

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To: GALEN J. SUPPES
4 BINGHAM
COLUMBIA, MO 65203

PCT

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT AND
THE WRITTEN OPINION OF THE INTERNATIONAL
SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

	Date of mailing (day/month/year) 02 MAR 2021
Applicant's or agent's file reference	FOR FURTHER ACTION See paragraphs 1 and 4 below
International application No. PCT/US 20/36936	International filing date (day/month/year) 10 June 2020 (10.06.2020)
Applicant GALEN J. SUPPES	

1. The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:
The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the international search report.

How? Directly to the International Bureau preferably through ePCT, or on paper to:
The International Bureau of WIPO, 34, chemin des Colombettes, 1211 Geneva 20, Switzerland

For more detailed instructions, see the *PCT Applicant's Guide*, International Phase, paragraphs 9.004 – 9.011.

2. The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.

3. **With regard to any protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

the protest together with the decision thereon has been transmitted to the International Bureau together with any request to forward the texts of both the protest and the decision thereon to the designated Offices.

no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

The applicant may **submit comments on an informal basis on the written opinion of the International Searching Authority** to the International Bureau. These comments will be made available to the public after international publication. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established.

Shortly after the expiration of **18 months from the priority date, the international application will be published** by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau before the completion of the technical preparations for international publication (Rules 90*bis*.1 and 90*bis*.3).

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for **entry into the national phase** before those designated Offices. In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months. For details about the applicable time limits, Office by Office, see www.wipo.int/pct/en/texts/time_limits.html and the *PCT Applicant's Guide*, National Chapters.

Within **22 months from the priority date, the applicant may request that a supplementary international search be carried out** by a different International Searching Authority that offers this service (Rule 45*bis*.1). The procedure for requesting supplementary international search is described in the *PCT Applicant's Guide*, International Phase, paragraphs 8.006-8.032.

Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	Authorized officer Lee Young Telephone No. PCT Helpdesk: 571-272-4300
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PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference		FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/US 20/36936	International filing date (<i>day/month/year</i>) 10 June 2020 (10.06.2020)	(Earliest) Priority Date (<i>day/month/year</i>) 11 June 2019 (11.06.2019)	
Applicant GALEN J. SUPPES			

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the language, the international search was carried out on the basis of:

- the international application in the language in which it was filed.
 a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

b. This international search report has been established taking into account the rectification of an obvious mistake authorized by or notified to this Authority under Rule 91 (Rule 43.6bis(a)).

c. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, see Box No. I.

2. Certain claims were found unsearchable (see Box No. II).

3. Unity of invention is lacking (see Box No. III).

4. With regard to the title,

- the text is approved as submitted by the applicant.
 the text has been established by this Authority to read as follows:

5. With regard to the abstract,

- the text is approved as submitted by the applicant.
 the text has been established, according to Rule 38.2, by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the drawings,

- a. the figure of the drawings to be published with the abstract is Figure No. 10
 as suggested by the applicant.
 as selected by this Authority, because the applicant failed to suggest a figure.
 as selected by this Authority, because this figure better characterizes the invention.
- b. none of the figures is to be published with the abstract.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 20/36936

A. CLASSIFICATION OF SUBJECT MATTER
 IPC - Classes and subs listed in Extra Page
 CPC - Classes and subs listed in Extra Page

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 See Search History document

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
 See Search History document

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
 See Search History document

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2015/089679 A1 (CONCA-GARCIA) 25 June 2015 (25.06.2015), entire document, especially Figs 1-2, 4; para [0065], [0068]-[0069], [0071]-[0072]	1-9
A	US 2019/0031333 A1 (Bell Helicopter Textron Inc.) 31 January 2019 (31.01.2019), entire document, especially Figs 1A-B, 1E-F, 3E-I; para [0018]-[0020], [0023], [0028], [0030]-[0031], [0033], [0037]	1-20
T	US 2020/0255128 A1 (Suppes) 13 August 2020 (13.08.2020), entire document	1-20
A, P	US 10,589,838 B1 (Suppes) 17 March 2020 (17.03.2020), entire document	1-20
A	US 7,059,562 B2 (Baldwin) 13 June 2006 (13.06.2006), entire document	1-20

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"D" document cited by the applicant in the international application	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"E" earlier application or patent but published on or after the international filing date	"&" document member of the same patent family
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search
 29 January 2021

