TELEPHONE: 64-0[illegible]
CABLE AND TELEGRAPHIC ADDRESS:
"AERORESEARCH MELBOURNE"
CORRESPONDENCE SHOULD BE ADDRESSED
"THE CHIEF SUPERINTENDENT"
BOX 4331, G.P.O., MELBOURNE

In reply refer to E3. 10

Your Ref.555/6/8

COMMONWEALTH OF AUSTRALIA
DEPARTMENT OF SUPPLY

AERONAUTICAL RESEARCH LABORATORIES
506 LORIMER STREET,
FISHERMEN'S BEND.

23 MAY 1966

Secretary,
Department of Air,
CANBERRA. A.C.T.

AIRCRAFT DESIGN PROPOSED BY SQN.LDR.G.L.WALLER
FEASIBILITY STUDY

Your above reference sought of the Department of Supply an investigation of the feasibility of a new aircraft design proposed by Squadron Leader Waller. The matter was referred to A.R.L. and Squadron Leader Waller was interviewed at these Laboratories on 26th April.

2. I attach copies of our technical comments on Squadron Leader Waller's proposal. I think these remarks can be summed up by the concluding paragraph which I quote:

> "At this stage it is only possible to say, in view of the foregoing remarks, that there does not seem to be any obvious aerodynamic advantage in the proposal over systems obtaining lift by direct axial acceleration of a vertical jet.

(T.F.C.LAWRENCE)
CHIEF SUPERINTENDENT

c.c.Deputy Chief Scientist

27/5 Your R13/2/29 of 1st April, 1966, refers. It is believed that no further action is required.

Lawrence

(T.F.C.LAWRENCE)
CHIEF SUPERINTENDENT

I spoke to Mr L. & said he should not have written direct to Air. Dept of Air
Ham 30/5

Noted
Jm

P. A.
FILE EXAMINED
FOLIOS 9 TO 10
INITIALS g
DATE 29/8/66

DEPARTMENT OF SUPPLY

AERONAUTICAL RESEARCH LABORATORIES

COMMENTS ON AIRCRAFT DESIGN PROPOSED BY SQN.LDR.WALLER, R.A.A.F.

The data provided by Squadron Leader Waller is too inadequate to attempt a precise feasibility study, but attention is drawn to certain basic principles which are involved.

A momentum balance taken around the entire system shows that the ring aerofoil cannot produce more lift than the upward component of the reaction produced in turning the horizontal jet vertically downward. Thus the maximum lift obtainable, under ideal conditions with no losses, is completely determined by the momentum entering the system in the initially-horizontal jet. The ring wing acts merely as a turning vane, so that designing it for an excessively-high lift will result in over-turning of the jet and an actual decrease in the vertical reaction.

It should further be observed that the above maximum lift will only be developed if the jet comes cleanly away from the aircraft. If any part of the jet is reabsorbed into the aircraft system so as to reduce the total vertical downward component of the momentum finally ejected, the resultant lift on the system will be reduced accordingly.

From the data given by Squadron Leader Waller it appears that an all-up-weight in the region of 2000-3000lb. is contemplated.

If the lower value (2000 lb.) is taken, together with the given fan mass flow of 3.09 slug/sec. (1300 c.f.s.), then the radial velocity required in the incident jet is approximately 650 f.p.s.

Neglecting compressibility effects, the jet height at exit from the 6 ft. diameter fan will thus be 1.25 inches. It can be seen that submerging a wing of, say 1.5 to 2 ft. chord in a jet of this thickness could pose difficulties.

Further the ideal minimum horsepower required for this case -

$$\frac{1.09 \times 650^2}{2 \times 550} = 1185$$

as against the proposed input of 100 H.P.

Alternatively, if we take the incident-jet radial velocity at, say, 100 f.p.s., the mass flow required will be 20 slug/sec. (i.e. approximately 7 times the given value), and the ideal H.P. required will be 182.

It is assumed that it is proposed to run a centrifugal fan without a volute to produce a flow all around the periphery, and although we can find no data for use in this condition, a preliminary calculation implies that, for 100 f.p.s. radial exit velocity and volume flow of 1300 c.f.s., the efficiency is likely to be less that 50%.

At this stage it is only possible to say, in view of the foregoing remarks, that there does not seem to be any obvious aerodynamic advantage in the proposal over systems obtaining lift by direct axial acceleration of a vertical jet.

Aeronautical Research Laboratories.
20th May, 1966.


2 5 MAY 1966

R13/2/29

17 MAY 1966

Dear Squadron Leader,

Many thanks for sending me a copy of your patent specifications and schematic drawing of your VTOC design.

I understand Miss Lemaire of Aeronautical Research Laboratories is examining your proposals and is in the course of preparing a report.

