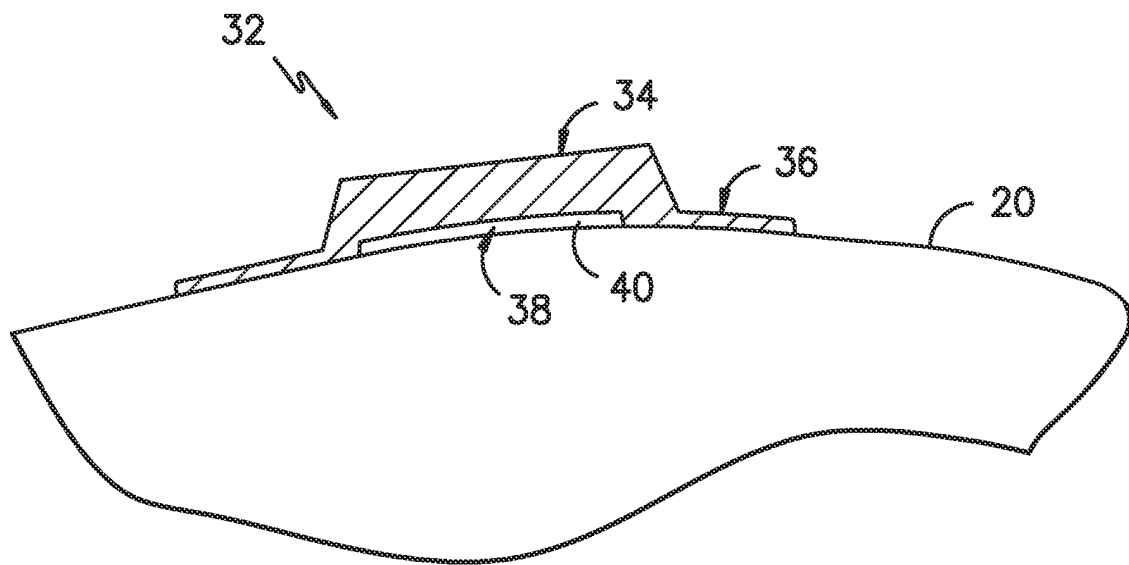
Latest standardized assignees - inventors removed

POWER JETS RESEARCH & DEVELOPMENT

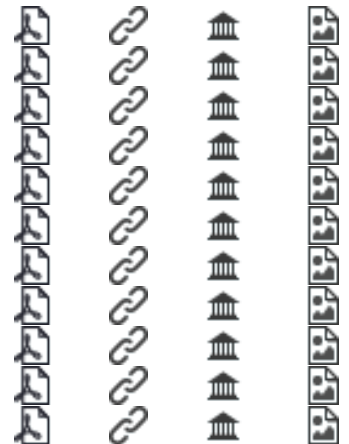
Family 21/31 - FAMPAT - ©Questel

Title

(EP3051125)

Vortex generator for a rotor blade**Images****Publication numbers with kind code & date**

CN105863955	B	2020-05-12	CN105863955B
ES2755501	T3	2020-04-22	ES2755501
CA2918917	C	2020-02-11	CA2918917
DK3051125	T3	2019-11-18	DK3051125T
EP3051125	B1	2019-08-21	EP3051125
US10087912	B2	2018-10-02	US10087912
IN201644002809	A	2016-08-31	IN201644002809
CN105863955	A	2016-08-17	CN105863955
US20160222941	A1	2016-08-04	US20160222941
EP3051125	A1	2016-08-03	EP3051125
CA2918917	A1	2016-07-30	CA2918917

**Abstract**

(EP3051125)

Universal **vortex** generators 32 for wind **turbine** rotor blades 16 and methods of manufacturing same are disclosed. The **vortex** generator 32 includes a base portion 36 configured for attachment to at least one of a suction side surface 20 or a pressure side surface 22 of the rotor blade 16 and at least one airflow modifying element 34 extending from the base portion 36. In addition, the airflow modifying element 34 includes one or more discontinuities 38 configured therein so as to increase flexibility of the **vortex** generator 32.

Inventors

TOBIN JAMES ROBERT

HERR STEFAN

RIDDELL SCOTT GABELL

BOOTH MICHAEL CHRISTOPHER

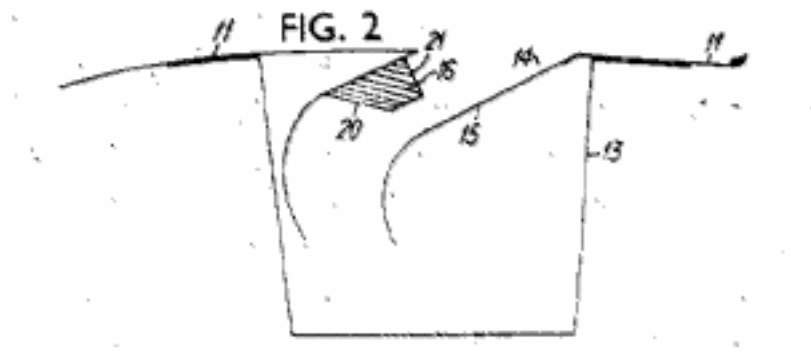
Latest standardized assignees - inventors removed

GENERAL ELECTRIC

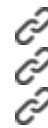
Family 22/31 - FAMPAT - ©Questel

Title

(US3525486)

Vortex generators**Images****Publication numbers with kind code & date**

US3525486	A	1970-08-25	US3525486
GB1183714	A	1970-03-11	GB1183714
DE1481583	A1	1969-03-27	DE1481583

**Abstract**

(US3525486)

1,183,714. Boundary layer control. HAWKER SIDDELEY AVIATION Ltd. 20 Feb., 1967 [22 Feb., 1966], No. 7788/66. Heading F2R. The boundary layer of a **flow** of **air** past a surface 11 (e.g. of an aerofoil or a gas **turbine air** intake) is controlled by a stream of **air** injected from a duct 14, the **air** stream being made to swirl, e.g. by a fin 16 which lies in a helical plane with respect to the duct 14. There may be a series of ducts 14 across the surface each fed by pressurized **air** from a common channel 13, the **air** stream from each duct swirling in the opposite direction to the next adjacent stream. The swirling airstream is a **vortex** which is stated to impart energy from the main airflow to the boundary layer, thereby reducing a thickening of the boundary layer and reducing the tendency for the **flow** to break away from the surface.