Date of mailing of the international search report
02 MAR 2021

Name and mailing address of the ISA/US
 Mail Stop PCT, Attn: ISA/US, Commissioner for Patents
 P.O. Box 1450, Alexandria, Virginia 22313-1450
 Facsimile No. 571-273-8300

Authorized officer
 Lee Young
 Telephone No. PCT Helpdesk: 571-272-4300

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/US 20/36936

-*A. CLASSIFICATION OF SUBJECT MATTER*-

IPC - B64C 3/38, B64C 27/52, B64C 9/04, B64D 35/04, B64C 19/02, B64C 13/16, B64D 27/24, B64D 31/02, B64C 29/00, B64C 17/04, B64C 27/28, B64C 29/02, B64C 13/28, B64C 27/26, B64C 29/00, B64C 39/08, B64C 39/12, B64C 1/26, B64C 11/46, B64C 15/02, B64D 31/12, B64D 33/08 (2021.01)

CPC - B64C 39/024, B64C 29/0033, B64C 2201/027, B64C 2201/104, B64C 2201/108, B64C 27/001, B64C 2027/004, B64C 3/38, B64C 27/52, B64C 9/04, B64D 35/04, B64C 19/02, B64C 13/16, B64D 27/24, B64D 31/02, B64C 29/00, B64C 31/036, B64C 2201/021, B64C 2201/024, B64C 2201/048, B64C 2201/128, B64C 29/0025, B64C 3/385, B64C 2201/088, B64C 17/04, B64C 27/28, B64C 29/02, B64C 13/28, B64C 27/26, B64C 29/00, B64C 39/08, B64C 39/12, B64C 1/26, B64C 11/46, B64C 15/02, B64D 31/12, B64D 33/08

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To: GALEN J. SUPPES
4 BINGHAM
COLUMBIA, MO 65203

PCT

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

Date of mailing (day/month/year)		02 MAR 2021
Applicant's or agent's file reference		FOR FURTHER ACTION See paragraph 2 below
International application No.	International filing date (day/month/year)	Priority date (day/month/year)
PCT/US 20/36936	10 June 2020 (10.06.2020)	11 June 2019 (11.06.2019)
International Patent Classification (IPC) or both national classification and IPC		
IPC - Classes and subs listed in Supplemental Box		
CPC - Classes and subs listed in Supplemental Box		
Applicant GALEN J. SUPPES		

1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

Name and mailing address of the ISA/US Mail Stop PCT, Attn: ISA/US Commissioner for Patents P.O. Box 1450, Alexandria, Virginia 22313-1450 Facsimile No. 571-273-8300	Date of completion of this opinion 29 January 2021	Authorized officer Lee Young PCT Help Desk Telephone No. 571-272-4300
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**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 20/36936

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of:
 - the international application in the language in which it was filed.
 - a translation of the international application into _____ which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b)).

2. This opinion has been established taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rule 43*bis*.1(b)).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, this opinion has been established on the basis of a sequence listing:
 - a. forming part of the international application as filed:
 - in the form of an Annex C/ST.25 text file.
 - on paper or in the form of an image file.
 - b. furnished together with the international application under PCT Rule 13*ter*.1(a) for the purposes of international search only in the form of an Annex C/ST.25 text file.
 - c. furnished subsequent to the international filing date for the purposes of international search only:
 - in the form of an Annex C/ST.25 text file (Rule 13*ter*.1(a)).
 - on paper or in the form of an image file (Rule 13*ter*.1(b) and Administrative Instructions, Section 713).

4. In addition, in the case that more than one version or copy of a sequence listing has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that forming part of the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

5. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

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PCT/US 20/36936

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step and industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-20	YES
	Claims	None	NO
Inventive step (IS)	Claims	1-20	YES
	Claims	None	NO
Industrial applicability (IA)	Claims	1-20	YES
	Claims	None	NO

2. Citations and explanations:

Claims 1-20 meet the criteria as set forth by PCT Article 33(2)-33(3) as having novelty and an inventive step because the prior art fails to teach or fairly suggest the claimed subject matter.

The prior art is exemplified by (1) WO 2015/089679 A1 to CONCA-GARCIA (hereinafter Conca) and (2) US 2019/0031333 A1 to Bell Helicopter Textron Inc. (hereinafter Bell).