Yours sincerely,

(J. C. WISDOM)
Assistant Controller (Aerosciences)

Squadron Leader G.L. Waller
Directorate of Establishments,
Department of Air,
Russell Offices,
CANBERRA. A.C.T.

fw 16/5/

From: Squadron Leader G.L. WALLER

Directorate of Establishments
Department of Air
Russell Offices
CANBERRA ACT

J.C. WISDOM Esq.,
Research and Development
Department of Supply
339 Swanston Street
MELBOURNE VIC

Dear Mr Wisdom

1. As requested by you, I send herewith a copy of each of the patent specifications and the schematic drawing of my VTOC design.

2. I stress that the drawing is only schematic; optimum dimensions, shapes and arrangement of components etc. can only be determined after the design, operating requirements and efficiency of the air generator (fan) annular aerofoil arrangement have been determined. I have therefore suggested to Mr. Kerr and Miss Lemaire that the aerodynamic feasibility study be limited at this stage to proving - or disproving - the air generator/annular aerofoil concept.

Yours sincerely

Gordon Waller

COMMONWEALTH OF AUSTRALIA.

Patent Office, Canberra

Notification of Lodgment of Application for Patent and Acknowledgment of Documents.

Application No. 1222

Application by Gordon Leslie Wilbert

Lodged at Patent Office on 4 FEB 1966 19

accompanied by the following documents—

NOTE.—Date of application inserted as priority date of claims.

Application for patent with fee stamp affixed.

Declaration in support.

Provisional Complete Specification 7 sheets with True Copy.

Drawings sheets, with True Copy.

Certified copy of basic specification.

Additional copy of claims.

Issued to A/Sergeant, 36 Melbourne Ave Deakin A.C.T.

for Commissioner of Patents.

10341/65....

Copy.

Affix Patent Office Fee Stamp here $4 or $24

COMMONWEALTH OF AUSTRALIA. Form 1.

Patents Act 1952-1962.

APPLICATION FOR A PATENT.

I ~~WE~~ GORDON LESLIE WALLER
(Use BLOCK letters.)

of 36 Melbourne Avenue,

Deakin, A.C.T.

hereby apply for the grant of a Patent for an invention entitled

AIRCRAFT WITH ANNULAR AEROFOIL

which is described in the accompanying provisional ~~complete~~ specification.

My ~~OUR~~ address for service is as above

Dated this fourth day of February 19 66

To :

THE COMMISSIONER OF PATENTS.

(*Signature.*)

This form must be accompanied by either a provisional specification (Form 9 and true copy) with fee of $4, or by a complete specification (Form 10 and true copy) with fee of $24.

Section 34. "34.—(1.) Any of the following persons, whether a British subject or not, may make an application for a patent :—

(*a*) the actual inventor ;

(*b*) the assignee of the actual inventor ;

(*c*) the legal representative of a deceased actual inventor ;

(*d*) the legal representative of a deceased assignee of the actual inventor ;

(*e*) a person to whom the invention has been communicated by the actual inventor, his legal representative or assignee (if the actual inventor, his legal representative or assignee is not resident in Australia) ;

(*f*) the assignee of such a legal representative as is specified in paragraph (c) or (*d*) of this sub-section ;

(*fa*) a person who would, if a patent were granted upon an application made by a person referred to in any of the preceding paragraphs, be entitled to have the patent assigned to him ; or

(*g*) the agent or attorney of a person referred to in any of the preceding paragraphs.

(2.) Two or more persons may make a joint application for a patent and a patent may be granted to them jointly.

(3.) An assignee of a part interest in an invention may make a joint application for a patent with any of the persons referred to in sub-section (1.) of this section and a patent may be granted to them jointly."

Address for Service.—An address for service in Australia at which documents may be served on him personally or on a person specified in the form on his behalf must be stated in the application by the person completing the form.

A person may, by notice in writing lodged at the Patent Office, change his address for service to an address specified in the notice.

NOTE.—A declaration must be lodged before acceptance of the application—see back of this form.

Copy

NOTE.—If a declaration in Form 7 is not completed at time of lodgment of the application, it must be lodged before acceptance accompanied by the prescribed fee of 50c.

COMMONWEALTH OF AUSTRALIA. Form 7.

Patents Act 1952-1962.

DECLARATION IN SUPPORT OF AN APPLICATION FOR A PATENT OR PATENT OF ADDITION.

In support of the Application made by Gordon Leslie Waller

for a patent ~~patent of addition~~ for an invention entitled

Aircraft with Annular Aerofoil

I, Gordon Leslie Waller

of 36 Melbourne Avenue, Deakin, A.C.T.,

do solemnly and sincerely declare as follows:—

1. I am the applicant for the patent. ~~patent of addition~~.

(*or, in the case of an application by a body corporate*)

~~1. I am authorized by~~

~~the applicant for the patent patent of addition to make this declaration on its behalf.~~

2. I am the actual inventor of the invention.

(*or, where a person other than the inventor is the applicant*)

~~2.~~ —

~~of~~

~~is the actual inventor of the invention and the facts upon which I am entitled the is entitled to make the application are as follows:—~~

Declared at CANBERRA this fourth day of February 1966

To: THE COMMISSIONER OF PATENTS.