(From GB1183714 A)

Inventors

WIMPENNY JOHN CECIL

Latest standardized assignees - inventors removed

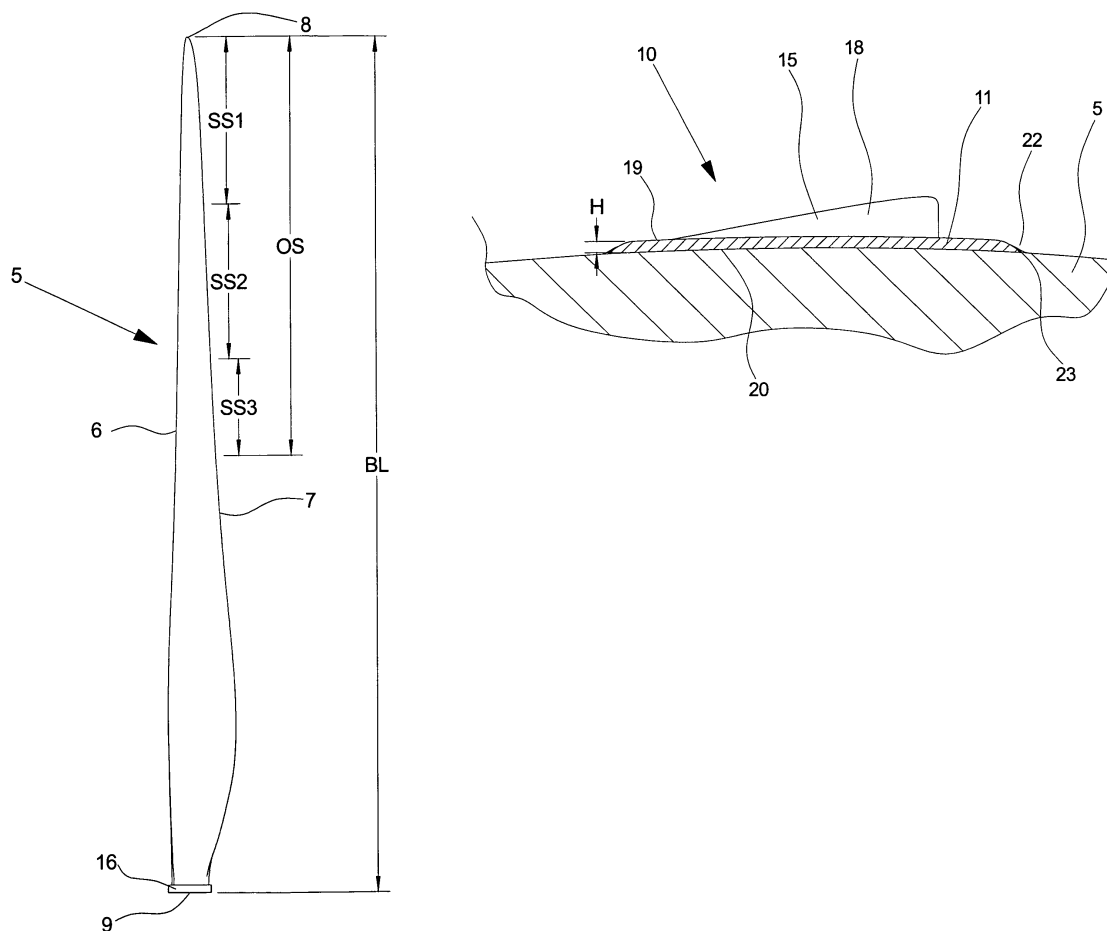
HAWKER SIDDELEY AVIATION

Family 23/31 - FAMPAT - ©Questel

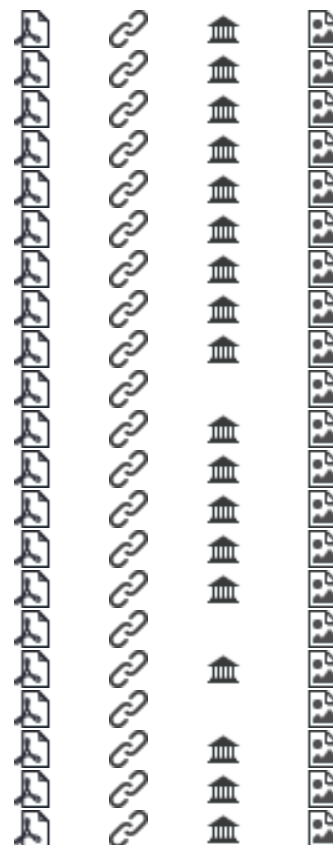
Title

(EP2027390)