Regarding claim 1, Conca teaches a multicopter (1; Fig. 1) comprising:

an airchassis (11; Figs. 1-2 & 4; para [0065]: "an open, essentially rectangular and horizontally oriented frame 11");

a front tiltwing (31-32; Fig. 1; para [0069]: "two rudder elements 31,32 which can be pivoted about a horizontal axis laterally on the frame 11") pivotably coupled to the airchassis and configured to transition between a hovering configuration and a cruising configuration (intended use; as 31-32 are pivotably coupled to 11, they are considered capable of being tilted to suitable positions/configurations for hovering and cruising), the front tiltwing including: [a] a first propulsor configured to generate at least one of a tiltwing propulsor thrust or a tiltwing propulsor lift and] b) an aerodynamic lift surface (see 31-32 are aerodynamic lift surfaces; Fig. 1);

a counterbalance propulsor system (70-72; Fig. 1; para [0071]: "[t]he rotor 70 comprises two rotor blades 71, 72") coupled to the airchassis (see 70-72 are coupled to 11 via 63 and 60; Fig. 1), the counterbalance propulsor system configured to balance gravitational, aerodynamic, thrust and lift forces and torques caused by the front tiltwing (intended use; para [0072]: "[t]he propellers 76, 77 can be variable-pitch propellers. They supply the rotational energy of the rotor 70 in vertical flight and, if necessary, additional drive force in the flight direction in horizontal flight"), the counterbalance propulsor system including a second propulsor (see 71-72 comprising propulsors 74-77; Fig. 1; para [0072]: "[a]t the outer end of the main area 71.2, 72.2 there is a propeller drive 74, 75 with a propeller 76, 77 arranged thereon") configured to generate at least one of thrust or lift (intended use; para [0072]: "[t]he propellers 76, 77 can be variable-pitch propellers. They supply the rotational energy of the rotor 70 in vertical flight and, if necessary, additional drive force in the flight direction in horizontal flight"); and a control unit (para [0068]: "[t]he fuselage front part 13 and the fuselage rear part 14 take on components required for flight operations, such. B. control electronics"). Conca does not specifically teach wherein the front tiltwing further comprising:

a first propulsor configured to generate at least one of a tiltwing propulsor thrust or a tiltwing propulsor lift. However, Bell teaches a multicopter (10; Figs. 1A-B) comprising:

a fuselage (12; Figs. 1A-B; para [0018]: "a fuselage 12");

a front tiltwing (20; Figs. 1A-B; para [0019]: "[d]ual tiltwing assembly 18 includes a forward wing 20") configured to transition between a hovering configuration (Fig. 1A) and a cruising configuration (Fig. 1B; para [0019]: "a dual tiltwing assembly 18 that is operable to transition between a vertical lift orientation, as best seen in FIGS. 1A ... and a forward thrust orientation, as best seen in FIGS. 1B"), the front tiltwing including: a) a first propulsor (see 24 attached to 20; Figs. 1A-B; para [0020]: "[t]he propulsion assemblies 24 of forward wing 20 may be referred to as forward propulsion assemblies") configured to generate at least one of a tiltwing propulsor thrust (para [0023]: "each propulsion assembly 24 may be operable for independent thrust vectoring") or a tiltwing propulsor lift (para [0028]: "each propulsion assembly 24 to generate lift") and b) an aerodynamic lift surface (see that 20 is an aerodynamic lift surface; Fig. 1A-B). However, the prior art does not disclose/teach individually nor fairly suggest in combination wherein the front tiltwing further comprising a first propulsor configured to generate at least one of a tiltwing propulsor thrust or a tiltwing propulsor lift.

Regarding claims 2-9, the prior art does not teach nor fairly suggest the multicopter as claimed since they are dependent upon claim 1.

-*-Continued in Supplemental Box-*

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/US 20/36936

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Regarding claim 9, the terms "the front passively-adjusting tiltwing" and "a single airchassis" lack antecedent basis and have been interpreted to be "the front tiltwing" and "the airchassis".

Regarding claims 10-12, the terms "the fuselage" and "the front passively-adjusting tiltwing" lack antecedent basis and have been interpreted to be "the single fuselage" and "the single front passively-adjusting tiltwing".

Regarding claim 15, the second recitation of "a front tiltwing" and the term "the tiltwing propulsor lift" lack antecedent basis and have been interpreted to be "the front tiltwing" and "the front tiltwing propulsor lift".

Regarding claim 19, the term "a front tiltwing" lacks antecedent basis and has been interpreted to be "the front tiltwing".

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.

