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(54) Title: APPARATUS FOR OPTICAL SEE-THROUGH HEAD MOUNTED DISPLAY WITH MUTUAL OCCLUSION AND OPAQUENESS CONTROL CAPABILITY

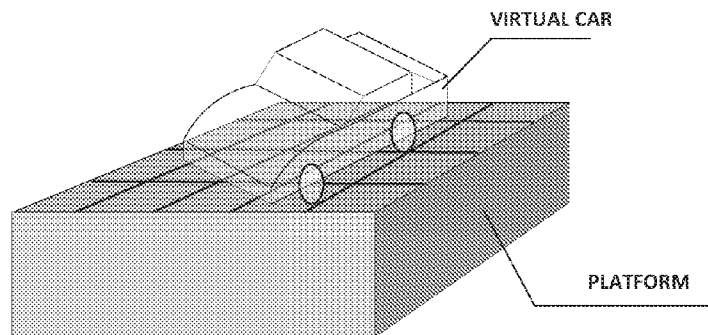


Fig. 1a

(57) Abstract: The present invention comprises a compact optical see-through head-mounted display capable of combining a see-through image path with a virtual image path such that the opaqueness of the see-through image path can be modulated and the virtual image occludes parts of the see-through image and vice versa. The present invention relates generally to Head Mounted Displays, and more particularly, but not exclusively, to optical see-through head-mounted displays with opaqueness control and mutual occlusion capability in which real objects may be occluded by computer-rendered virtual objects situated in front or vice versa.



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2013/035486

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(8) - G02B 27/01 (2014.01)

USPC - 345/8

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)

IPC(8) - G02B 27/01 (2014.01)

USPC - 345/7, 8, 9

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
CPC - G02B 27/017, 27/0172; G02B 2027/0172 (2014.01)

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

PatBase, Google Patents, Google Scholar

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2012/0068913 A1 (BAR-ZEEV et al) 22 March 2012 (22.03.2012) entire document	1-33, 36, 38-46
A	US 7,639,208 B1 (HA et al) 29 December 2009 (29.12.2009) entire document	1-33, 36, 38-46
A	US 2002/0113752 A1 (SULLIVAN et al) 22 August 2002 (22.08.2002) entire document	1-33, 36, 38-46
A	US 2005/0007673 A1 (CHAOULOV et al) 13 January 2005 (13.01.2005) entire document	1-33, 36, 38-46
A	US 2010/0202048 A1 (AMITAI et al) 12 August 2010 (12.08.2010) entire document	1-33, 36, 38-46
A	US 2011/0213664 A1 (OSTERHOUT et al) 01 September 2011 (01.09.2011) entire document	1-33, 36, 38-46
A	US 6,356,392 B1 (SPITZER) 12 March 2002 (12.03.2002) entire document	1-33, 36, 38-46
A	US 2001/0000677 A1 (TAKAGI et al) 03 May 2001 (03.05.2001) entire document	1-33, 36, 38-46
A	WO 2012/037290 A2 (OSTERHOUT et al) 22 March 2012 (22.03.2012) entire document	1-33, 36, 38-46

 Further documents are listed in the continuation of Box C.

\* 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 application or patent 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

"&amp;" document member of the same patent family

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03 January 2014

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/US2013/035486

**Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

- 1.  Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
- 2.  Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
- 3.  Claims Nos.: 34, 35, 37  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:

- 1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
- 2.  As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
- 3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
- 4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

**Remark on Protest**

- The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- No protest accompanied the payment of additional search fees.