(*Signature of Declarant.*)

(IMPORTANT.—Cross out inapplicable words in the above Form.)

11487/65.—9/65.—5,000.

TRUE COPY

I certify that this and the following 6 pages are a true and correct copy of the original Specifications.

.....(Signature.)

FORM 9A.

COMMONWEALTH OF AUSTRALIA.

The *Patents Act* 1952-1962.

PROVISIONAL SPECIFICATION FOR THE INVENTION ENTITLED:—

Here insert Title of Invention as in Application Form.

AIRCRAFT WITH ANNULAR AEROFOIL

The invention is described in the following statement :—

This invention relates to an aircraft with an annular aerofoil and associated components to achieve vertical and transitional flight and to effect flight control.

Present vertical lift aircraft use aerodynamic lift and considerable downwards thrust or use mainly downwards thrust to achieve vertical and transitional flight. They also use flight control systems that mainly rely for their effect upon a reaction obtained from the ambient atmosphere.

It is the object of the invention to give an aircraft the capability of sustaining vertical flight and of achieving transitional flight by mainly aerodynamic lift and to provide the aircraft with a flight control system that mainly does not

rely for effect upon reaction obtained from the ambient atmosphere. This is accomplished in the following manner:-

An aircraft with a body which may be of circular shape but the body as a whole is of a shape capable of generating aerodynamic lift. Located in and concentric with an annular gap in and around the top of the aircraft is an annular aerofoil of a section which gives a leading edge around the inner circumference and a trailing edge around the outer circumference of the annular aerofoil. The upper surface of the annular aerofoil is exposed to the ambient atmosphere and the lower surface faces downwards into the body of the aircraft. The annular gap between the trailing edge of the annular aerofoil and the outer circumference of the cavity in which the annular aerofoil is located is capable of being closed or being varied in size equally or unequally around the annular gap by selective and controlled movement of suitable vanes or shutters. A similar provision may be made for the annular gap between the leading edge of the annular aerofoil and the inner circumference of the cavity in which the annular aerofoil is located. The annular aerofoil is attached to a disc or partial disc located within the aircraft and below, concentric and parallel with the annular aerofoil. The annular aerofoil may be capable of controlled perpendicular movement relative to the disc or partial disc. An annular chamber with a continuous lipped gap around each of the inner and outer circumferences of the chamber is located within the body of the aircraft and concentric with the annular aerofoil. The lips of the gap around the outer circumference of the chamber face the leading edge of the annular aerofoil. This chamber and the lipped gaps around its inner and outer circumferences are respectively and hereinafter referred to as the inner throat, the inlet of the inner throat and the outlet of the inner throat. A similar chamber but of larger inner and outer circumferences is located within the body of the aircraft and concentric with the annular aerofoil. The lips of the gap around the inner

circumference of the chamber face the trailing edge of the annular aerofoil. This chamber and the lipped gaps around its inner and outer circumferences are respectively and hereinafter referred to as the outer throat, the inlet of the outer throat and the outlet of the outer throat. The inner and outer throats may be capable of controlled perpendicular and/or tilting movement relative to the plane of the annular aerofoil. Located in or near the outer throat are vertical and horizontal vanes or blades capable of selective and controlled rotating movement. The inner throat and/or the outer throat may be attached to the body of the aircraft or to the disc or partial disc. The disc or partial disc has a central vertical axle which is mounted in bearings attached to the aircraft. An air generator or generators which may be in the form of a fan or fans is or are also attached to the vertical axle. The disc or partial disc may have fan blades attached around and near its outer circumference. The disc or partial disc and attachments are rotated by jet reaction devices attached to and near the outer circumference of the disc or partial disc. The inlets of the jet reaction devices are connected to an annular chamber located within the body of the aircraft and concentric with the disc or partial disc and the efflux outlets of the jet reaction devices are connected to a similar chamber. The chamber to which the efflux outlets of the jet reaction devices are connected has outlets or an outlet around the body of the aircraft and open to the ambient atmosphere. The outlets or outlet of the chamber are capable of being varied in size equally or unequally by selective and controlled movement of suitable vanes or shutters. Vertical and horizontal vanes or blades capable of selective and controlled rotating movement may be located across the outlets or outlet of the chamber.

The production of aerodynamic lift by the invention for vertical flight is accomplished in the following manner:-

A large volume of air is generated by the air generator or generators, is forced through the inlet of the inner throat, through the inner throat, and through and shaped by the outlet of the inner throat, impinges on and is divided by the leading edge of the annular aerofoil, passes over and under the annular aerofoil and causes the annular aerofoil to produce aerodynamic lift. The amount of aerodynamic lift produced by the annular aerofoil is regulated by varying the output of the air generator and/or by varying the position around the leading edge of the aerofoil at which the main mass of air impinges by controlled vertical movement of the inner throat and/or the annular aerofoil. After passing over and under the annular aerofoil the air is forced and sucked into the inlet of the outer throat and this combined with rotation of the annular aerofoil results in a degree of boundary layer control of the air flow over the annular aerofoil. The air is then forced and sucked through the outer throat, and through the outlet of the outer throat into the annular chamber in which the inlets of the jet reaction devices are located. The passage of the air into the annular chamber may be assisted by the action of the fan blades which may be attached around and near the outer circumference of the disc or partial disc.

