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**Declarations under Rule 4.17:**

- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))
- of inventorship (Rule 4.17(iv))

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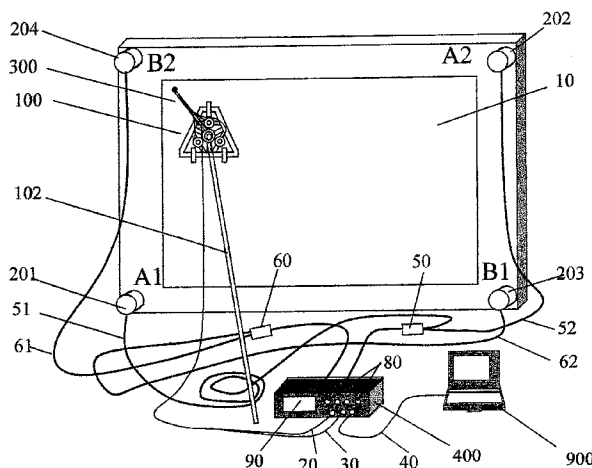
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[Continued on next page]

(54) Title: SYSTEM AND ITS APPARATUSES FOR IMAGE REPRODUCTION AND RECORDING WITH THE METHODS FOR POSITIONING, PROCESSING AND CONTROLLING



(57) Abstract: Image reproduction and recording system, having exclusive plurality of uses, with the methods for positioning, processing and controlling, with flexible operations (hand, robot, vehicle) of head carrier, works based on mechanical-guiding-apparatus-free positioning system. The common apparatuses include: head Gamier, sprayer/reader or sprayer/reader array, and computer. Additional apparatuses used in relative-motion-based method or wave-based method, include operation-module(OM) and motion-detectors(MD), or operation-unit(OU) and communication-units(CU's), respectively. The MD and OM provide the information of positioning for computer to determines the relative position and direction of the head array on head carrier. The CU's radiate and receive signal needed for determining distance information. The OU processes and converts the received signal into distance-related data and pass to computer. The computer determines the coordinates of a head in the head array from these data, and sends it back to OU or OM. Then the OU or OM sends the color data and spraying commands to head array, and provides power for head, or sends reading commands to reader array for reading color data.

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*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/25111

A. CLASSIFICATION OF SUBJECT MATTER

IPC: B41J 3/36(2006.01);G09G 5/08(2006.01)

USPC: 400/88;345/158,157,169

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)

U.S. : 400/88; 345/158,157,169

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

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5,311,208 A (BURGER et al) 10 May 1994 (10-05-1994), the entire document.	1-31
A	US 5,739,812 A (MOCHIZUKI et al) 14 April 1998 (14-04-1998), the entire document.	1-31
A	US 5,861,877 A (KAGAYAMA et al) 19 January 1999 (19-01-1999), the entire document.	1-31
A	US 6,398,432 B1 (DAY et al) 04 June 2002 (04-06-2002), the entire document.	1-31

Further documents are listed in the continuation of Box C.

See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"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

"E" earlier application or patent published on or after the international filing date

"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

"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)

"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

"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

"&" document member of the same patent family

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19 SEP 2006

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# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/25111

## Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)

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

1.  Claim Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claim 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.  Claim Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:  
Please See Continuation Sheet

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 an additional fee, this Authority did not invite payment of any additional fee.
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.

No protest accompanied the payment of additional search fees.

**BOX II. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING**

1. This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

\* Group I, claim(s) 1, 4-6 and 24-25, drawn to an image generation system to generate image.

\* Group II, claim(s) 2-3, 7-23, 26-31 drawn to the positioning method called wave-based method or the positioning method called relative-motion-based method and the corresponding embodiments for 2D and 3D positioning.

2. This application contains claims directed to more than one species of the generic invention. These species are deemed to lack unity of invention because they are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for more than one species to be examined, the appropriate additional examination fees must be paid. The species are as follows:

• (A), claims 2, 7-8, 11-23 and 26-27: The positioning method called *wave-based method* and the corresponding embodiments for 2D and 3D positioning comprising *providing communication unit for transmitting and receiving signals in positioning operation and the signal is a predetermined kind of waves*.

• (B), claims 3, 9-10 and 28-31: The positioning method called *relative-motion-based method* and the corresponding embodiments for 2D and 3D positioning comprising *providing motion detectors, being installed on head holder for obtaining the information of locator relative motion*.

\* The inventions listed as Groups I and II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: Group I, claims 1, 4-6 and 24-25 are directed to an image generation system to generate image, which comprising different embodiment from Group II, claims 2-3, 7-23, 26-31 which are directed to the positioning method called wave-based method or the positioning method called relative-motion-based method and the corresponding embodiments for 2D and 3D positioning.

\* The species listed above do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, the species lack the same or corresponding special technical features for the following reasons: Each of the species (A) and (B) having distinguish method steps and embodiment which is different from each other.