A wind turbine blade and a pitch controlled wind turbine

Images**Publication numbers with kind code & date**

EP2027390	B2	2020-07-01	EP2027390
IN303529	B	2018-11-27	IN-303529
US8678746	B2	2014-03-25	US8678746
CA2654772	C	2013-09-24	CA2654772
US20120189444	A1	2012-07-26	US20120189444
ES2379159	T9	2012-06-25	ES2379159
US8162590	B2	2012-04-24	US8162590
ES2379159	T3	2012-04-23	ES2379159
BRPI0621730	A2	2011-12-20	BR200621730
AT537356	T	2011-12-15	ATE537356
EP2027390	B1	2011-12-14	EP2027390
CN101484692	B	2011-08-31	CN101484692B
CN101484692	A	2009-07-15	CN101484692
US20090087314	A1	2009-04-02	US20090087314
IN5106/KOLNP/2008	A	2009-03-27	IN2008KN05106
MX2008015664	A	2009-03-25	MX2008015664
EP2027390	A1	2009-02-25	EP2027390
AR061601	A1	2008-09-10	AR--61601
AU2006344292	A1	2007-12-13	AU2006344292
CA2654772	A1	2007-12-13	CA2654772
WO2007/140771	A1	2007-12-13	WO2007140771



Abstract

(EP2027390)

The invention relates to a wind **turbine** blade (5) comprising one or more turbulence generating strips (10), where the strips (10) are placed on a surface of the blade (5). The blade (5) is characterized in that at least one joint area (22) of the turbulence generating strips (10) and the surface of the blade (5) are completely or partially covered by sealing means (23). The invention further relates to a pitch controlled wind **turbine** (1) comprising at least two pitch controlled wind **turbine** blades (5) and pitch controlling means for pitching the blades (5). The pitch controlled wind **turbine** (1) is characterized in that the blades (5) comprises one or more turbulence generating strips (10), wherein at least one joint area (22) of the turbulence generating strips (10) and a surface of the blades (5) are completely or partially covered by sealing means (23).

Inventors

HAAG MICHAEL DRACHMANN

Latest standardized assignees - inventors removed

VESTAS WIND SYSTEMS

Family 24/31 - FAMPAT - ©Questel

Title

(US3578264)