The production of aerodynamic lift by the invention for transitional flight is accomplished in the following manner:-

Movement of the aircraft in the horizontal plane relative to the plane of the aircraft or in a plane with a substantial horizontal component relative to the plane of the aircraft causes the body of the aircraft to produce aerodynamic lift and at and above a certain speed of movement in such planes the body produces sufficient aerodynamic lift to sustain flight. From nil forward speed and until reaching such speed of movement in such planes the aircraft is in a condition of transitional flight and the balance of aerodynamic lift necessary to sustain such flight is produced and regulated in the manner as hereinbefore

described for the condition of vertical flight. The amount of aerodynamic lift produced by the annular aerofoil for transitional flight is also regulated by controlled movement of the vanes or shutters provided to vary the size of the annular gap between the trailing edge of the annular aerofoil and the outer circumference of the annular cavity in which the annular aerofoil is located. During transitional flight from nil forward speed controlled movement of the vanes or shutters to progressively and equally decrease the size of the annular gap causes a progressive disturbance of the airflow over and under the annular aerofoil and this causes a progressive decrease in the aerodynamic lift produced by the annular aerofoil. When and after the aircraft reaches the forward speed at which the body of the aircraft produces the aerodynamic lift necessary for flight, the annular gap is completely closed by the vanes or shutters. During transitional flight to nil forward speed, movement of the vanes or shutters is controlled to progressively increase the size of the annular gap to cause a progressive increase in the aerodynamic lift produced by the annular aerofoil. When the aircraft reaches and while it remains at nil forward speed, the annular gap is and remains completely open.

Flight control by the invention is accomplished in the following manner:-

Selective and controlled rotating movement of the horizontal vanes or blades located in or near the outer throat mainly effects flight control of the aircraft in the pitching and rolling planes. The vanes or blades being in the path of air being forced and sucked through the outer throat, movement of the selected vanes or blades deflects the air and causes a pitch and/or roll reaction by the aircraft. Control in the pitching and rolling planes may also be effected or assisted by selective and controlled tilting movement of the inner throat. Such tilting of the inner throat would have the effect of varying around the annular aerofoil, the angle made

by the plane of the annular aerofoil and the mean of the path taken by the air between the inner throat and the leading edge of the annular aerofoil. This would cause the annular aerofoil to produce greater aerodynamic lift near to lowest point of tilt of the inner throat and this in turn would cause the aircraft to roll and/or pitch upwards and away from that point. Control in the rolling and/or pitching planes may also be effected or assisted by selective and controlled movement of the vanes or shutters which may be provided to equally or unequally vary the size of the annular gap between the leading edge of the annular aerofoil and the inner circumference of the cavity in which the annular aerofoil is located. Movement of the vanes or shutters to unequally vary the size of the annular gap would restrict the airflow over the upper surface of portion of the annular aerofoil, and would cause that portion to generate less aerodynamic lift. This in turn would cause the aircraft to roll and/or pitch downwards and away from the area of restriction of the annular gap. Control in the yawing plane is effected by selective and controlled rotating movement of vertical vanes or blades in or near the outer throat. The vanes or blades being in the path of air being forced and sucked through the outer throat, movement of the vanes or blades deflects the air and causes a yaw reaction by the aircraft. Control in the pitching, rolling and yawing planes may also be effected or assisted by selective and controlled rotating movement of the horizontal and vertical vanes or blades which may be located across the outlets or outlet through which the efflux of the jet reaction devices pass into the ambient atmosphere. Such deflection of the efflux would cause a pitch, roll or yaw reaction by the aircraft. Flight control is assisted by such inherent stability the aircraft may possess as the result of the gyroscopic effect produced by the rotating disc or partial disc and attached components and transmitted to the aircraft.

Propulsion of the aircraft by the invention during and

after transitional flight is accomplished in the following manner:-

Thrust from the jet reaction devices attached to the disc or partial disc in addition to driving the disc or partial disc and attached components propels the aircraft during and after transitional flight from nil forward speed. The jet reaction devices efflux into the annular chamber and out to the ambient atmosphere through the outlets or an outlet around the body of the aircraft. The vanes or shutters provided to regulate equally or unequally the size of the outlet or sizes of the outlets are selectively controlled to cause the efflux to be directed through selected outlets or a selected portion of the outlet which are or is opposite to the direction of horizontal or substantially horizontal movement required by the aircraft. Such control of direction of efflux exit from the aircraft causes the aircraft to be propelled in the required direction by thrust reaction by the aircraft.

