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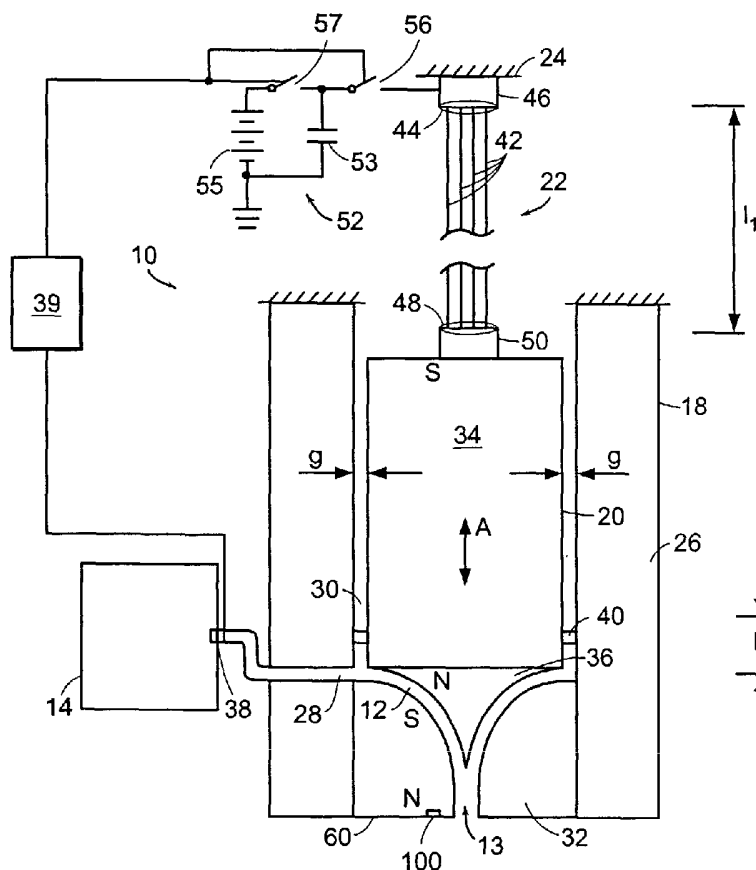
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WO 03/039635 A3

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60/338,169 26 October 2001 (26.10.2001) US
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- (81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW.
- (84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: NEEDLELESS INJECTOR



(57) Abstract: An injector (10) includes a housing having a chamber (12) for holding a liquid formulation of an active principle to be injected into a biological body and an output port (13) in fluid communication with the chamber (12) through which the liquid formulation is injected. A piston (20) is positioned within the housing, and includes an end portion (36) with substantially the same shape as the chamber. A magnetic force draws the piston (20) and housing together to expel the liquid formulation out of the chamber through the output port (13).



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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.

(88) Date of publication of the international search report:

30 October 2003

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 02/33545

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A61M5/30 A61M5/20

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 7 A61M B32B

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	GB 686 343 A (BECTON DICKINSON CO) 21 January 1953 (1953-01-21)	1,12,17
Y	page 2, line 13 -page 3, line 52; figures 1,2	2,13-16
A		3-11,18, 19,28
Y	--- US 3 057 349 A (AARON ISMACH) 9 October 1962 (1962-10-09) column 7, line 30 -column 7, line 34; figures 1,2	2,15,16
Y	--- US 5 722 953 A (MULHAUSER PAUL ET AL) 3 March 1998 (1998-03-03) column 5, line 13 -column 5, line 25 --- -/--	13

 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

20 January 2003

Date of mailing of the international search report

19. 05. 03

Name and mailing address of the ISA

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Björklund, A

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 02/33545

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 480 381 A (WESTON TERENCE E) 2 January 1996 (1996-01-02) column 6, line 55 ---	14
A	US 4 744 841 A (THOMAS THOMAS L) 17 May 1988 (1988-05-17) column 3, line 65 -column 4, line 6; figure 3 ---	1
A	US 5 919 167 A (VANROYEN DONALD F ET AL) 6 July 1999 (1999-07-06) column 2, line 66 -column 4, line 53; figure 2 -----	3-11,18, 19,28

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US 02/33545

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.: 32-43
because they relate to subject matter not required to be searched by this Authority, namely:
Rule 39.1(iv) PCT - Method for treatment of the human or animal body by surgery
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:

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.:
1-19, 28

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: 1-19, 28

The invention defines an injector having a piston disposed within a housing. The housing and the piston are drawn together by a magnetic force to expel fluid through an output port.

2. Claims: 20-27, 29-31, 44-51

The invention defines an actuator of a contracting material under tension, the tension being produced by a magnetic force.

Information on patent family members

International Application No

PCT/US 02/33545

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
GB 686343	A	21-01-1953	US 2550053 A	24-04-1951
US 3057349	A	09-10-1962	CH 371561 A	31-08-1963
			DE 1213958 B	07-04-1966
			GB 959397 A	03-06-1964
US 5722953	A	03-03-1998	AU 1973897 A	16-09-1997
			CN 1216474 A	12-05-1999
			EP 0956059 A	17-11-1999
			JP 2001505069 T	17-04-2001
			WO 9731665 A	04-09-1997
US 5480381	A	02-01-1996	AT 161427 T	15-01-1998
			AU 2444592 A	16-03-1993
			BR 9206407 A	13-12-1994
			CA 2116341 A	04-03-1993
			DE 69223793 D	05-02-1998
			DE 69223793 T	23-04-1998
			EP 0599940 A	08-06-1994
			ES 2110513 T	16-02-1998
			WO 9303779 A	04-03-1993
			HK 1010993 A	24-03-2000
			JP 3257794 B	18-02-2002
			JP 6509954 T	10-11-1994
			JP 3257795 B	18-02-2002
			KR 233339 B	01-12-1999
			NO 940606 A	21-04-1994
			RU 2129445 C	27-04-1999
US 4744841	A	17-05-1988	NONE	
US 5919167	A	06-07-1999	NONE	

PATENT COOPERATION TREATY

PCT

REC'D 22 MAY 2003

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INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 0050.2036003	FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/US 02/ 33545	International filing date (day/month/year) 18/10/2002	(Earliest) Priority Date (day/month/year) 26/10/2001
Applicant MASSACHUSETTS INSTITUTE OF TECHNOLOGY		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 7 sheets.
 It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :

contained in the international application in written form.

filed together with the international application in computer readable form.

furnished subsequently to this Authority in written form.

furnished subsequently to this Authority in computer readable form.

the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. **Certain claims were found unsearchable** (See Box I).

3. **Unity of invention is lacking** (see Box II).

4. With regard to the **title**,

the text is approved as submitted by the applicant.

the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

the text is approved as submitted by the applicant.

the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.

as suggested by the applicant.

because the applicant failed to suggest a figure.

because this figure better characterizes the invention.

1
 None of the figures.