Boundary layer control of flow separation and heat exchange

Images

3 Sheets-Sheet 1

FIG-1

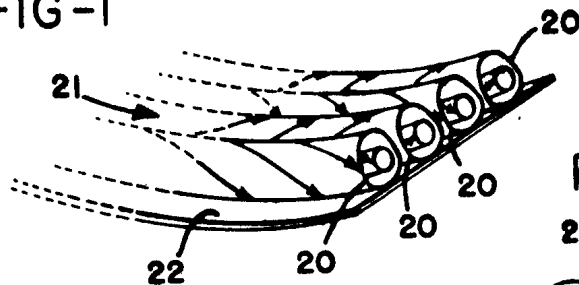


FIG-2

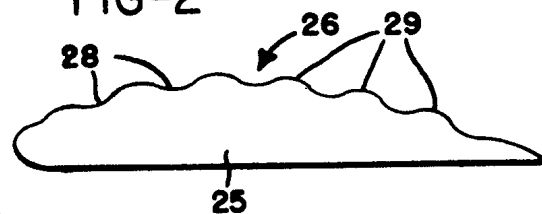


FIG-3

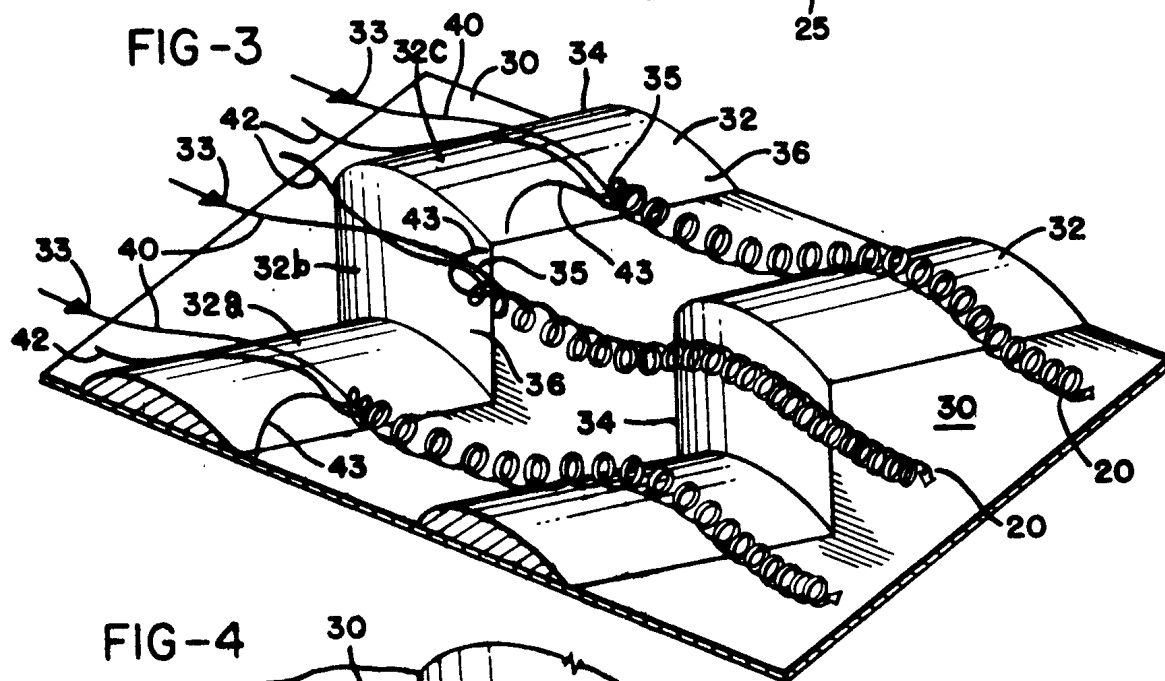


FIG-4

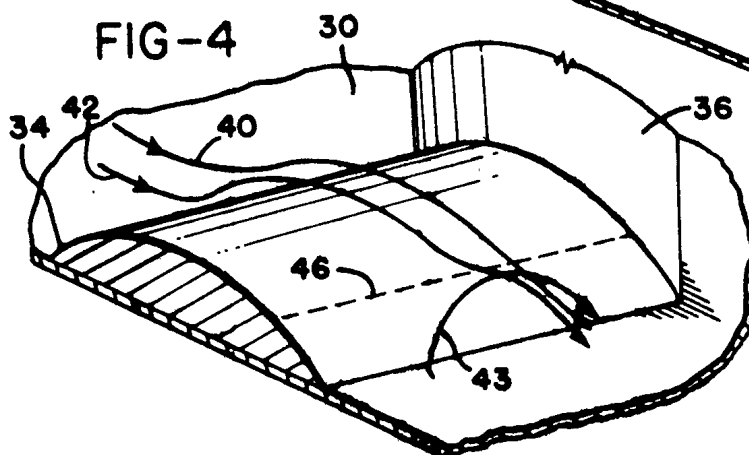


FIG-4A

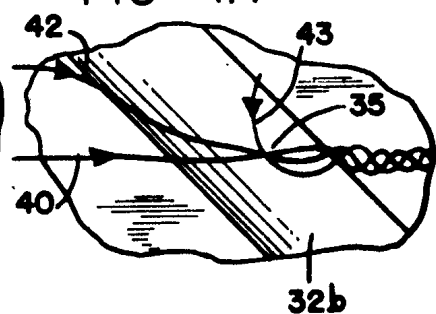
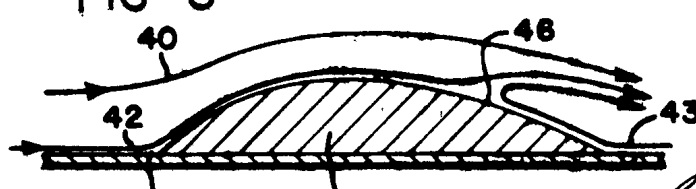


FIG-5



INVENTOR

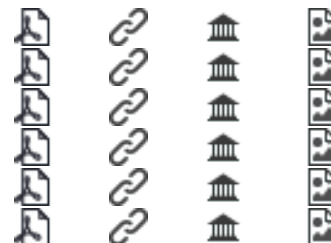
ARNOLD M. KUETHE

BY
AM

11A'D171R

Publication numbers with kind code & date

US3578264	B1	1991-11-19	US3578264
GB1281899	A	1972-07-19	GB1281899
US3578264	A	1971-05-11	US3578264
FR2012571	A	1970-03-20	FR2012571
FR2012571	A1	1970-03-20	FR2012571
DE1934246	A1	1970-01-22	DE1934246

**Abstract**

(US3578264)

Boundary layer control for delay or prevention of **flow** separation and/or increase in rate of heat exchange between a surface and a fluid by an arrangement of surface elements which may take the form of either crests or discrete concave depressions in the surface, having effective depths or dimensions of less than that of the adjacent boundary layer thickness, to cause the formation of vortices with succeeded surface elements being positioned to cause **vortex** amplification, for effective boundary layer mixing with less drag, weight penalty, noise, and energy loss than that of conventional vane-type generators.