Production of thrust lift by the invention for all conditions of flight may be accomplished in the following manner:-

Thrust produced by the jet reaction devices obtained and controlled as hereinbefore described may be directed downwards to produce thrust lift only or to produce a thrust lift component of propulsion thrust by selective controlled movement of the horizontal vanes or blades which may be located across the outlets or the outlet through which the jet reaction devices efflux into the ambient atmosphere.

Dated this fourth day of February 1966

GORDON LESLIE WALLER

(Name of Applicant.)
(BLOCK LETTERS.)

FORM 9A

COMMONWEALTH of AUSTRALIA

THE PATENTS ACT 1952-1962

PROVISIONAL SPECIFICATION FOR THE INVENTION ENTITLED:-

AIRCRAFT WITH ANNULAR AEROFOIL

The invention is described in the following statement:-

This invention relates to the invention described in Provisional Specification for Invention entitled "Aircraft with Annular Aerofoil", Provisional Application for Patent No 1222 dated 4th February 1966.

The objects of this invention are:-

(i) To provide a means of varying the amount of aerodynamic lift generated by the annular aerofoil further to those methods described in the beforementioned Provisional Specification.

(ii) To provide a means of eliminating power absorption by the air generator or air generators during the starting cycle of the jet reaction device.

(iii) To provide a means of making the air generator or air generators rotate at a speed less than the speed of rotation of the axle of the disc or partial disc.

(iv) To provide a means of making the aircraft capable of taking off from and landing on, and having mobility on, land or water.

The objects of this invention are achieved in the following manner:-

The inner throat may be attached to and rotate with the air generator or air generators, or may be an integral part of the air generator or air generators. The central hub of the air generator or air generators has a splined central bore which fits over and is capable of sliding movement along, matching splines on the axle of the disc or partial disc. The sliding movement of the hub may be controlled by manual or/and automatic means. Such automatic means may be in the form of a device activated by centrifugal force. Incorporated in the hub is a clutch which may be engaged or disengaged by manual or/and automatic means. Such automatic means may be in the form of a device activated by centrifugal force. Also incorporated in the hub may be a planetary or other suitable reduction gear assembly. Located in the cavities in the under-side of the aircraft may be a number of landing/floatation units which may be in the form of sealed cylinders. The landing/floatation units may be capable of being extended to and retracted from a perpendicular position or near perpendicular position downwards from the under-side of the aircraft. A wheel which may be capable of castoring and which may be capable of being extended or retracted, may be fitted to the lower end of each or some of the landing/floatation units, the term "lower end" meaning that part of each landing/floatation unit which, when extended, is the greatest distance from the underside of the aircraft. As an alternative to a wheel at the lower end of each or some of the landing/floatation units may be a device operating on the "hovercraft" principle which provides a cushion of pressure air below the lower end of each or some of the landing/floatation units. The pressure air for such devices may be provided by the air generator or air generators or by the jet reaction devices.

The further method of varying the aerodynamic lift of the annular aerofoil by the invention is accomplished in the following manner:-

Controlled movement of the hub of the air generator or air generators along the splined portion of the axle of the disc gives within the limits of the sliding travel capability of the hub along the splined portion of the axle, a number of positions at which the hub may be held stationary relative to the axle. At each such position the pressure air generated and expelled by the air generator or air generators and shaped by the inner throat fixed to or integral with the air generator or air generators impinges on and is divided by a particular

.../2

position on and around the circumference of the leading edge of the annular aerofoil. Each selected position of the hub within the limits of its sliding travel along the splines of the axle of the disc or partial disc thus results in an aero-dynamic reaction by the annular wing equivalent to the aero-dynamic reaction by a wing of finite length to a variation of angle of attach of such wing to the relative wind. Therefore, and as is the case with a wing of finite length, the greater the angle of attack of the annular aerofoil the greater the aero-dynamic lift produced and vice versa.

Elimination of power absorption by the air generator or air generators during the starting cycle of the jet reaction devices is accomplished in the following manner:-

A sequence in the starting cycle of the jet reaction devices is the rapid rotation of the disc or partial disc to which the jet reaction devices are attached. Such rotation, if the air generator or air generators also have to be rotated, would require application of considerable power. At the beginning of the starting cycle of the jet reaction devices the clutch incorporated in the hub of the air generator or air generators is disengaged by manual or/and automatic means and causes disengagement of the air generator or air generators from the hub and prevents power absorption by the air generator or air generators during the starting cycle of the jet reaction devices. When all sequences of the starting cycle of the jet reaction devices are completed, the clutch may be manually or/and automatically engaged and the hub then transmits rotational power produced by the jet reaction devices to the air generator or air generators.

Rotation of the air generator or air generators at a speed less than the rotation speed of the axle of the disc or partial disc is accomplished in the following manner:-

Power to the air generator or air generators is transmitted through the planetary or other form of reduction gear assembly incorporated in the hub of the air generator or air generators. The reduction gear assembly converts the input rotational power created by the jet reaction devices into a rotational power of greater torque but lower rotational speed for the air generator or air generators.

