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[Continued on next page]

(54) Title: MECHANICAL FINGER

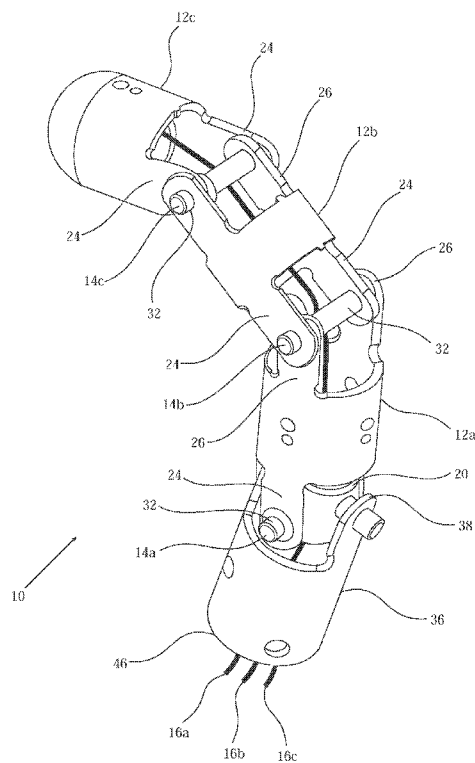


FIG. 1B

(57) Abstract: A mechanical digit (10) comprising first and second hollow digit segments and a tendon (16b) passing through a void of each digit segment; the tendon is secured to the second digit segment so that pulling the tendon in a proximal direction causes downwards flexion of a digit relative to the axis of the digit around an hinged point between the segments, and release of said tendon causes upward extension of the digit. A gripper comprising a palm (18) and at least two digit is also disclosed.



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- *with international search report (Art. 21(3))*
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INTERNATIONAL SEARCH REPORT

International application No
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A. CLASSIFICATION OF SUBJECT MATTER

INV. A61F2/58 B25J9/10 B25J15/00 B25J18/00 B25J15/08
ADD.

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)

A61F B25J

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)

EP0-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 685 924 A (MASSEY PEYTON L [US]) 11 August 1987 (1987-08-11) the whole document -----	1-15
X	EP 1 195 151 A1 (HARADA ELECTRONICS CO LTD [JP]; NAT INST OF ADVANCED IND SCIEN [JP]; H) 10 April 2002 (2002-04-10) paragraph [0024] - paragraph [0043] -----	1-15
X	JP 2005 349488 A (SHARP KK) 22 December 2005 (2005-12-22) the whole document -----	1,2,4-15
A		3
X	US 6 668 678 B1 (BABA KATSUYUKI [JP] ET AL) 30 December 2003 (2003-12-30) the whole document -----	1,2,4-15
A		3
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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

"E" earlier document but published on or after the international filing date

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"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

28 January 2011

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INTERNATIONAL SEARCH REPORT

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>US 4 986 723 A (MAEDA YUJI [JP]) 22 January 1991 (1991-01-22) the whole document -----</p>	1-15

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2010/054267

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 4685924	A	11-08-1987	NONE	

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			DE 60023142 T2	06-07-2006
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			JP 2145282 A	04-06-1990
			JP 5012116 B	17-02-1993

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IB2010/054267

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.:
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:

see additional 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 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.:

see additional sheet(s)

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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-15

Mechanical finger comprising two hollow segments defining an axial void with an axis, the segments being connected to each other with a hinged joint and a tendon passing through the axial void of the first segment off the axis, entering the void of the second segment and crossing a plane including the axis inside the void, the tendon being secured to the second segment so that pulling the tendon in a proximal direction causes downwards flexion of the digit relative to the axis around the joint, and subsequent to flexion, release of the tendon causes upward extension of the finger.

2. claims: 16-21

A mechanical arm suitable for controlling an end effector secured thereto, the arm comprising:
an arm support base;
a hollow support rod;
a hollow extension unit including an axial lumen, secured to a distal end of the rod with a hinged elbow joint;
an upper rotating rod within the axial lumen of the support rod;
a lower rotating rod within the axial lumen of the extension unit;
a wrist shell.

3. claims: 22-32

An orientation controller.