Inventors

ARNOLD M KUETHE

Latest standardized assignees - inventors removed

UNIVERSITY OF MICHIGAN

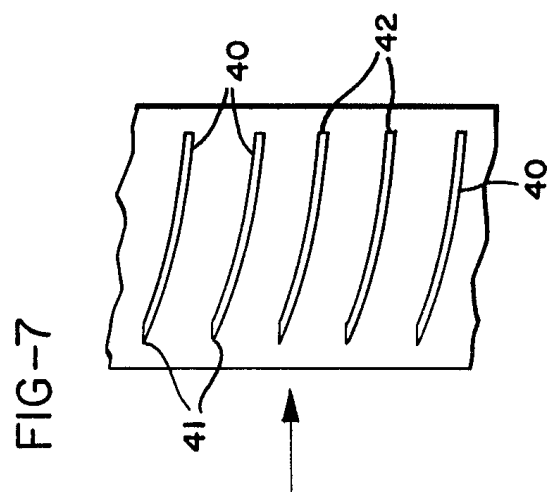
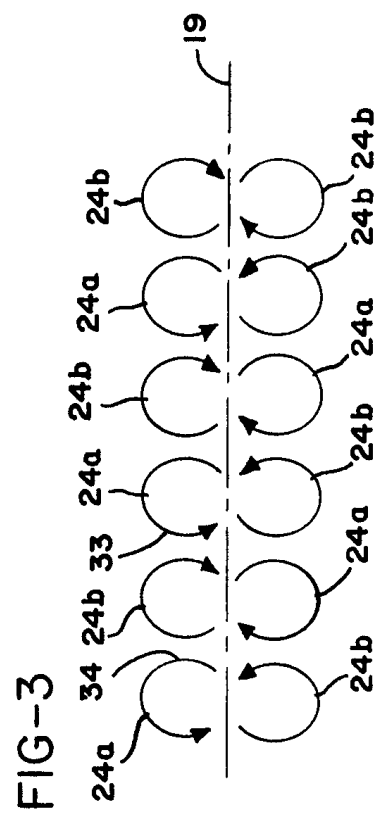
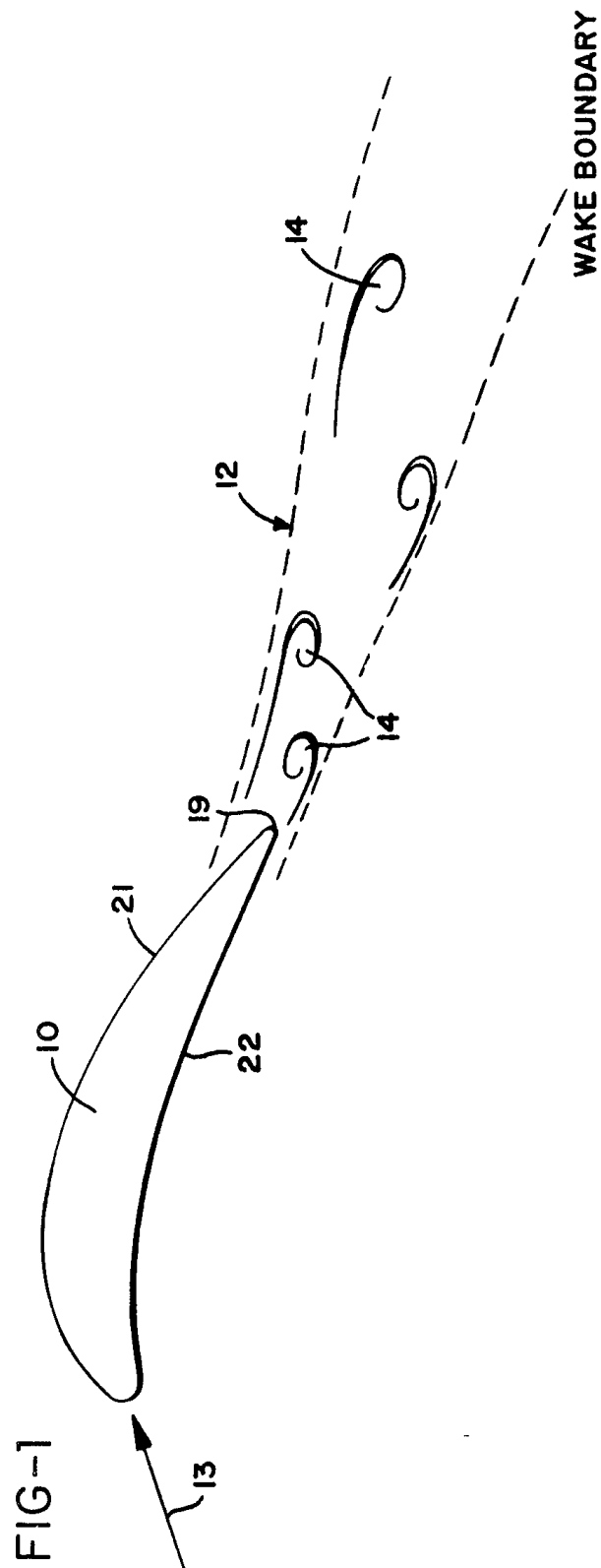
Family 26/31 - FAMPAT - ©Questel

Title

(US3776363)

Control of noise and instabilities in jet engines, compressors, turbines, heat exchangers and the like

Images



INVENTOR

ARNOLD M. KUETHE

BY



(US3776363)

Intrinsic sound, noise and instabilities directly or indirectly due to the shedding of cross-stream vortices caused when **air** or fluid moves over the trailing edge of a plate, blade, vane or the like are reduced by the formation of relatively steady-state streamwise vortices upstream of the terminal edge. The invention is applied to **turbine** and compressor blades, jet tube inlets and exits, heat-exchanger tubes and the like by placing or forming streamwise **vortex**-inducing generators within the boundary layer on the shedding item so that the induced streamwise vortices trail off of the trailing edge and suppress the formation of cross-stream disturbances. Through this process, noise disturbances which would otherwise amplify to high sound intensities and/or large **flow** disturbances, high structural stresses and loss of efficiency through passage over successive shedding items are suppressed in their early stages of development.

Inventors

KUETHE A

Latest standardized assignees - inventors removed

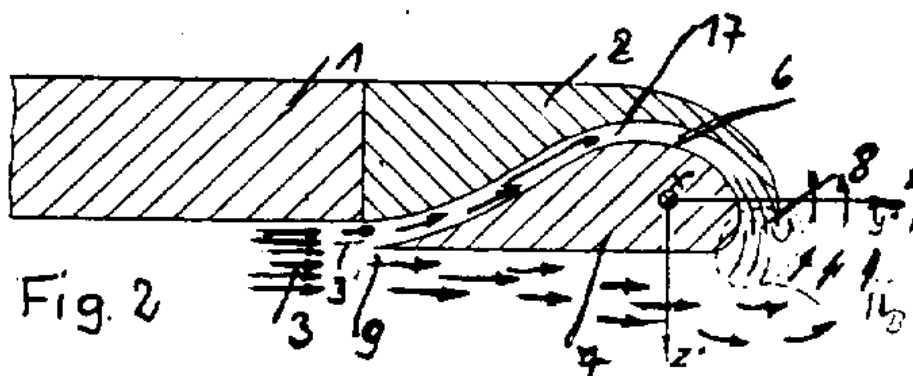
UNIVERSITY OF MICHIGAN

Family 27/31 - FAMPAT - ©Questel

Title

(DE3836673)

Method and arrangement for reducing the induced drag of a wing

Images**Publication numbers with kind code & date**

DE3836673	C2	1993-09-16	DE3836673
DE3836673	A1	1990-05-03	DE3836673

**Abstract**

(DE3836673)

In order to reduce the induced drag of a wing over which **flow** passes it is provided that an element (3') of the lateral **flow** (3) is deflected at the end (2) of the wing through a gap on the underneath of the wing (1) into a guide duct (6). In this guide duct (6), the element of the lateral **flow** (3) is diverted at its outlet (8) on the underneath of the wing (1) such that it is directed downwards, so that a rotational impulse is produced which opposes the normal **vortex**. <IMAGE>