PCT/US 20/36936

Supplemental Box

In case the space in any of the preceding boxes is not sufficient.

Continuation of:

-*-International Patent Classification (IPC) or both national classification and IPC-*

IPC - B64C 3/38, B64C 27/52, B64C 9/04, B64D 35/04, B64C 19/02, B64C 13/16, B64D 27/24, B64D 31/02, B64C 29/00, B64C 17/04, B64C 27/28, B64C 29/02, B64C 13/28, B64C 27/26, B64C 29/00, B64C 39/08, B64C 39/12, B64C 1/26, B64C 11/46, B64C 15/02, B64D 31/12, B64D 33/08 (2021.01)

CPC - B64C 39/024, B64C 29/0033, B64C 2201/027, B64C 2201/104, B64C 2201/108, B64C 27/001, B64C 2027/004, B64C 3/38, B64C 27/52, B64C 9/04, B64D 35/04, B64C 19/02, B64C 13/16, B64D 27/24, B64D 31/02, B64C 29/00, B64C 31/036, B64C 2201/021, B64C 2201/024, B64C 2201/048, B64C 2201/128, B64C 29/0025, B64C 3/385, B64C 2201/088, B64C 17/04, B64C 27/28, B64C 29/02, B64C 13/28, B64C 27/26, B64C 29/00, B64C 39/08, B64C 39/12, B64C 1/26, B64C 11/46, B64C 15/02, B64D 31/12, B64D 33/08

-*-Box V.2 - Citations and Explanations-*

Regarding claim 10, Bell teaches a multicopter (10; Figs. 1A-B) comprising a single front [passively-adjusting] tilting wing (20; Figs. 1A-B; para [0019]: "[d]ual tilting assembly 18 includes a forward wing 20") in front of a single fuselage (12; Figs. 1A-B; para [0018]: "a fuselage 12"), a tilting propulsor (see 24 attached to 20; Figs. 1A-B; para [0020]: "[t]he propulsion assemblies 24 of forward wing 20 may be referred to as forward propulsion assemblies"), at least one counterbalance propulsor (see 24 attached to aft tilting wing 22; Figs. 1A-B; para [0020]: "the propulsion assemblies 24 of aft wing 22 may be referred to as aft propulsion assemblies"), a plurality of longitudinally-extending lift-generating surfaces (12, 20, 80a, 90a & 92a; Figs. 1E-F; para [0033]: "synchronizing link 88a has an outer housing 90a and floating link 86a has an outer housing 92a that nest together to form a generally airfoil shaped assembly"), and a total multicopter weight (all multicopter has a total weight);

the plurality of longitudinally-extending lift-generating surfaces comprising the single fuselage, the single front [passively-adjusting] tilting, and an arm (80a; Figs. 1E-F) mechanically connecting the single front [passively-adjusting] tilting to the single fuselage (see 80a connecting 20 to 12; Figs. 1E-F; para [0030]-[0031]: "a fixed link 72 formed by fuselage 12 ... an output link 80a coupled between fixed link 72 and forward wing 20"); wherein the plurality of longitudinally-extending lift-generating surfaces forms a lift path (see the lift path formed by the longitudinally-extending lift-generating surfaces in Fig. 1F), but the prior art does not teach nor fairly suggest wherein the single front tilting is a passively-adjusting tilting and wherein lift provided by the single front passively-adjusting tilting is less than half total multicopter weight.

Regarding claims 11-14, the prior art does not teach nor fairly suggest the multicopter as claimed since they are dependent upon claim 10.

Regarding claim 15, Bell discloses a landing method (Figs. 3E-I; para [0037]: "[w]hen aircraft 10 begins its approaches to the destination, any propulsion assemblies 24 that were shut down or operated at a reduced speed are reengaged to provide full propulsion capabilities. Aircraft 10 may now begin its transition from forward flight mode to vertical takeoff and landing flight mode. As best seen in FIGS. 3E - 3H, dual tilting assembly 18 transitions from forward thrust orientation, as best seen in FIG. 3E, to vertical lift orientation, as best seen in FIG. 3H") for landing a multicopter (see 10 in Figs. 3E-I detailed Figs. 1A-B) [comprising a plurality of failsafe methods];

