

PATENT COOPERATION TREATY

PCT

From the INTERNATIONAL SEARCHING AUTHORITY

To:
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INVITATION TO PAY ADDITIONAL FEES
 AND, WHERE APPLICABLE, PROTEST FEE
 (PCT Article 17(3)(a) and Rule 40.1 and 40.2(e))

	Date of mailing <i>(day/month/year)</i>
	12 December 2018 (12-12-2018)
Applicant's or agent's file reference J1125BPCT	PAYMENT DUE within ONE MONTH from the above date of mailing
International application No. PCT/US2018/048998	International filing date <i>(day/month/year)</i>
	31 August 2018 (31-08-2018)
Applicant APPLE INC.	

1. This International Searching Authority

(i) considers that there are 4 *(number of)* inventions claimed in the international application covered by the claims indicated on an extra sheet:

(ii) therefore considers that **the international application does not comply with the requirements of unity of invention** (Rules 13.1, 13.2 and 13.3) for the reasons indicated on an extra sheet:

(iii) has carried out a partial international search (see Annex) will establish the international search report on those parts of the international application which relate to the invention first mentioned in claims Nos.:
see extra sheet

(iv) will establish the international search report on the other parts of the international application only if, and to the extent to which, additional fees are paid.

2. Consequently, the applicant is hereby **invited to pay**, within the time limit indicated above, the amount indicated below:

<u>EUR 1.775,00</u>	x	<u>3</u>	=	<u>EUR 5.325,00</u>
Fee per additional invention		number of additional inventions		currency/total amount of additional fees

3. The applicant is informed that, according to Rule 40.2(c), **the payment of any additional fee may be made under protest**, i.e., a reasoned statement to the effect that the international application complies with the requirement of unity of invention or that the amount of the required additional fee is excessive, where applicable, subject to the payment of a protest fee.
 Where the applicant pays additional fees under protest, the applicant is hereby invited, within the time limit indicated above, to pay a protest fee (Rule 40.2(e)) in the amount of EUR 875,00 *(currency/amount)*

Where the applicant has not, within the time limit indicated above, paid the required protest fee, the protest will be considered not to have been made and the International Searching Authority will so declare.

4. Claim(s) Nos. _____ have been found to be unsearchable under Article 17(2)(b) because of defects under Article 17(2)(a) and therefore have not been included with any invention.

Name and mailing address of the International Searching Authority European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040 Fax: (+31-70) 340-3016	Authorized officer GALLEGO, Antonio Tel: +49 (0)89 2399-81 02
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This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-12

A head-mounted display, having a housing, a headband and an headband adjustment mechanism responsive to a control signal generated by a feedback component, and an eye tracking system that is operable to measure motion of the housing relative to the eyes of the user, wherein the control signal is based in part on the motion of the housing relative to the eyes of the user (i.e. the combination of features of claims 1 and 10).

2. claims: 13-15

A head-mounted display, having a housing, a headband and an headband adjustment mechanism responsive to a control signal generated by a feedback component, wherein the adjustment mechanism includes a variable volume structure that changes fit of the headband relative to the head of the user by volumetric expansion or volumetric contraction (i.e. the combination of features of independent claim 13).

3. claims: 16-18

A method for adjusting a head-mounted display, comprising: loosening a headband upon detecting user contact with a first location and a second location on the housing; and tightening the headband upon detecting cessation of user contact with the first location or the second location on the housing (i.e. the combination of features of independent claim 16).

4. claims: 19-23

A head-mounted display, having a housing, a headband and a support to extend over a head of the user, having a first portion that is connected to the housing, a second portion that is adjustably connected to the first portion, and a third portion that is adjustably connected to the second portion, wherein the third portion defines a free end for the support assembly that is free from connection to the housing (i.e. the combination of features of independent claim 19).

1.1 Reference is made to the following document:

D1 = JP 2009 111512 A (CANON KK) 21 May 2009

D2 = CN 106 054 391 A (SHANGHAI LEWO I TECH CO LTD) 26 October 2016

D3 = CN 107 076 995 A (SZ DJI TECHNOLOGY CO LTD) 18 August 2017

D4 = JP H09 179061 A (OLYMPUS OPTICAL CO) 11 July 1997

1.1.1 D1 discloses in Fig.1,2 and corresponding text, a head-mounted display to be worn by a user, comprising:

- a housing 1;
- an eye box chamber to be positioned adjacent to eyes of the user; and
- a support assembly 2 that includes a headband 24,29, 34 and
- an adjustment mechanism 27, 31 that is operable to change fit of the headband relative to a head of the user in response to a control signal,
- wherein the adjustment mechanism includes a feedback component, and the control signal is generated based on output from the feedback component (s. par.14,15).