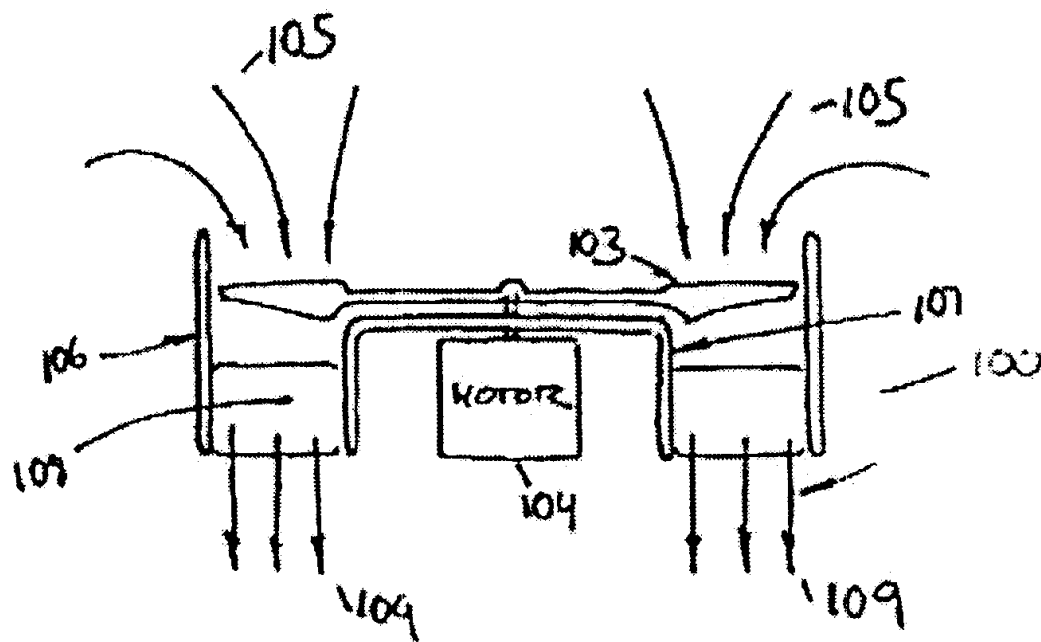
Inventors

HARRIEHAUSEN, MICHAEL, 2000 HAMBURG, DE

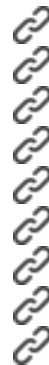
Family 28/31 - FAMPAT - ©Questel

Title

(US6543726)

Fluid **flow** straightening techniques**Images****Publication numbers with kind code & date**

US6729839	B1	2004-05-04	US6729839
US6687951	B2	2004-02-10	US6687951
US6543726	B2	2003-04-08	US6543726
US6520449	B2	2003-02-18	US6520449
US6464459	B2	2002-10-15	US6464459
US20020047071	A1	2002-04-25	US20020047071
US20020020035	A1	2002-02-21	US20020020035
US20010048052	A1	2001-12-06	US20010048052
US20010036406	A1	2001-11-01	US20010036406

**Abstract**

(US20010036406)

Contra-rotating members are used for straightening a fluid **flow**. The members may take the form of propellers, fans or impellers. The contra-rotation eliminates tangential **flow** components, and most importantly, eliminates cylindrical vortices. The present invention finds specific use in applications in which toroidal vortices are employed and/or generated.

