

(19) **DANMARK**

(10) **DK/EP 2734304 T3**



(12)

Oversættelse af
europæisk patentskrift

Patent- og
Varemærkestyrelsen

-
- (51) Int.Cl.: **B 02 C 15/00 (2006.01)**
- (45) Oversættelsen bekendtgjort den: **2015-02-02**
- (80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2014-10-29**
- (86) Europæisk ansøgning nr.: **13700910.6**
- (86) Europæisk indleveringsdag: **2013-01-22**
- (87) Den europæiske ansøgnings publiceringsdag: **2014-05-28**
- (86) International ansøgning nr.: **EP2013051133**
- (87) Internationalt publikationsnr.: **WO2013117423**
- (30) Prioritet: **2012-02-06 DE 102012100946**
- (84) Designerede stater: **AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**
- (73) Patenthaver: **ThyssenKrupp Industrial Solutions AG, ThyssenKrupp Allee 1, 45143 Essen, Tyskland**
- (72) Opfinder: **ASSMANN, Björn Olaf, Kletterrosenweg 1, 59063 Hamm, Tyskland**
PETRING, Jörg, Koppelweg 12, 49808 Lingen, Tyskland
KACHE, Guido, Mozartstr. 7, 59269 Beckum, Tyskland
- (74) Fuldmægtig i Danmark: **PATRADE A/S, Fredens Torv 3A, 8000 Århus C, Danmark**
- (54) Benævnelse: **Valsemølle og fremgangsmåde til drift af en valsemølle**
- (56) Fremdragne publikationer:
JP-A- H07 204 528

Roller mill and method for operating a roller mill**Description**

5 The invention relates to a roller mill for grinding material to be ground with a grinding table and at least one grinding roller which works with the grinding table and a method for operating such a roller mill, as are known, for example, from JPH 07 204 528 A.

10 In roller mills, the material to be ground is mostly fed centrally and as a result of centrifugal force passes outwards and is picked up there by the grinding rollers rolling on the grinding table. It is already known from EP 0 858 839 A1 that moistening of the material to be ground causes stabilization of the grinding bed and the quiet running of the roller mill and also the grinding efficiency can thereby be
15 improved. It is known to deliver the water to the grinding table together with the material to be ground or directly at the feed point. In EP 0 858 839 A1, a water lance is used, which is arranged in front of the grinding roller in the rotation direction of the grinding table.

20 It was found, however, that the product quality is adversely influenced by injected water volume flows which are too high. Moreover, the availability of water may be limited in certain regions.

In JP 2000157882 A, therefore, the volume flow of the sprayed-on water is regulated as a function of a vibration sensor. When a specific vibration level is exceeded, the injected water volume flow is increased, and vice versa.

The object on which the invention is based, therefore, is to make the feed of the water onto the grinding bed even more efficient, in order, on the one hand, to
30 influence positively the quiet running of the roller mill and optimize the grinding efficiency and the throughput of the roller mill and, on the other hand, to manage with water volume flows which are as low as possible.

According to the invention, this object is achieved by means of a roller mill having
35 the features of Claim 1 and by means of a method having the features of Claim 6.

The roller mill according to the invention for grinding material to be ground has a grinding table and at least one grinding roller which works with the grinding table,

a water lance for applying water to the material to be ground being placed in the rotation direction of the grinding table in front of the grinding roller. The water lance is in this case designed to be rotatable, and means are provided for rotating the water lance in order specifically to influence the exposure time of the water to the material to be ground before the material to be ground is gathered by the grinding roller.

In the method according to the invention for operating a roller mill, a grinding table and at least one grinding roller which works with the grinding table are provided. Furthermore, water is applied to the material to be ground via a water lance arranged in the rotation direction of the grinding table in front of the grinding roller. The exposure time of the water to the material to be ground, before the grinding roller gathers the material to be ground, is influenced in that the interval between the water landing on the material to be ground and the gathering of the material to be ground by the grinding roller can be specifically set by rotating the water lance.

In the tests on which the invention is based, it became apparent that the exposure time of the water in the material to be ground, before the material to be ground is gathered by the grinding roller, has a great influence upon the quiet running. Furthermore, it was found that the stream of material to be ground passes from the centre to the grinding track by centrifugal force very differently, depending on the nature of the material to be ground. In order, then, to apply the water quantity to be sprayed onto the material to be ground as effectively as possible, according to the invention the rotation of the water lance is proposed. In this way, the interval between the water jets impacting the material to be ground and the grinding roller can be set specifically to the conditions prevailing in each case.