the multicopter comprising a front tilting wing (20; Figs. 1A-B; para [0019]: "[d]ual tilting assembly 18 includes a forward wing 20"), a vehicle center of gravity (all vehicle has a center of gravity), a front tilting propulsor thrust (see 24 attached to 20; Figs. 1A-B; para [0020]: "[t]he propulsion assemblies 24 of forward wing 20 may be referred to as forward propulsion assemblies" and para [0023]: "each propulsion assembly 24 may be operable for independent thrust vectoring"), a front tilting propulsor lift (para [0028]: "each propulsion assembly 24 to generate lift"), a front tilting propulsor force said front tilting propulsor force being a vector sum of the front tilting propulsor thrust and the front tilting propulsor lift (as 24 can generate thrust and lift, it thus has front tilting propulsor force), a ratio of tilting propulsor thrust to lift (as 24 can generate thrust and lift, it thus has ratio of the thrust to lift), the front tilting propulsor lift, a total multicopter lift (with the aerodynamic shape of 10, it thus has total lift), a total multicopter thrust (with the propulsion assembly 24, the multicopter 10 thus has total thrust), but the prior art does not teach nor fairly suggest wherein the method further comprising a plurality of failsafe methods: a first failsafe method, and a second failsafe method;

the second failsafe method comprising transitioning the front tilting to a position wherein the front tilting propulsor lift is greater than one third of the total multicopter lift and the front tilting propulsor lift is greater than the total multicopter thrust; and

the first failsafe method comprising transitioning the front tilting to a position wherein the total multicopter lift is more than four times greater than the front tilting propulsor lift and the tilting propulsor thrust is at least eighty percent of the total multicopter thrust.

Regarding claims 16-20, the prior art does not teach nor fairly suggest the landing method as claimed since they are dependent upon claim 15.

Claims 1-20 have industrial applicability as defined by PCT Article 33(4) because the subject matter can be made or used by industry.

SEARCH HISTORY

Application Number	PCT/US 20/36936
Search Conducted By	VY
Search Approved By	SCL
CPC/IPC Classifications Searched	<p>IPC (8) B64C 3/38, B64C 27/52, B64C 9/04, B64D 35/04, B64C 19/02, B64C 13/16, B64D 27/24, B64D 31/02, B64C 29/00, B64C 17/04, B64C 27/28, B64C 29/02, B64C 13/28, B64C 27/26, B64C 29/00, B64C 39/08, B64C 39/12, B64C 1/26, B64C 11/46, B64C 15/02, B64D 31/12, B64D 33/08 (2021.01)</p> <p>CPC: B64C 39/024, B64C 29/0033, B64C 2201/027, B64C 2201/104, B64C 2201/108, B64C 27/001, B64C 2027/004, B64C 3/38, B64C 27/52, B64C 9/04, B64D 35/04, B64C 19/02, B64C 13/16, B64D 27/24, B64D 31/02, B64C 29/00, B64C 31/036, B64C 2201/021, B64C 2201/024, B64C 2201/048, B64C 2201/128, B64C 29/0025, B64C 3/385, B64C 2201/088, B64C 17/04, B64C 27/28, B64C 29/02, B64C 13/28, B64C 27/26, B64C 29/00, B64C 39/08, B64C 39/12, B64C 1/26, B64C 11/46, B64C 15/02, B64D 31/12, B64D 33/08</p>
Date Conducted	29 January 2021 (29.01.2021)
Documentation Searched	<p>IPC (8) B64C 3/38, B64C 27/52, B64C 9/04, B64D 35/04, B64C 19/02, B64C 13/16, B64D 27/24, B64D 31/02, B64C 29/00, B64C 17/04, B64C 27/28, B64C 29/02, B64C 13/28, B64C 27/26, B64C 29/00, B64C 39/08, B64C 39/12, B64C 1/26, B64C 11/46, B64C 15/02, B64D 31/12, B64D 33/08 (2021.01)</p> <p>CPC: B64C 39/024, B64C 29/0033, B64C 2201/027, B64C 2201/104, B64C 2201/108, B64C 27/001, B64C 2027/004, B64C 3/38, B64C 27/52, B64C 9/04, B64D 35/04, B64C 19/02, B64C 13/16, B64D 27/24, B64D 31/02, B64C 29/00, B64C 31/036, B64C 2201/021, B64C 2201/024, B64C 2201/048, B64C 2201/128, B64C 29/0025, B64C 3/385, B64C 2201/088, B64C 17/04, B64C 27/28, B64C 29/02, B64C 13/28, B64C 27/26, B64C 29/00, B64C 39/08, B64C 39/12, B64C 1/26, B64C 11/46, B64C 15/02, B64D 31/12, B64D 33/08 (keyword limited; terms below)</p>
Search Terms Used	Tiltwing tilt wing propulsor rotor propeller proprotor multicopter aircraft bicopter fuselage chassis frame* body case skeleton unmanned aerial vehicle system drone vertical takeoff land*