1.1.2 Also D2 discloses in Fig.1,3 and corresponding text (in particular description second last, third last and fourth last paragraphs) a head-mounted display to be worn by a user, comprising:

- a housing 1;
- an eye box chamber to be positioned adjacent to eyes of the user;
- a support assembly that includes a headband 2 and
- an adjustment mechanism 5,6 that is operable to change fit of the headband relative to a head of the user in response to a control signal,
- wherein the adjustment mechanism includes a feedback component, and the control signal is generated based on output from the feedback component.

1.1.3 Hence, claim 1 reads on each of D1 and D2, and therefore does not fulfill the requirements of Art.33(2) PCT.

1.2 Also the subject-matter of the following claims is known from D1:

claim 7 (see fig.1,2, and par.14,15),

claim 9 (see push button switches 68,69)

1.3 The subject-matter of claims 2, 4, 5, 12 is known from D2.

1.4 Concerning claim 3, reference is made to D3, fig.1-4.

1.5 Concerning claim 6, reference is made to D4, par.60.

1.6 Still concerning claim 7, reference is made also to D4, par.62-64.

1.7 Concerning claim 8, reference is made to D4, par.63.

1.8 However, the features of claim 10 (an eye tracking system that is operable to measure motion of the display relative to the eyes of the user, wherein the control signal is based in part on the motion of the housing relative to the eyes of the user) are not apparently known from the above documents. Hence, these features constitute the contribution to the art, or special technical feature stf of group 1. These features lead to a stable position of the display upon movement.

1.9 The following feature of claim 13 is not apparently known from D1 or D2: the adjustment mechanism includes a variable volume structure that changes fit of the headband relative to the head of the user by volumetric expansion or volumetric contraction. Hence, these features constitute the contribution to the art, or special technical feature stf of group 2. This feature leads to an alternative fixing mechanism.

1.10 Concerning claim 16, D1 discloses a method for adjusting a head-mounted display, comprising loosening an adjustable headband relative to a housing in response to detecting user contact, and tightening the adjustable headband relative to the housing. The features of detecting user contact with a first location 27 and a second location on the housing, and of responding to detecting cessation of user contact with the first location or the second location on the housing is not apparently disclosed in D1. Hence, these features constitute the contribution to the art, or special technical feature stf of group 3.

This feature leads to an alternative method of using.

1.11 Concerning claim 16, D2 discloses a support assembly that is configured to extend over a head of the user, has a first portion 2 that is connected to the housing 1. However, D2 does not disclose a second portion that is adjustably connected to the first portion, and a third portion that is adjustably connected to the second portion, wherein the third portion defines a free end for the support assembly that is free from connection to the housing. Hence, these features constitute the contribution to the art, or special technical feature stf of group 4. This feature leads to an support assembly having more degrees of freedom.

1.12 It is immediately obvious that the stf of the above groups of claims are not the same, and that the effects of each of these stf is different from the effects of the other stf. Hence, the stf are not the same, and do not correspond to each other within the meaning of Rule 13.2 PCT. Hence, the above groups of claims are not so linked as to form a single general inventive concept within the meaning of Rule 13.1 PCT.

1. The present communication is an Annex to the invitation to pay additional fees (Form PCT/ISA/206). It shows the results of the international search established on the parts of the international application which relate to the invention first mentioned in claims Nos.:
- see 'Invitation to pay additional fees'
2. This communication is not the international search report which will be established according to Article 18 and Rule 43.
3. If the applicant does not pay any additional search fees, the information appearing in this communication will be considered as the result of the international search and will be included as such in the international search report.
4. If the applicant pays additional fees, the international search report will contain both the information appearing in this communication and the results of the international search on other parts of the international application for which such fees will have been paid.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 106 054 391 A (SHANGHAI LEWO INFORMATION TECH CO LTD) 26 October 2016 (2016-10-26)	1,7,9
Y A	abstract; figures 1,2 paragraphs [0014], [0015] -----	3,6-8,10 11
X	JP 2009 111512 A (CANON KK) 21 May 2009 (2009-05-21)	1,2,4,5, 12
Y A	abstract; figures 1,3 -----	3,6-8,10 11
Y	CN 107 076 995 A (SZ DJI TECHNOLOGY CO LTD) 18 August 2017 (2017-08-18) figures 1-4	3
Y	JP H09 179061 A (OLYMPUS OPTICAL CO) 11 July 1997 (1997-07-11) paragraphs [0060], [0062] - [0064] -----	6-8
Y	US 9 128 283 B1 (HEINRICH MITCHELL JOSEPH [US] ET AL) 8 September 2015 (2015-09-08) column 9, lines 42-57; claim 12; figures 1B,5	10
X,P	US 2018/046147 A1 (AGHARA SANJAY R [IN] ET AL) 15 February 2018 (2018-02-15) paragraphs [0046], [0053], [0064] ----- -/--	1,2,4,5, 7-9,12



