



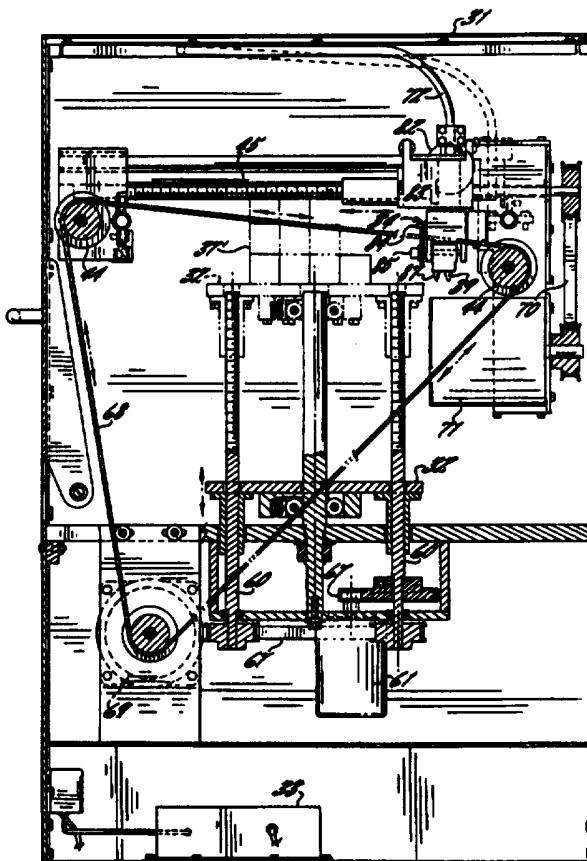
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(21) International Application Number: PCT/US95/14503		(74) Agent: REGAN, Christopher, F.; Allen, Dyer, Doppelt, Franjola and Milbrath, P.A., Suite 1401, 255 South Orange Avenue, Orlando, FL 32802 (US).	
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(30) Priority Data: 08/326,015      19 October 1994 (19.10.94)      US			
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		<b>Published</b> <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>	
		(88) Date of publication of the international search report: 1 August 1996 (01.08.96)	

(54) Title: APPARATUS AND METHOD FOR DISPENSING BUILD MATERIAL TO MAKE A THREE-DIMENSIONAL ARTICLE

## (57) Abstract

A three-dimensional article making apparatus includes a build material dispenser (34) positioned adjacent a platform for ejecting a plurality of droplets of build material; and dispenser positioners for relatively positioning the dispenser in five degrees of freedom with respect to the platform. Accordingly, the dispenser may be rotated and flipped to permit construction of a cantilevered portion of an article without requiring support material. The dispenser positioners include a Z-direction positioner for positioning the dispenser vertically relative to the platform, and X-Y positioner for positioning the dispenser in an X-Y planar direction relative to the platform, a flip angle positioner for rotatably positioning the dispenser relative to a generally horizontal axis, and a phi angle positioner for rotatably positioning the dispenser relative to a generally vertical axis. A processor is operatively connected to the dispenser and the dispenser positioners for advancing the dispenser along a predetermined path of travel while operating or firing the dispenser to construct the three-dimensional article in successive layers or portions based upon the article defining data. Method aspects of the invention are also disclosed.



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## INTERNATIONAL SEARCH REPORT

Intern. Patent Application No

PCT/US 95/14503

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 B29C67/00

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 6 B29C

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 practical, 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.
X	US,A,4 665 492 (MASTERS WILLIAM E) 12 May 1987	26-29
A	see column 5, line 58 - column 6, line 9; figure 5	1-25, 50-56, 59-74
X	--- GB,A,2 233 928 (BROTHER KOGYO KABUSHIKI KAISHA) 23 January 1991 see figures	26,29
A	--- EP,A,0 426 363 (STRATASYS INC) 8 May 1991 see column 20, line 58 - column 21, line 15 -----	

☐ 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

Date of the actual completion of the international search

29 February 1996

Date of mailing of the international search report

- 5. 06. 96

Name and mailing address of the ISA

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# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US 95/ 14503

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 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.:  
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:

See annexe

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.:

1-30, 50-56, 59-74

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

1.Claims 1-30,50-56,59-74:

3-dimensional modelling apparatus with dispensing head with five degrees of freedom.

2.Claims 31-38:

3-dimensional modelling apparatus comprising negative meniscus means.

3.Claims 39-46:

3-dimensional modelling apparatus comprising filling means for filling a conduit and dispenser.

4.Claims 47-49:

3-dimensional modelling apparatus comprising testing means.

5.Claims 57,58:

3-dimensional modelling apparatus comprising means to create release structure.

# INTERNATIONAL SEARCH REPORT

information on patent family members

Intern. Application No

PCT/US 95/14503

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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