Date Conducted	29 January 2021 (29.01.2021)
Electronic Database Searched	PatBase
Files Searched	Full-text: AU BE BR CA CH CN DE DK EP ES FI FR GB IN JP KR SE TH TW US WO Bibliographic: (European) AT BA BE BG CH CS CY CZ DD DK EE ES FI GE GR HR HU IE IS IT LT LU LV MC MD MT NL NO PL PT RO RS SE SI SK SM TR UA YU (Asia) EA GC HK ID IL IN KZ MN MY PH RU SG SU TH TJ TW UZ VN (North America) CA CR CU DO GT HN MX NI PA SV TT (South America) AR BR CL CO EC PE UY (Australasia) AU NZ (Africa) AP DZ EG KE MA MW OA ZA ZM ZW
Date Conducted	29 January 2021 (29.01.2021)
Search Logic:	
<p>Search 1: pa=(suppes near family near trust) (Results 5) Search 2: inv=(galen near suppes) (Results 18) Search 3: 2 not 1 (Results 13) Search 4: PN=(US20200255128 or US10589838) (Results 1) Search 5: cta 4 (Results 6) Search 6: cta 5 (Results 184) Search 7: 6 not (1 or 2 or 4 or 5) (Results 181) Search 8: PN=(US4899957 or US10351235 or US685939 or US7070145 or US10252796 or US20180086442) (Results 6) Search 9: cta 8 (Results 225) Search 10: 9 not (1 or 2 or 4 or 5 or 6 or 8) (Results 169) Search 11: PN=(US2011315809 or US2006006279 or US3081964 or US2009014580 or US2005045762) (Results 5) Search 12: IC=(B64C3/38 or B64C27/52 or B64C9/04 or B64D35/04 or B64C19/02 or B64C13/16 or B64D27/24 or B64D31/02 or B64C29/00) (Results 16474) Search 13: 12 and FT=(tiltwing) (Results 77) Search 14: 13 not (1 or 2 or 4 or 5 or 6 or 8 or 9 or 11) (Results 52) Search 15: 12 and FT=(tilt near wing) (Results 471) Search 16: 15 and FT=((tilt near wing) near (propulsor or rotor or propeller or propotor)) (Results 243) Search 17: 16 not (1 or 2 or 4 or 5 or 6 or 8 or 9 or 11 or 13) (Results 193) Search 18: CPC=(B64C39/024 or B64C29/0033 or B64C2201/027 or B64C2201/104 or B64C2201/108 or B64C27/001 or B64C2027/004 or B64C3/38 or B64C27/52 or B64C9/04 or B64D35/04 or B64C19/02 or B64C13/16 or B64D27/24 or B64D31/02 or B64C29/00) (Results 18711) Search 19: 18 and FT=(tiltwing) (Results 98) Search 20: 19 not (1 or 2 or 4 or 5 or 6 or 8 or 9 or 11 or 13 or 16) (Results 17) Search 21: 18 and FT=((tilt near wing) near (propulsor or rotor or propeller or propotor)) (Results 272) Search 22: 21 not (1 or 2 or 4 or 5 or 6 or 8 or 9 or 11 or 13 or 16 or 19) (Results 68) Search 23: FT=(multicopter or aircraft or bicopter) (Results 491722) Search 24: 23 and FT=(tiltwing) (Results 136)</p>	

Search 25: 24 not (1 or 2 or 4 or 5 or 6 or 8 or 9 or 11 or 13 or 16 or 19 or 21) (Results 33)

Search 26: 23 and FT=((tilt near wing) near (propulsor or rotor or propeller or proprotor)) (Results 737)

Search 27: 26 and FT=(fuselage or chassis or frame* or body or case or skeleton) (Results 559)

Search 28: 27 not (1 or 2 or 4 or 5 or 6 or 8 or 9 or 11 or 13 or 16 or 19 or 21 or 24) (Results 291)

Search 29: FT=((unmanned near aerial near (vehicle or system)) or drone) (Results 94712)

Search 30: 29 and FT=(tiltwing) (Results 32)