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

° Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "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

- "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
- "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
- "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.
- "&" document member of the same patent family

**Annex to Form PCT/ISA/206
COMMUNICATION RELATING TO THE RESULTS
OF THE PARTIAL INTERNATIONAL SEARCH**

International Application No
PCT/US2018/048998

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A,P	US 2017/277254 A1 (OSMAN STEVEN [US]) 28 September 2017 (2017-09-28) abstract paragraph [0063]; figures 5-7 -----	11

Patent Family Annex

Information on patent family members

International Application No PCT/US2018/048998
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
CN 106054391	A	26-10-2016	NONE

JP 2009111512	A	21-05-2009	JP 5004751 B2 22-08-2012
			JP 2009111512 A 21-05-2009

CN 107076995	A	18-08-2017	CN 107076995 A 18-08-2017
			WO 2018058276 A1 05-04-2018

JP H09179061	A	11-07-1997	NONE

US 9128283	B1	08-09-2015	NONE

US 2018046147	A1	15-02-2018	US 2018046147 A1 15-02-2018
			WO 2018031209 A2 15-02-2018

US 2017277254	A1	28-09-2017	US 2017276943 A1 28-09-2017
			US 2017277254 A1 28-09-2017

Application no:
Demande n°: PCT/US2018/048998
Anmelde-Nr:

DISCLAIMER

The attached provisional opinion on the patentability of the first invention searched serves only as information.
A reply addressing the points raised in the opinion is **not** required and will **not** be taken into account when issuing the final search report and opinion on patentability.

AVERTISSEMENT

L'avis provisoire ci-joint sur la brevetabilité de la première invention recherchée ne sert qu'à titre d'information.
Une réponse abordant les points soulevés dans l'avis n'est **pas** nécessaire et ne sera **pas** prise en compte lors de l'établissement du rapport final de la recherche et de l'avis sur la brevetabilité.

DISCLAIMER

Die beigefügte vorläufige Stellungnahme zur Patentierbarkeit der ersten geprüften Erfindung dient lediglich zur Information.
Eine Antwort auf die erhobenen Punkte in der Stellungnahme ist **nicht** erforderlich und bleibt bei der Erstellung des endgültigen Recherchenberichts und der Stellungnahme zur Patentierbarkeit **unberücksichtigt**.

Documents:

- D1 = JP 2009 111512 A (CANON KK) 21 May 2009
D2 = CN 106 054 391 A (SHANGHAI LEWO I TECH CO LTD) 26 October 2016
D3 = CN 107 076 995 A (SZ DJI TECHNOLOGY CO LTD) 18 August 2017
D4 = JP H09 179061 A (OLYMPUS OPTICAL CO) 11 July 1997
D5 = US 9 128 283 B1 (HEINRICH M JOSEPH [US] ET AL) 8 September 2015

Item IV

- 1 This Authority considers that the following groups of claims are not so linked as to form a single general inventive concept, as required by Rule 13.1 PCT:

Group 1(claims 1-12):

A head-mounted display, having a housing, a headband and an headband adjustment mechanism responsive to a control signal generated by a feedback component,
and an eye tracking system that is operable to measure motion of the housing relative to the eyes of the user, wherein the control signal is based in part on the motion of the housing relative to the eyes of the user (i.e. the combination of features of claims **1 and 10**).

Group 2(claims 13-15):

A head-mounted display, having a housing, a headband and an headband adjustment mechanism responsive to a control signal generated by a feedback component,
wherein the adjustment mechanism includes a variable volume structure that changes fit of the headband relative to the head of the user by volumetric expansion or volumetric contraction (i.e. the combination of features of independent claim 13).

Group 3(claims 16-18):

A method for adjusting a head-mounted display, comprising:
loosening a headband upon detecting user contact with a first location and a second location on the housing; and
tightening the headband upon detecting cessation of user contact with the first location or the second location on the housing (i.e. the combination of features of independent claim 16).

Group 4(claims 19-23):

A head-mounted display, having a housing, a headband and a support to extend over a head of the user, having a first portion that is connected to the

housing, a second portion that is adjustably connected to the first portion, and a third portion that is adjustably connected to the second portion, wherein the third portion defines a free end for the support assembly that is free from connection to the housing (i.e. the combination of features of independent claim 19).