Capability by the aircraft of taking off from and landing on and mobility on land or water surfaces is accomplished in the following manner:-

During and after landing and before and during take-off from land or water surfaces, the landing/floatation units are caused to be in the extended position and support and provide a means of land or water mobility for the aircraft. When supporting and providing a means of mobility for the aircraft on land, such support and mobility is through the medium of the wheels or air cushions located at the lower end of the landing/floatation units. When supporting and providing a means of mobility for the aircraft on water, such support and mobility may be provided by the landing/floatation units alone or may be provided through the medium of air cushions located at the lower end of the landing/floatation units.

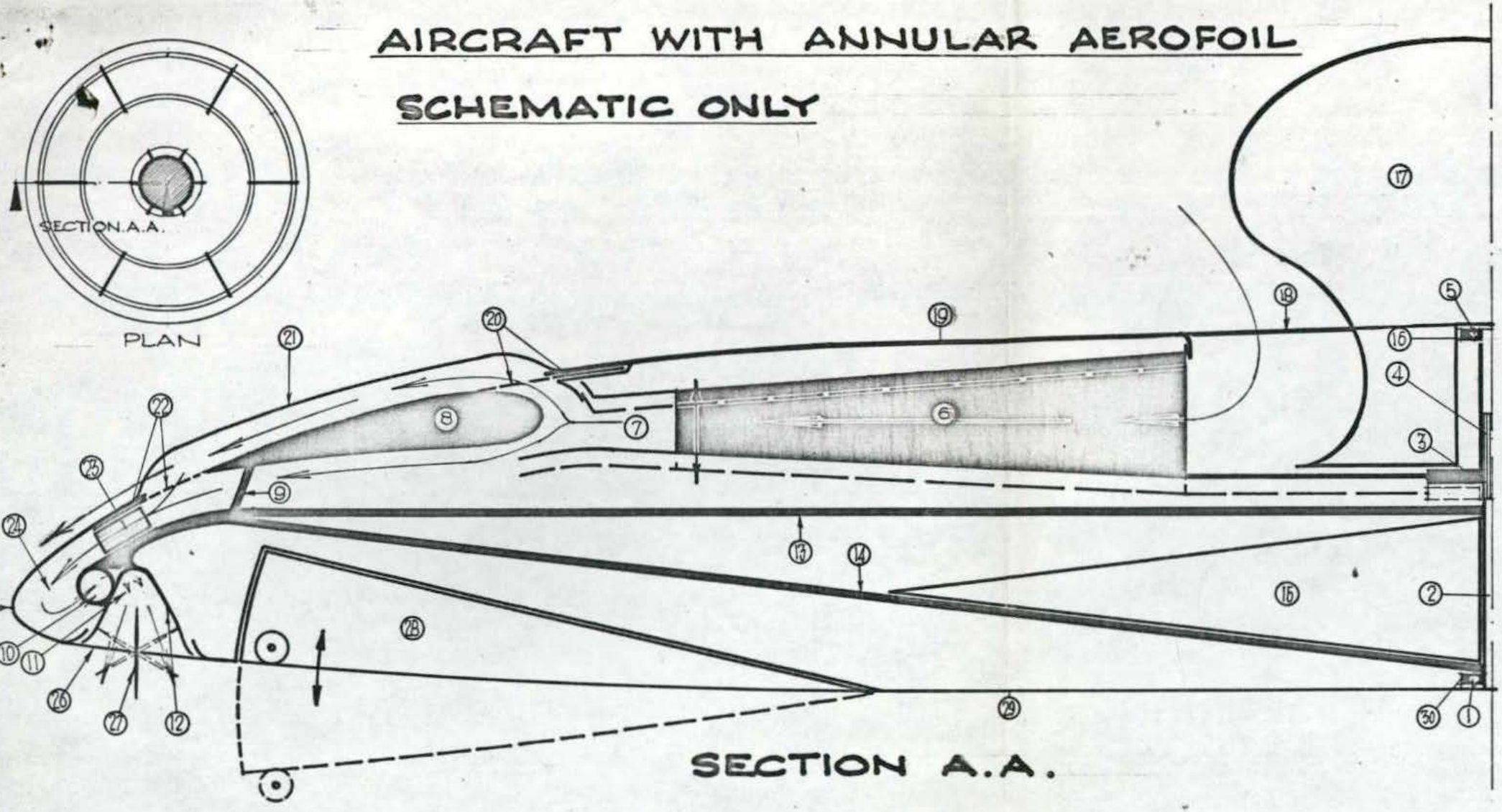
Dated this TWENTY-EIGHTH day of MARCH 1966.