Inventors

ILLINGWORTH LEWIS

Latest standardized assignees - inventors removed

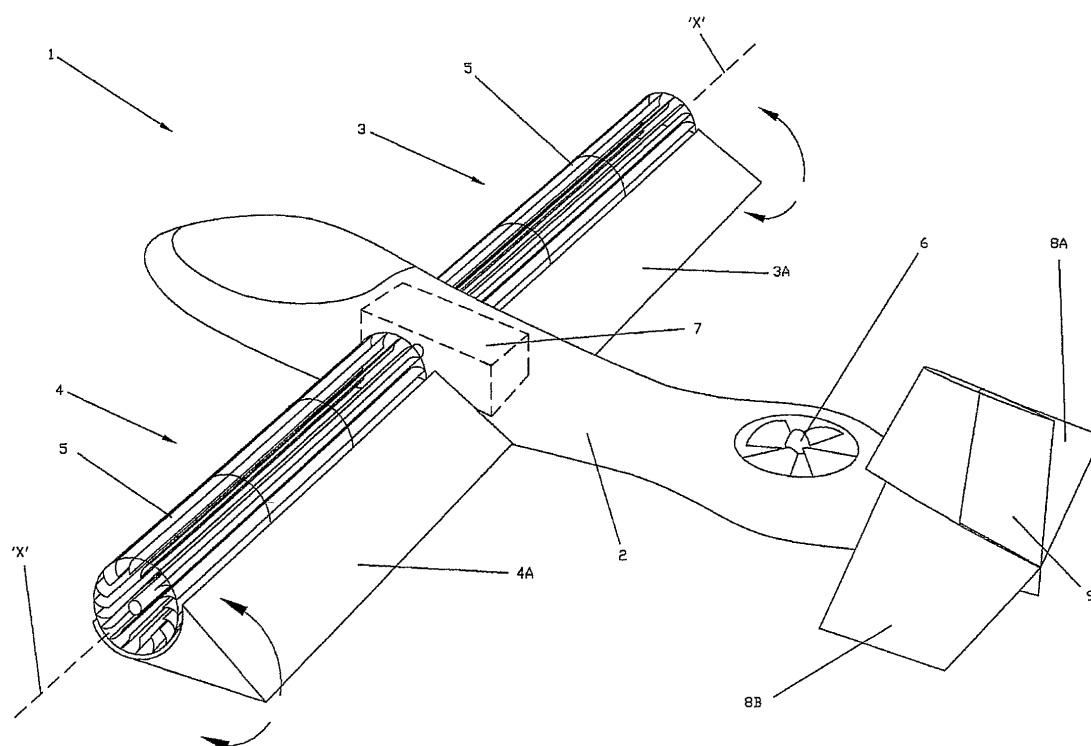
DMR HOLDING

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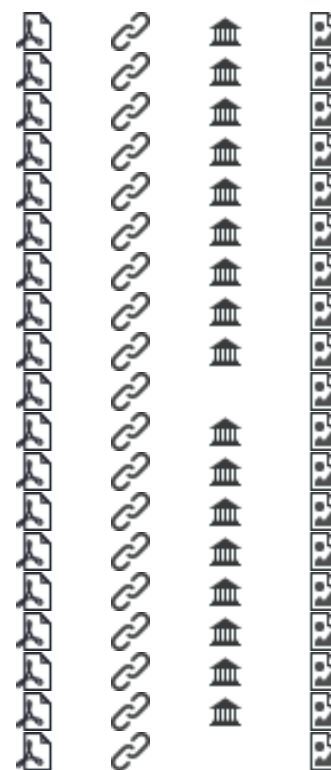
Title

(EP2004484)

Aircraft with aerodynamic lift generating device

Images**Publication numbers with kind code & date**

IN295799	B	2018-04-16	IN-295799
CA2682372	C	2016-06-07	CA2682372
US8448905	B2	2013-05-28	US8448905
AU2007232413	B2	2013-01-17	AU2007232413
CN101405182	B	2012-10-10	CN101405182B
IL194268	B	2012-01-31	IL-194268
US20110101173	A1	2011-05-05	US20110101173
DE602007006292	D1	2010-06-17	DE602007006292
EP2004484	B8	2010-06-16	EP2004484
AT466766	T	2010-05-15	ATE466766
EP2004484	B1	2010-05-05	EP2004484
CN101405182	A	2009-04-08	CN101405182
IN9117/DELNP/2008	A	2009-03-20	IN2008DN09117
EP2004484	A2	2008-12-24	EP2004484
WO2007/113525	A3	2007-11-29	WO2007113525
AU2007232413	A1	2007-10-11	AU2007232413
CA2682372	A1	2007-10-11	CA2682372
WO2007/113525	A2	2007-10-11	WO2007113525
GB0606518	D0	2006-05-10	GB200606518

**Abstract**

(EP2004484)

An aircraft (1) comprising: a fuselage (2), opposing wings (3, 4) either side of the fuselage (2), each wing (3, 4) supports at least one tangential **flow** rotor (5) and has a rotational axis. At least one tail section (3A) is disposed on each wing (3, 4) for

forming a wing trailing edge. The tail sections (3A) are moveable about the, or each, rotor axis (X) relative to the fuselage (2) so as to provide, in use of said aircraft (1), variable thrust forces, whereby in use, movement of the or each tail section (3A) controls the flight of the aircraft (1). Lift is generated by way of a shroud (12) which forms an extension to the tail section (3A) curved surface or cowl to jointly cover a proportion of the circumference of the rotor. Ideally the shroud (12) and tail section curved surfaces create a **vortex** chamber generally within the rotor. An alternative embodiment includes a vertical axis fan (6) is provided on the fuselage (2) to adjust aircraft "pitch".

Inventors

PEEBLES PATRICK WILLIAM

Latest standardized assignees - inventors removed

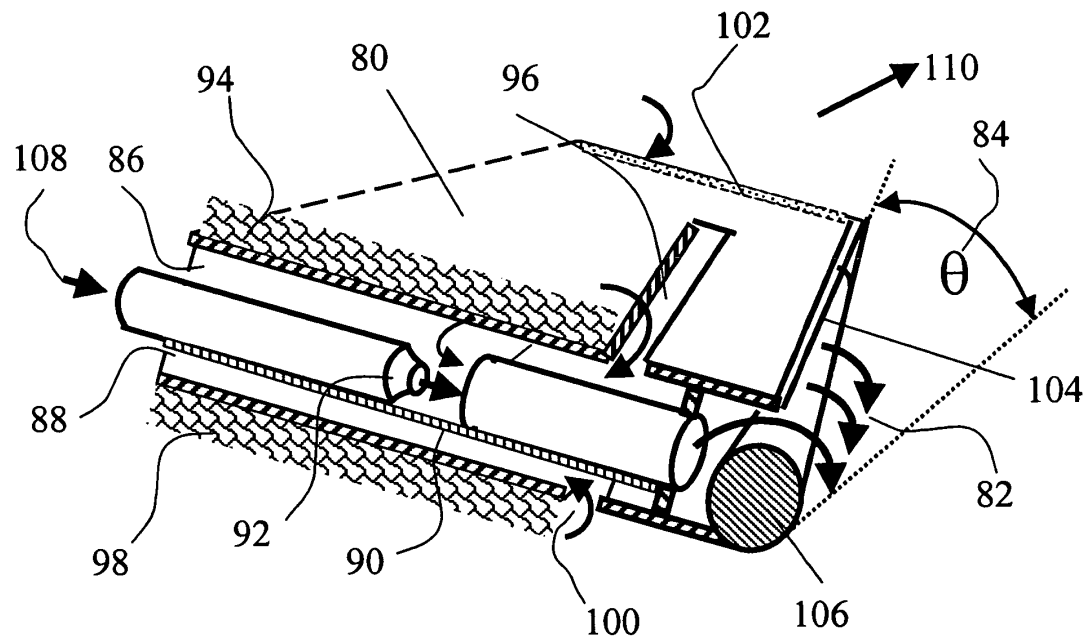
FANWING

Family 30/31 - FAMPAT - ©Questel

Title

(US7134631)

Vorticity cancellation at trailing edge for induced drag elimination

Images**Publication numbers with kind code & date**[US7134631](#)

B2 2006-11-14

US7134631

[US20060006290](#)

A1 2006-01-12

US20060006290

**Abstract**

(US20060006290)

Wing tip vortices are evident from airliner vapor trails, and helicopter blade slap. Elliptically loaded high aspect ratio tapered wings have minimum induced drag but cannot eliminate it. Different methods are disclosed herein, for upper and lower surface boundary layers to cancel their opposing vorticity upon shedding from the trailing edge, thereby eliminating wake vorticity, induced drag and associated noise. This requires wing-rotor-propeller or fan blades with a platform designed for uniform bound circulation and with boundary layer control near the tip. In addition this requires special techniques to counter span-wise pressure gradients, such as tip circulation control blowing or an upwind small propeller or wind turbine on each tip. These techniques can eliminate wake vorticity with its induced drag, noise, flying on the backside of the power curve and the option for asymmetric loading by pneumatic means to eliminate need for cyclic pitch control or conventional ailerons.