1.1 Reference is made to the following document:

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1.1.1 D1 discloses in Fig.1,2 and corresponding text, a head-mounted display to be worn by a user, comprising:

- a housing 1;
- an eye box chamber to be positioned adjacent to eyes of the user; and
- a support assembly 2 that includes a headband 24,29, 34 and
- an adjustment mechanism 27, 31 that is operable to change fit of the headband relative to a head of the user in response to a control signal,
- wherein the adjustment mechanism includes a feedback component, and the control signal is generated based on output from the feedback component (s. par.14,15).

1.1.2 Also D2 discloses in Fig.1,3 and corresponding text (in particular description second last, third last and fourth last paragraphs) a head-mounted display to be worn by a user, comprising:

- a housing 1;
- an eye box chamber to be positioned adjacent to eyes of the user;
- a support assembly that includes a headband 2 and
- an adjustment mechanism 5,6 that is operable to change fit of the headband relative to a head of the user in response to a control signal,
- wherein the adjustment mechanism includes a feedback component, and the control signal is generated based on output from the feedback component.

1.1.3 Hence, claim 1 reads on each of D1 and D2, and therefore does not fulfill the requirements of Art.33(2) PCT.

1.2 Also the subject-matter of the following claims is known from D1:

- claim 7 (see fig.1,2, and par.14,15),
claim 9 (see push button switches 68,69)
- 1.3 The subject-matter of claims 2, 4, 5, 12 is known from D2.
- 1.4 Concerning claim 3, reference is made to D3, fig.1-4.
- 1.5 Concerning claim 6, reference is made to D4, par.60.
- 1.6 Still concerning claim 7, reference is made also to D4, par.62-64.
- 1.7 Concerning claim 8, reference is made to D4, par.63.
- 1.8 However, the features of claim 10 (an an eye tracking system that is operable to measure motion of the display relative to the eyes of the user, wherein the control signal is based in part on the motion of the housing relative to the eyes of the user) are not apparently known from the above documents. Hence, these features constitute the contribution to the art, or special technical feature **stf** of group 1. These features lead to a stable position of the display upon movement.
- 1.9 The following feature of claim 13 is not apparently known from D1 or D2: the adjustment mechanism includes a variable volume structure that changes fit of the headband relative to the head of the user by volumetric expansion or volumetric contraction. Hence, these features constitute the contribution to the art, or special technical feature **stf** of group 2. This feature leads to an alternative fixing mechanism.
- 1.10 Concerning claim 16, D1 discloses a method for adjusting a head-mounted display, comprising loosening an adjustable headband relative to a housing in response to detecting user contact, and tightening the adjustable headband relative to the housing. The features of detecting user contact with a first location 27 and a second location on the housing, and of responding to detecting cessation of user contact with the first location or the second location on the housing is not apparently disclosed in D1. Hence, these features constitute the contribution to the art, or special technical feature **stf** of group 3. This feature leads to an alternative method of using.
- 1.11 Concerning claim 16, D2 discloses a support assembly that is configured to extend over a head of the user, has a first portion 2 that is connected to the housing 1. However, D2 does not disclose a second portion that is adjustably connected to the first portion, and a third portion that is adjustably connected to the second portion, wherein the third portion defines a free end for the support assembly that is free from connection to the housing. Hence, these features constitute the contribution to the art, or special technical feature **stf**

of group 4. This feature leads to an support assembly having more degrees of freedom.

- 1.12 It is immediately obvious that the stf of the above groups of claims are not the same, and that the effects of each of these stf is different from the effects of the other stf. Hence, the stf are not the same, and do not correspond to each other within the meaning of Rule 13.2 PCT. Hence, the above groups of claims are not so linked as to form a single general inventive concept within the meaning of Rule 13.1 PCT.

Item V

Concerning group 1 of claims(i.e. claims 1-12):

- 2 It is reminded that claims 1-9 and 12 are not novel or not inventive, as discussed above.
- 3 Concerning claim 10, D5 teaches in claim 12, col.9, lines 42-57, fig.1B & 5 an an eye tracking system that is operable to measure motion of the display relative to the eyes of the user, wherein the control signal is based in part on the motion of the housing relative to the eyes of the user.
- In order to improve the head mounted display of D1 or D2, a skilled person could be expected to incorporate the teaching of D5 into the head mounted display D1 or D2 having a housing, thereby arriving at the subject-matter of claim 10, which is not therefore inventive, contrary to the requirements of Art. 33(3) PCT.
- 4 In particular concerning claim 11, reference is made to Item VI.

Further Remarks:

- 4.1 The subject-matter claimed is industrially applicable.
- 4.2 The features of the claims are not provided with reference signs placed in parentheses (Rule 6.2(b) PCT).
- 4.3 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the documents cited is not mentioned in the description, nor are these documents identified therein.