GORDON LESLIE WALLER

(Name of Applicant)

AIRCRAFT WITH ANNULAR AEROFOIL

SCHEMATIC ONLY



ROTATING COMPONENTS

1	Bearing	6	Impeller / fan	11	Efflux of jet reactor
2	Axle	7	Inner throat	12	Annular chamber
3	Centrifugal clutch	8	Annular aerofoil	13	Disc
4	Splined hub	9	Strut	14	Strut
5	Bearing	10	Inlet of jet reactor	15	Annular fuel tank

OTHER COMPONENTS

16	Bearing housing	21	Stay	26	Stay
17	Cabin	22	Shutter	27	Vane
18	Stay	23	Vane in outer throat	28	Landing / floatation unit
19	Body	24	Annular chamber	29	Body
20	Shutter	25	Body	30	Bearing housing

R13/2/29

DESPATCHED
21 APR 1966
CENTRAL REGISTRY
DEPT. OF SUPPLY

21 APR 1966

Secretary,
Department of Air,
CANBERRA. A.C.T.

(Attention: Wing Cdr. J. Flannery)

Folio 1

NEW AIRCRAFT DESIGN - PROPOSED FEASIBILITY STUDY

Further to your letter 55/6/8 of 22nd March, 1966, arrangements have been made with Aeronautical Research Laboratories to have Sqn. Ldr. Waller's new aircraft proposals examined in detail.

Sqn. Ldr. Waller has already had some discussions with the Chief Scientist and Deputy Chief Scientist.

(Sgd.) A. S. COOLEY

(A. S. COOLEY)
Secretary

DCAS.
S/L Waller will be speaking with Supt. Aerodynamics RAE on Tuesday 26/4.

20/4.

R/S / TRANSIT
FILE EXAMINED
FOLIOS 6 TO 7
INITIALS
DATE 22/4/66

From: Squadron Leader G.L. Waller

R13/2/29 (6)

Department of Air (D Est)
Russell Offices
CANBERRA ACT

Tel: Dept. of Air Ext 2352

5th April 1966

Dr. W.A.S. Butement, CBE
Chief Scientist
Department of Supply
339 Swanston Street
MELBOURNE VIC

Dear Dr Butement

1. Your and Mr. Wills interest in my VTOL aircraft concept has encouraged me to think about design detail of the concept and I have, I believe, now solved a number of design and performance details that have been worrying me. I have lodged a further patent application and specification concerning the details.

2. I have also done considerable research on how to increase aerodynamic lift of the annular aerofoil and find that a number of boundary layer control methods could be easily applied to the aerofoil and should greatly increase lift.

3. Now that my mind is in high gear concerning the design, I hope it will be possible for the "numbers" work to soon commence at ARL - I am available now to take part in such work and the RAAF seems quite happy that I remain with the project for as long as may be necessary.

4. I shall be in Melbourne on Tuesday and Wednesday, 12th and 13th April, and will telephone your secretary for information on when the "numbers" work is likely to commence.

Yours sincerely

Received AM 12/4/66

P. A.
FILE EXAMINED
FOLIOS 5 TO 6
INITIALS
DATE 15/4/66

(5)

INTERNAL MEMORANDUM — DEPARTMENT OF SUPPLY

TO: DEPUTY CHIEF SCIENTIST	REGISTRY USE ONLY: R13/2/29
	OUR FILE No.: E.3 Pt.3
FROM (Branch or Establishment): A.R.L.	FOR ENQUIRIES REFER TO:
	DATE: 6 APR 1966

S.F.C. 3.4.1 (8/63) C.D.O. 5180

RECD. 7 APR 1966 MINISTRY OF SUPPLY REGISTRY

YOUR REFERENCE

SUBJECT NEW AIRCRAFT DESIGN - PROPOSED FEASIBILITY STUDY

We will arrange to have discussions with Sqn. Ldr. Waller on his invention. We will inform you of progress.

(J.B. DANCE)
ACTING CHIEF SUPERINTENDENT

CM Wisdom


REC'D.
7 - MAR 1966


RECEIVED
-7 APR 1966

4

A/g Chief Superintendent,
Aeronautical Research Laboratories,
FISHERMEN'S BEND.

R13/2/29

NEW AIRCRAFT DESIGN - PROPOSED
FEASIBILITY STUDY

The attached papers received from the Secretary, Department of Air refer to a new aircraft design which has been invented by an R.A.A.F. Officer, Sqn. Ldr. G.L. Waller.

Would you please arrange for one of your officers to consult with Sqn. Ldr. Waller with a view to carrying out a feasibility study of his invention. Would you please keep me informed of progress in this matter.

for A/DEPUTY CHIEF SCIENTIST

1/4

R/S / TRANSIT
FILE EXAMINED
FOLIOS 4 TO 7
INITIALS
DATE 1/4/66

Mr Wisdom 3/

S/L Walker rang today to say that he would be available at any time to come to Melbourne to discuss his divorce - he was here last week & discussed with Chief Scientist.

I gave him your name as H.Q. contact

Harold
2/13

Squadron Leader Waller rang[2] and left the following message:-

"The formal request about my design was forwarded from Canberra, from Department of Air to Department of Supply, last Monday or Tuesday week".

