

(19) World Intellectual Property Organization
International Bureau



(43) International Publication Date
28 February 2008 (28.02.2008)

PCT

(10) International Publication Number
WO 2008/024962 A3

(51) International Patent Classification:

B23Q 1/01 (2006.01) **B23Q 1/52** (2006.01)
B23Q 11/00 (2006.01)

(21) International Application Number:

PCT/US2007/076739

(22) International Filing Date: 24 August 2007 (24.08.2007)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:

11/508,853 24 August 2006 (24.08.2006) US

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(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

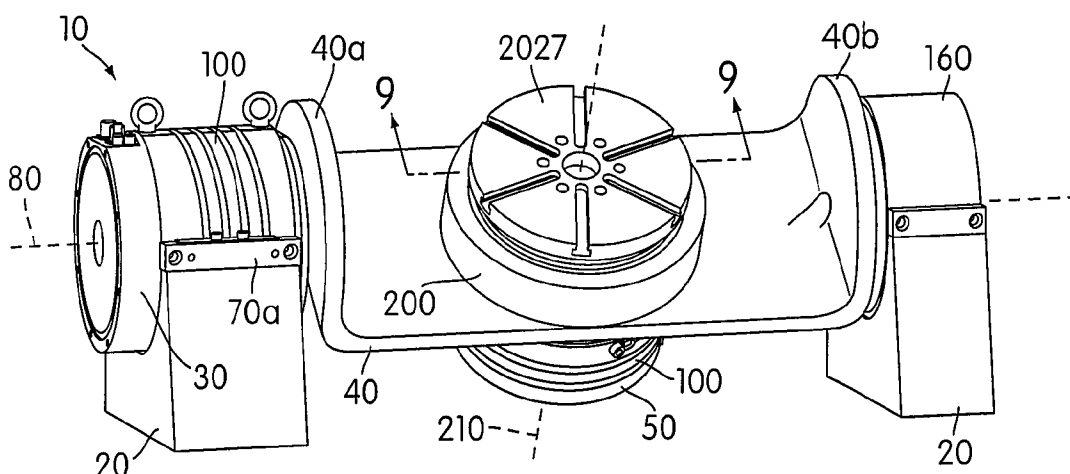
(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(88) Date of publication of the international search report:
24 July 2008

(54) Title: ROTARY TABLE WITH DIRECT DRIVE MOTOR



(57) Abstract: A rotary table (10) for a material processing machine such as a vertical milling machine utilizes direct drive motor (s) to precisely angularly position a work piece along one or more pivotal axes. The direct drive motor (s) (30) are thermally insulated from the remainder of the machine to limit misaligning thermal expansion of the components of the machine. The motors may be symmetrically attached to their respective supports (70) such that thermal expansion/contraction of the motor and surrounding components occurs symmetrically with respect to the motor to limit misalignment of the motor's rotational axis. A motor may mount to its respective support only at a first axial end thereof such that thermal expansion of a second axial end of the motor does not adversely shift the position of the first end. Axially narrow clamps selectively secure the rotors of the motors in desired positions.

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2007/076739

A. CLASSIFICATION OF SUBJECT MATTER

INV. B23Q1/01 B23Q11/00 B23Q1/52

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)

B23Q

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)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 201 10 420 U1 (ANDREU KOSTAKIS [DE]; BONNEICK HEINZ [DE]) 23 August 2001 (2001-08-23)	17
Y	figures 1,6-8	1-4
X	US 2002/006764 A1 (HANISCH MANFRED [DE] ET AL HANISCH MANFRED [DE] ET AL) 17 January 2002 (2002-01-17)	17
Y	paragraphs [0006], [0011]; figure 6	1-4
Y	DE 43 01 434 A1 (STAR GMBH [DE]) 21 July 1994 (1994-07-21) column 4, lines 1-5; claims 23,27	1-4
A	DE 41 28 276 A1 (MITUTOYO CORP [JP]) 5 March 1992 (1992-03-05) columns 13-14	1
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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

5 December 2007

Date of mailing of the international search report

27/05/2008

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INTERNATIONAL SEARCH REPORT

International application No
PCT/US2007/076739

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 1 136 165 A (MITSUBISHI HEAVY IND LTD [JP]) 26 September 2001 (2001-09-26) paragraph [0027] -----	1

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US2007/076739

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 allsearchable 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.:

1-4, 17

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: 1-4,17

Processing machine comprising a direct drive motor with a motor support having a low thermal conductivity.

Problem solved: limit amount of heat transferred from the motor to the base of the machine (see paragraph [0047]).

2. claims: 5-6

Rotary table comprising a direct drive motor with a motor support, whereby the motor is physically supported only at one of two axial ends.

Problem solved: allow axial thermal expansion of the second axial end without affecting position of workholding device (see paragraph [0013]).

3. claims: 7-9

Method for modifying an existing processing that includes a worm-gear driven rotary indexer, mounting a direct drive motor.

Problem solved: avoid backlash related inaccuracies (see paragraph [0064]).

4. claims: 10-14

A collet with circumferentially spaced collet segments.

Problem solved: clamp a rotating spindle.

5. claims: 15-16

Processing machine comprising a direct drive motor, two work holding devices and a timing belt.

Problem solved: transmit pivotal movement to the second workholding device.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2007/076739

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
DE 20110420	U1	23-08-2001	AT 320326 T	15-04-2006
			WO 03002294 A1	09-01-2003
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			EP 1399288 A1	24-03-2004
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