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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
5 August 2010 (05.08.2010)

PCT

(10) International Publication Number
WO 2010/086792 A1

(51) International Patent Classification:
B02C 15/14 (2006.01)

(21) International Application Number:
PCT/IB2010/050339

(22) International Filing Date:
26 January 2010 (26.01.2010)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
PA 2009 00138 30 January 2009 (30.01.2009) DK

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(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, 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, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, 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, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

— *with international search report (Art. 21(3))*

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

(54) **Title**: A ROLLER MILL

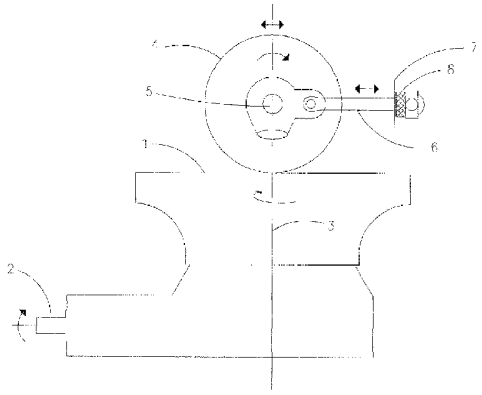

FIG. 1

(57) **Abstract**: A description is given of a roller mill for grinding particulate material such as cement raw materials, cement clinker and similar materials, said roller mill comprising a grinding table (1) which by means of a drive mechanism (2) is rotatable about a vertical axis (3), at least one roller (4) which is rotatably mounted on a shaft (5) and being maintained in tangential direction relative to the grinding table by means of a guide mechanism (6) and a support (7). The roller mill is peculiar in that it comprises a vibration-compensating device (8) which is arranged in connection with the guide mechanism (6) to ensure in interaction therewith that the roller (4) is maintained in tangential direction relative to the grinding table (1), independently of the flexibility of the guide mechanism support (7) so that the variations in the torsional moment of the mill drive mechanism (2) and hence the wear on the drive mechanism are reduced. This is due to the fact that the vibration-compensation mechanism equalizes the elastic movement affecting the guide mechanism support when the tangential force, which is to be absorbed via the guide mechanism (6), varies due to a change in the operating environment, thereby actively preventing the roller (4) from moving tangentially relative to the grinding table (1).

WO 2010/086792 A1

Description

Title of Invention: A ROLLER MILL

[1] The present invention relates to a roller mill for grinding particulate material such as cement raw materials, cement clinker and similar materials, said roller mill comprising a grinding table which by means of a drive mechanism is rotatable about a vertical axis, at least one roller which is rotatably mounted on a shaft and being maintained in tangential direction relative to the grinding table by means of a guide mechanism and a support.

[2] Roller mills of the aforementioned kind are generally known. During operation, the drive mechanism of the roller mill is quite often exposed to substantial loads which will reduce its service life, and which are ascribable to major variations in the torsional moment which often appear as high-frequency variations in the torsional moment. These variations in the torsional moment relate primarily to the flexibililty in the mill drive mechanism and furthermore to the flexibility of the support of the guide mechanism which is often constituted by the frame or housing of the mill, and originating for example from variations in the tangential force imposed on the roller due to changes in the operating environment, such as changes in the grinding bed thickness etc. This flexibility in the guide mechanism support will enable the roller to move tangentially relative to the grinding table during the operation of the mill, leading to increased variation in the torsional moment of the drive mechanism due to the thereby existing mass and spring oscillation system.

[3] It is the objective of the present invention to provide a roller mill by means of which the aforementioned disadvantage is eliminated or at least substantially reduced.

[4] This is obtained by means of a roller mill of the kind mentioned in the introduction and being characterized in that it comprises a vibration-compensating device which is arranged in connection with the guide mechanism to ensure in interaction therewith that the roller is maintained in tangential direction relative to the grinding table.

[5] It is hereby obtained that the roller is maintained in tangential direction relative to the grinding table independently of the flexibility of the guide mechanism support, so that the variations in the torsional moment of the mill drive mechanism and hence the loads on the drive mechanism are reduced. This is due to the fact that the vibration-compensation mechanism equalizes the elastic movement affecting the guide mechanism support when the tangential force, which is to be absorbed via the guide mechanism, varies due to a change in the operating environment, thereby actively preventing the roller from moving tangentially relative to the grinding table.

[6] The vibration-compensating device may in principle be any suitable device compensating for vibrations. In one embodiment the vibration-compensating device may

thus comprise a so-called active vibration damper (AVD).

[7] In order to minimize the amount of energy which is lost, the vibration-compensating device should preferably function as a spring moving in counterphase with the tangential load imposed on the guide mechanism support, and hence the elastic movement of the guide mechanism.

[8] The vibration-compensating device may comprise electrical as well as mechanical and hydraulic components and may be controlled for example by means of a measuring device indicating the absolute tangential position of the roller relative to the grinding table, or alternatively using a measuring device indicating the tangential force which is transferred via the guide mechanism or through the hydraulic pressure in hydraulic components such as hydraulic cylinders.

[9] The guide mechanism of the roller mill may be constituted by any suitable guide mechanism. In one embodiment the guide mechanism may comprise a tangential arm which at its respective ends is rotatably connected to the shaft and the support, respectively, whereas in a second embodiment it may comprise a frame structure in which the rollers are suspended.

[10] The invention will now be explained in further details with reference to the drawing, being diagrammatical, and where

[11] Fig. 1 shows a side view of an embodiment of the roller mill according to the invention, and

[12] Fig. 2 shows a top view of the sam embodiment of the roller mill.

