

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**
(PCT Rule 43*bis*.1)

To:

see form PCT/ISA/220

Date of mailing
(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION
See paragraph 2 below

International application No.
PCT/US2018/048998

International filing date (day/month/year)
31.08.2018

Priority date (day/month/year)
07.09.2017

International Patent Classification (IPC) or both national classification and IPC
INV. G02B27/01 G02C3/00

Applicant
APPLE INC.

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 43*bis*.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 usually 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 66.1*bis*(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:



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Date of completion of this opinion

see form PCT/ISA/210

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Box No. I Basis of the 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 43bis.1(a))
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 13ter.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 13ter.1(a)).
 - on paper or in the form of an image file (Rule 13ter.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:

Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non obvious), or to be industrially applicable have not been examined in respect of

the entire international application

claims Nos. 13-23

because:

the said international application, or the said claims Nos. relate to the following subject matter which does not require an international search (*specify*):

the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):

the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed (*specify*):

no international search report has been established for the whole application or for said claims Nos. 13-23

a meaningful opinion could not be formed without the sequence listing; the applicant did not, within the prescribed time limit:

furnish a sequence listing in the form of an Annex C/ST.25 text file, and such listing was not available to the International Searching Authority in the form and manner acceptable to it; or the sequence listing furnished did not comply with the standard provided for in Annex C of the Administrative Instructions.

furnish a sequence listing on paper or in the form of an image file complying with the standard provided for in Annex C of the Administrative Instructions, and such listing was not available to the International Searching Authority in the form and manner acceptable to it; or the sequence listing furnished did not comply with the standard provided for in Annex C of the Administrative Instructions.

pay the required late furnishing fee for the furnishing of a sequence listing in response to an invitation under Rule 13ter.1(a) or (b).

See Supplemental Box for further details

Box No. IV Lack of unity of invention

1. In response to the invitation (Form PCT/ISA/206) to pay additional fees, the applicant has, within the applicable time limit:
- paid additional fees
 - paid additional fees under protest and, where applicable, the protest fee
 - paid additional fees under protest but the applicable protest fee was not paid
 - not paid additional fees
2. This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rule 13.1, 13.2 and 13.3 is
- complied with
 - not complied with for the following reasons:
see separate sheet
4. Consequently, this report has been established in respect of the following parts of the international application:
- all parts.
 - the parts relating to claims Nos. 1-12

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

1. Statement

Novelty (N)	Yes: Claims	<u>3, 6, 8, 10, 11</u>
	No: Claims	<u>1, 2, 4, 5, 7, 9, 12</u>
Inventive step (IS)	Yes: Claims	<u>11</u>
	No: Claims	<u>1-10, 12</u>
Industrial applicability (IA)	Yes: Claims	<u>1-12</u>
	No: Claims	

2. Citations and explanations

see separate sheet

Box No. VI Certain documents cited

1. Certain published documents (Rules 43*bis*.1 and 70.10)
and / or
2. Non-written disclosures (Rules 43*bis*.1 and 70.9)
see form 210

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:

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 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.