8 20/3/66

M. Hession [illegible]
Pl find out where they are?

[illegible] 30/3

R 13/2/29

Dale with Mr Wisdom who is forwarding copy of Dept of Air memo of 22/3/66 to ARL for feasibility study. [illegible] 30/3

N/F

COMMONWEALTH OF AUSTRALIA

1.

TELEPHONE: 65.9111

TELEGRAPHIC ADDRESS: " AIRFORCE CANBERRA "

IN REPLY QUOTE 555/6/8

DEPARTMENT OF AIR

CANBERRA, A.C.T.

22 MAR '66

Secretary
Department of Supply
339 Swanston Street
MELBOURNE C1 VIC

NEW AIRCRAFT DESIGN - PROPOSED FEASIBILITY STUDY

1. An officer of this Department, Squadron Leader G.L. Waller, has submitted for consideration an aircraft design which he has invented, and which he believes is of military significance. RAAF engineering officers have undertaken a short preliminary investigation of the proposal, and they consider that the advice of Aeronautical Research Laboratories should be sought concerning whether or not it is a feasible and practical proposition. Relevant extracts from the record of the discussions these officers had with Squadron Leader Waller are attached for your information.

2. An important factor concerning Squadron Leader Waller's invention seems to be the question of the aerodynamic properties of what is referred to as an annular aerofoil in the aircraft. In fact, it is believed that the aerodynamic feasibility of the design must first be investigated before the degree of Departmental interest that should be shown in it can be determined. Accordingly, your assistance is now requested in this matter by allowing direct reference with Aeronautical Research Laboratories for the purpose of their undertaking an aerodynamic feasibility study of Squadron Leader Waller's invention.

3. Squadron Leader Waller could be made available to visit Aeronautical Research Laboratories to explain his ideas to the aerodynamicist chosen for the study. At the conclusion of their investigation it is requested that Aeronautical Research Laboratories report on the aerodynamic feasibility of the invention and particularly whether they consider the invention is worth pursuing further.

4. Your concurrence in the above proposals would be appreciated. If desired, personal contact may be made with Wing Commander J. Flannery of this Department (Extension 2737) concerning detailed arrangements.

for (A. B. McFarlane)
SECRETARY

CMC Wisdom

EXTRACTS FROM THE RECORD OF DISCUSSIONS
HELD AT THE DEPARTMENT OF AIR CONCERNING THE AIRCRAFT
INVENTED BY SQN LDR G.L. WALLER

"2. A large part of the discussion was concerned with Sqn Ldr Waller explaining the principle of operation of his proposed aircraft, and in answering the many questions of the other officers on this aspect. He did not have any drawings, as he said that the occasion had not yet arisen which required them. He agreed, however, that the sketch appended represented the basic principles of his design. He explained that he was quite clear in his own mind of the principles involved and the general way the aircraft would be constructed. At this stage he believed that consideration of engineering details was premature. In any case he felt that there were no insuperable design problems, and that his first need was for an evaluation of the aerodynamics involved.

3. In very broad terms the aircraft was described as consisting essentially of a body, which could be circular in shape, and a large rotating assembly mounted on a central shaft about which rotated:-

(a) a centrifugal type fan,

(b) an annular aerofoil, and

(c) a circular "disc" having perhaps four small jet engines, depending on aircraft size, mounted symmetrically around its periphery.

Associated with the rotating components are various systems of vanes for control purposes, and ducting to control the airflow over the aerofoil and through the aircraft to the engines.

4. Again very broadly, Sqn Ldr Waller explained that the aircraft worked as follows. The jet engines are first started by any suitable means. This causes the rotating assembly to rotate and accelerate. Eventually a sufficient speed is reached for the fan to deliver air, via appropriate ducting, over the aerofoil. The airflow then enters further ducting and is led to the intakes of the engines. The efflux from the engines is finally delivered to atmosphere in a downwards direction.

5. The primary lift in vertical flight for the aircraft is provided by the annular aerofoil, with a lift bonus being available from the engines efflux. The amount of lift can be varied by moving the aerofoil vertically in the airflow, and by changing the effective incidence by varying the direction of the airflow offered to the aerofoil from the fan.

6. A system of variable control vanes on the underside of the craft is proposed to vary the direction of the engine efflux. In this way transition from pure vertical to horizontal flight can be achieved. At this stage the general aerodynamic shape of the aircraft, which is of the lifting body type, would begin to provide additional lift, so that the lift from the annular aerofoil could be reduced as necessary. Control vanes in the airflow system of the aircraft together with those in the engine efflux are also envisaged for providing directional, role and pitch control, while gyroscopic effects of the rotating assembly are seen as providing appreciable stability.

7. Sqn Ldr Waller also explained that many details of the proposal were flexible as yet, and would depend on specialist advice. As an example, he said that it may be more practical for the annular aerofoil to be stationary relative to the other rotating portions of the aircraft. He did not consider that such matters affected the validity of his basic idea."