[13] Figs. 1 and 2 show a roller mill comprising a grinding table 1, which by means of a drive mechanism 2 is rotatable about a vertical axis 3, a roller 4, which is rotatably mounted on a shaft 5, and being maintained in tangential direction relative to the grinding table by means of a tangential arm 6 which at its respective ends is rotatably connected to the shaft 5 and a support 7, respectively.

[14] In order to maintain the roller 4 in tangential direction relative to the grinding table 1 independently of the flexibility of the support 7 of the tangential arm, the roller mill comprises a vibration-compensating device 8 which is arranged so in connection with the tangential arm 6 that the vibration-compensating device 8 will equalize the elastic movement affecting the support 7 of the tangential arm 6 when the tangential force, which is to be absorbed via the tangential arm 6, varies due to a change in the operating environment. This will ensure that the roller does not move tangentially relative to the grinding table, and therefore does not contribute significantly to the variations in the torsional moment of the mill drive mechanism.

[15] In one embodiment the vibration-compensating device 8 may comprise a so-called active vibration damper (AVD).

Claims

[Claim 1] 1. A roller mill for grinding particulate material such as cement raw materials, cement clinker and similar materials, said roller mill comprising a grinding table (1) which by means of a drive mechanism (2) is rotatable about a vertical axis (3), at least one roller (4) which is rotatably mounted on a shaft (5) and being maintained in tangential direction relative to the grinding table by means of a guide mechanism (6) and a support (7), **characterized in** that it comprises a vibration-compensating device (8) which is arranged in connection with the guide mechanism (6) to ensure in interaction therewith that the roller (4) is maintained in tangential direction relative to the grinding table (1).

[Claim 2] 2. A roller mill according to claim 1, **characterized in** that the vibration-compensating device (8) comprises a so-called active vibration damper (AVD).

[Claim 3] 3. A roller mill according to claim 1, **characterized in** that the vibration-compensating device (8) functions as a spring which is moving in counter-phase with the tangential load affecting the guide mechanism support (7) and hence the elastic movement of the support.

[Claim 4] 4. A roller mill according to claim 1, **characterized in** that the vibration-compensating device (8) comprises electrical, mechanical and/or hydraulic components.

[Claim 5] 5. A roller mill according to claim 1, **characterized in** that it comprises a measuring device indicating the absolute tangential position of the roller (4) relative to the grinding table (1).

[Claim 6] 6. A roller mill according to claim 1, **characterized in** that it comprises a measuring device indicating the tangential force which is transmitted via the guide mechanism (6).

[Claim 7] 7. A roller mill according to claim 1, **characterized in** that the hydraulic pressure in hydraulic components, such as hydraulic cylinders, is utilized for controlling the vibration-compensating device (8).

[Claim 8] 8. A roller mill according to any of the preceding claims , **characterized in** that the guide mechanism (6) comprises a tangential arm (6) which at its respective ends is rotatably connected to the shaft (5) and the support (7), respectively.

[Claim 9] 9. A roller mill according to any of the preceding claims , **characterized in** that the support (7) comprises the housing of the mill.

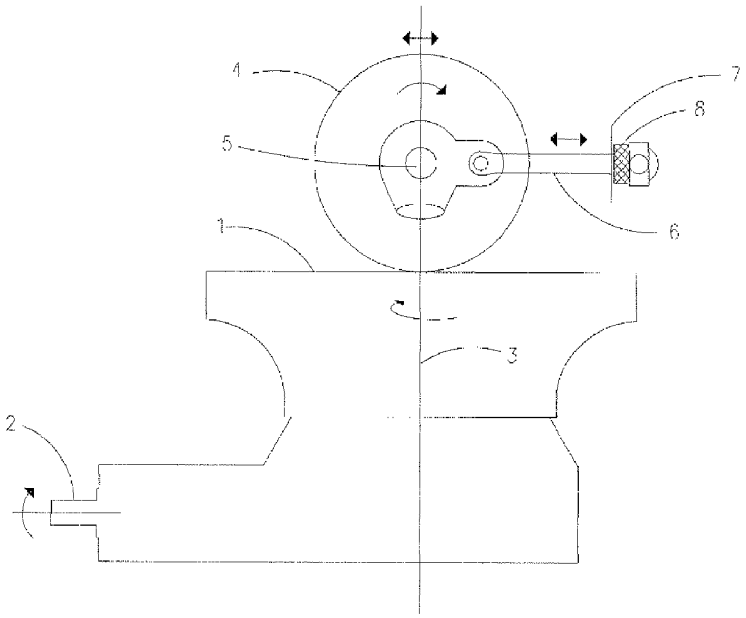

Fig. 1

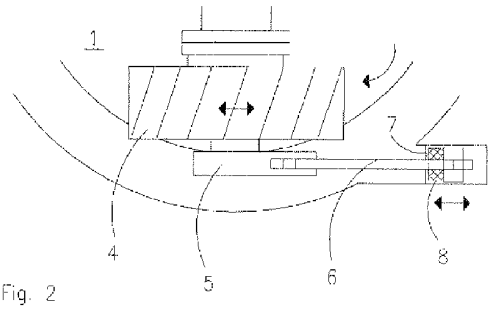

Fig. 2

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2010/050339

A. CLASSIFICATION OF SUBJECT MATTER
INV. B02C15/14
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)
B02C

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	US 4 147 308 A (MIKKELSEN BENT E) 3 April 1979 (1979-04-03) column 3, line 65 - page 4, line 43; figures 2-4	1
X	GB 2 052 304 A (PFEIFFER AG) 28 January 1981 (1981-01-28) the whole document	1
A	US 4 909 450 A (HENNE HEINRICH [DE] ET AL) 20 March 1990 (1990-03-20) * abstract; figures 1,3	1,9

☐ 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

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"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

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
25 June 2010	07/07/2010

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IB2010/050339

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