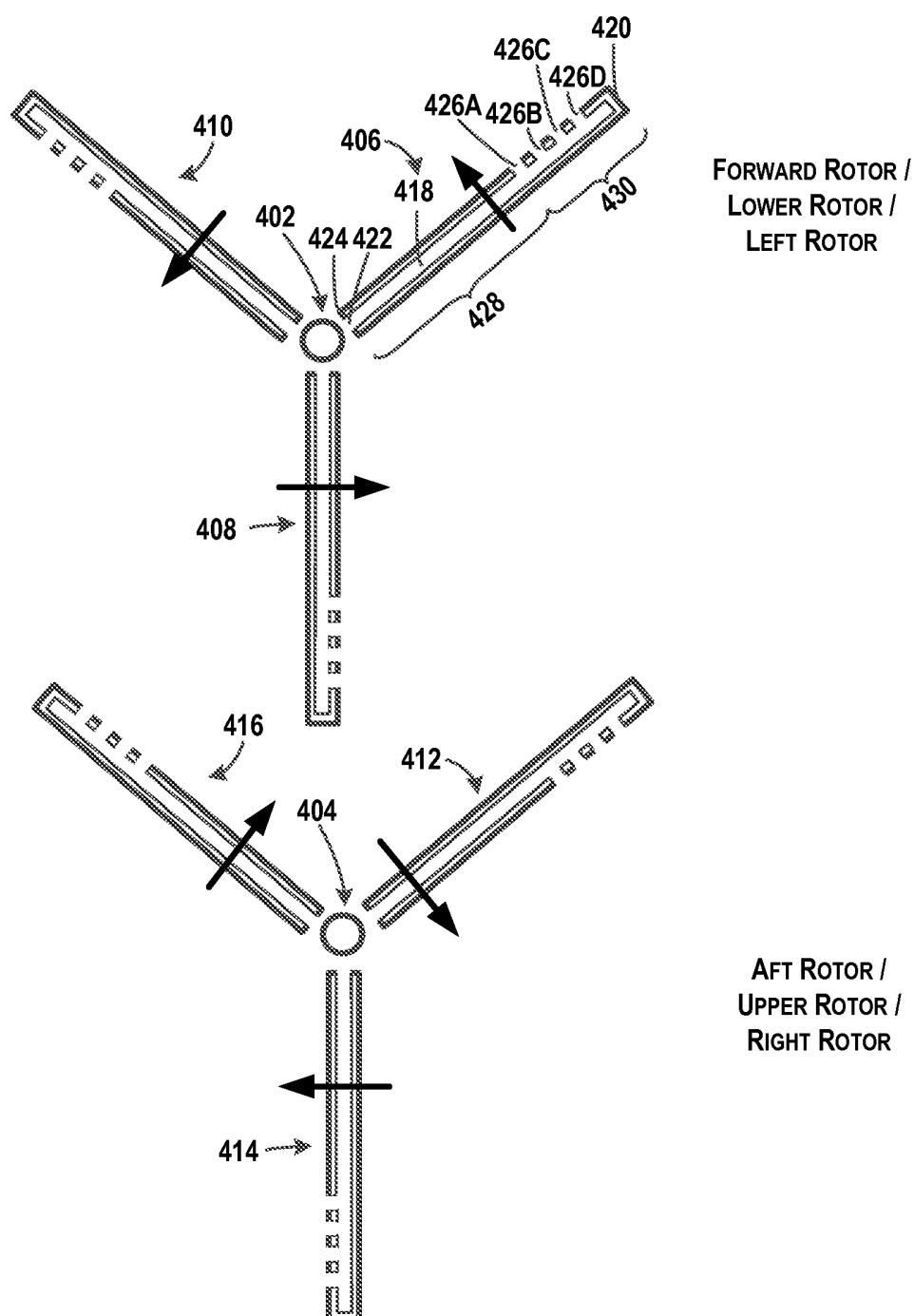
Inventors

LOTH JOHN L

Family 31/31 - FAMPAT - ©Questel

Title

(US10302064)

Methods and systems for rotary wing active **flow** control**Images****Publication numbers with kind code & date**[US10302064](#)

B2 2019-05-28

US10302064

[US20170029102](#)

A1 2017-02-02

US20170029102

**Abstract**

(US20170029102)

Within examples, systems for enhanced performance blades for rotor craft are provided and methods for operation. An example system for a rotary device is provided comprising a rotor blade coupled to a rotor hub. The system also comprises an **air** channel disposed within the rotor blade, where the **air** channel is sealed proximate to a distal end of the rotor blade.

The system also comprises an inlet positioned at a proximal end of the rotor blade, where the inlet is in fluid communication with the **air** channel. The system also comprises a plurality of outlets positioned along the rotor blade, where each of the plurality of outlets are in fluid communication with the **air** channel.

Inventors

CLINGMAN DANIEL J

MALLARI RANDY LEE M

Latest standardized assignees - inventors removed

BOEING