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[Continued on next page]

(54) Title: METHOD AND APPARATUS FOR INSPECTING WORKPIECES

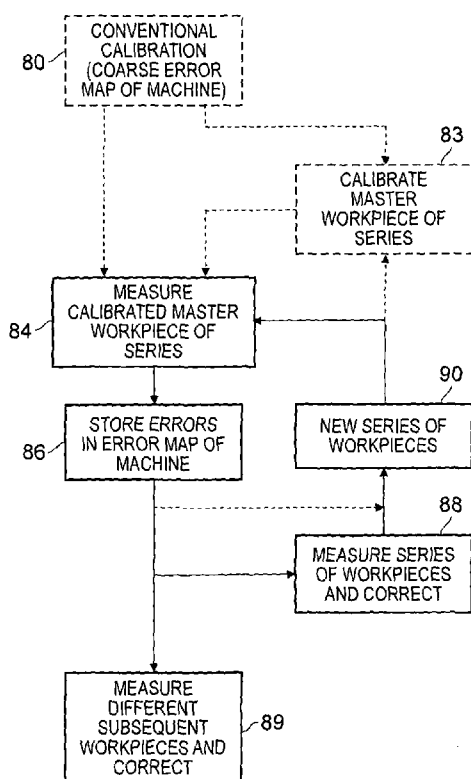


FIG. 3

(57) Abstract: Methods are described for measuring series of nominally identical production workpieces (10) on a dimensional measuring apparatus such as a coordinate measuring machine (12-20). One master workpiece of the series is calibrated (84), to provide correction values which are used to build an error map (86) of the measuring apparatus. This map is used to correct measurements not only of subsequent nominally identical workpieces of the same series (88), but also of multiple different subsequent series (90) of different workpieces. Each subsequent series also has a master workpiece which is calibrated (84) and used to further build the error map (86). As this process is repeated over time, the error map becomes more and more densely populated. In due course, it becomes possible to dispense with the use of a calibrated master workpiece, because measurements can be corrected using error values which already exist in the error map.



TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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- *of inventorship (Rule 4.17(iv))*

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INTERNATIONAL SEARCH REPORT

International application No

PCT/GB2013/000125

A. CLASSIFICATION OF SUBJECT MATTER

INV. G01B21/04

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)

G01B

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)

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	US 5 257 460 A (MCMURTRY DAVID R [GB]) 2 November 1993 (1993-11-02) abstract column 1, line 65 - column 9, line 6 figures 1-3	1-7, 13-17
X	----- WO 2011/107729 A1 (RENISHAW PLC [GB]; JONAS KEVYN BARRY [GB]) 9 September 2011 (2011-09-09) abstract page 2, line 10 - page 19, line 31 figures 1,2,3a,3b	1-7, 13-17
X	----- US 6 434 846 B1 (MCMURTRY DAVID R [GB] ET AL) 20 August 2002 (2002-08-20) abstract column 2, line 12 - column 7, line 36 figures 1-3, 4a, 4b -----	1-7, 13-17



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 application or patent 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

18 July 2013

Date of mailing of the international search report

21/10/2013

Name and mailing address of the ISA/

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB2013/000125

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.:

3-7, 13-15(completely); 1, 2, 16, 17(partially)

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: 3-7, 13-15(completely); 1, 2, 16, 17(partially)

Obtaining a full error map for geometrical errors of a coordinate measuring machine by populating the error map using the first workpiece of a series of workpieces and repeating for differing series of workpieces.

2. claims: 8-12(completely); 1, 2, 16, 17(partially)

Compensating for temperature effects when measuring a series of workpieces by providing an error map for different temperatures.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/GB2013/000125

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