Search 31: 30 not (1 or 2 or 4 or 5 or 6 or 8 or 9 or 11 or 13 or 16 or 19 or 21 or 24 or 27) (Results 1)

Search 32: 29 and FT=((tilt near wing) near (propulsor or rotor or propeller or proprotor)) (Results 150)

Search 33: 32 not (1 or 2 or 4 or 5 or 6 or 8 or 9 or 11 or 13 or 16 or 19 or 21 or 24 or 27 or 30) (Results 22)

Search 34: PN=(US20200317332 or US2020324885) (Results 2)

Search 35: cta 34 (Results 11)

Search 36: PN=(US2019031333 or US2014097290) (Results 2)

Search 37: cta 36 (Results 86)

Search 38: 37 not (1 or 2 or 4 or 5 or 6 or 8 or 9 or 11 or 13 or 16 or 19 or 21 or 24 or 27 or 30 or 32 or 34 or 35 or 36) (Results 64)

Search 39: FT=(vertical near (takeoff or land*)) (Results 17836)

Search 40: 39 and FT=(tiltwing) (Results 103)

Search 41: 40 not (1 or 2 or 4 or 5 or 6 or 8 or 9 or 11 or 13 or 16 or 19 or 21 or 24 or 27 or 30 or 32 or 34 or 35 or 36 or 37) (Results 0)

Search 42: 39 and FT=((tilt near wing) near (propulsor or rotor or propeller or proprotor)) (Results 336)

Search 43: 42 not (1 or 2 or 4 or 5 or 6 or 8 or 9 or 11 or 13 or 16 or 19 or 21 or 24 or 27 or 30 or 32 or 34 or 35 or 36 or 37 or 40) (Results 39)

Search 44: IC=(B64C17/04 or B64C27/28 or B64C29/02 or B64C13/28 or B64C27/26 or B64C29/00 or B64C39/08 or B64C39/12 or B64C1/26 or B64C11/46 or B64C15/02 or B64D31/12 or B64D33/08) (Results 14318)

Search 45: 44 and FT=(tiltwing) (Results 87)

Search 46: 45 not (1 or 2 or 4 or 5 or 6 or 8 or 9 or 11 or 13 or 16 or 19 or 21 or 24 or 27 or 30 or 32 or 34 or 35 or 36 or 37 or 40 or 42) (Results 0)

Search 47: 45 and FT=((tilt near wing) near (propulsor or rotor or propeller or proprotor)) (Results 12)

Search 48: 47 not (1 or 2 or 4 or 5 or 6 or 8 or 9 or 11 or 13 or 16 or 19 or 21 or 24 or 27 or 30 or 32 or 34 or 35 or 36 or 37 or 40 or 42 or 45) (Results 0)

Search 49: CPC=(B64C31/036 or B64C2201/021 or B64C2201/024 or B64C2201/048 or B64C2201/128 or B64C29/0025 or B64C3/385 or B64C2201/088 or B64C17/04 or B64C27/28 or B64C29/02 or B64C13/28 or B64C27/26 or B64C29/00 or B64C39/08 or B64C39/12 or B64C1/26 or B64C11/46 or B64C15/02 or B64D31/12 or B64D33/08) (Results 13999)

Search 50: 49 and FT=(tiltwing) (Results 75)

Search 51: 50 not (1 or 2 or 4 or 5 or 6 or 8 or 9 or 11 or 13 or 16 or 19 or 21 or 24 or 27 or 30 or 32 or 34 or 35 or 36 or 37 or 40 or 42 or 45 or 47) (Results 0)

Search 52: 49 and FT=((tilt near wing) near (propulsor or rotor or propeller or proprotor)) (Results 140)

Search 53: 52 not (1 or 2 or 4 or 5 or 6 or 8 or 9 or 11 or 13 or 16 or 19 or 21 or 24 or 27 or 30 or 32 or 34 or 35 or 36 or 37 or 40 or 42 or 45 or 47 or 50) (Results 2)

Electronic Database Searched	Google
Files Searched	Google Patents
Date Conducted	29 January 2021 (29.01.2021)
Search Logic:	
Multicopter multicopter with improved propulsor and failsafe operation multicopter with failsafe operation	

Electronic Database Searched	Google
Files Searched	Google Web
Date Conducted	29 January 2021 (29.01.2021)
Search Logic:	
Multicopter multicopter with improved propulsor and failsafe operation multicopter with failsafe operation	