Further refinements of the invention are the subject of the dependent claims.

The water lance expediently has multiple nozzles with nozzle axes facing in the direction of the grinding table, in order to cover the entire width of the stream of material to be ground which is to be gathered by the grinding roller.

To influence the exposure time of the water on the material to be ground, the means for rotating the water lance are preferably designed in such a way that the interval between the water landing on the material to be ground and the gather-

ing of the material to be ground by the grinding roller can be adjusted by rotating the water lance. A grinding track is formed on the grinding table in the operating area of the grinding roller, the water lance expediently extending across this grinding track and therefore radially to the grinding table. Furthermore, there
5 may be provision whereby the water lance is additionally arranged so that it can slide in the direction of its longitudinal extent. Further adaptation and orientation of the water jets are thereby possible. Moreover, the lance can in this way be drawn out of the grinding space in the event of maintenance and/or repair. If this is possible in continuous operation, the grinding operation in this case does not
10 have to be interrupted.

The rotation of the water lance expediently takes place subject to at least one operating parameter (for example, fluctuations in the power consumption of the drive, fluctuations in hydraulic pressure, grinding bed height, theoretical rolling
15 points of the grinding rollers).

Preferred embodiments of the invention are explained in more detail below by means of the description and the drawing.

20 In the drawing:

Fig. 1: shows a diagrammatic side view of a roller mill with a water lance,
lance,

Fig. 2: shows a diagrammatic top view of the roller mill according to
25 Fig. 1,

Fig. 3: shows a side view of the water lance,

Fig. 4a + 4b: show respectively a diagrammatic top view and side view of the
30 roller mill in the region of the water lance according to a first operating situation,

Fig. 5a + 5b: show respectively a diagrammatic top view and side view of the
35 roller mill in the region of the water lance according to a second operating situation,

Fig. 6a + 6b: show respectively a diagrammatic top view and side view of the roller mill in the region of the water lance according to a third operating situation.

5 The roller mill illustrated in Fig. 1 and 2 has essentially a grinding table 1 and two grinding rollers 2 working with the grinding table.

Furthermore, each grinding roller 2 is assigned a water lance 3 which is placed in the rotation direction of the grinding table 1 in front of each grinding roller 2. The
10 grinding roller 2 and the grinding table 1 are arranged in a grinding space delimited by a mill housing 5.

The water lance 3, illustrated in more detail in Fig. 3, is designed here as an elongate tubular piece which has a multiplicity of nozzles 3a on the side facing the
15 grinding table 1. The water 6 delivered to the water lance 3 is sprayed in the form of water jets 6a emerging from the nozzles 3a onto the material to be ground 7 delivered to the grinding table 1. The water lance can be rotated according to the double arrow 8 (Fig. 1) via means 9. The nozzles 3a of the water lance 3 may in this case occupy, in particular, the position illustrated in Fig. 4b, 5b and 6b with
20 respect to the grinding table 1 and to the assigned grinding roller 2. Moreover, in addition to the rotational moveability according to the double arrow 8, the water lance is arranged to be capable of sliding in the direction of its longitudinal extent according to the double arrow 10 and can thereby, in particular, also be drawn out of the mill housing 5, for example for maintenance or repair purposes. Ad-
25 justment according to the double arrows 8 and 10 may in this case take place, in particular, during continuous grinding operation.

The material to be ground 7 is fed in the conventional way centrally onto the grinding table 1 and then, on account of the centrifugal force, moves outwards
30 according to the dashed arrows 11, where it comes into the region of the grinding track 12 on which the grinding rollers 2 roll on the grinding table 1. Depending on the rotational speed of the grinding table 1 and on the nature of the material to be ground 7, the location at which and the direction in which the material to be ground 7 comes into the region of the grinding track are different, as illustrated
35 diagrammatically in Fig. 4a, 5a and 6a for the three different situations. By the water lance being rotated according to the double arrow 8, the interval between the impact of the water jets 6a upon the material to be ground and the gathering of the material to be ground by the grinding roller can be varied. In the position

according to Fig. 5a and 5b, this interval a_1 is shortest and, in the position according to Fig. 6a and 6b (interval a_2), is longest, while Fig. 4a and 4b show a medium interval a_3 . By means of the radially displaceable and axially rotatable water lance 3, the impact region of the water jets 6a upon the material to be ground 7 can be influenced specifically. Thus, water injection can be set optimally to the precisely prevailing operating conditions of the roller mill. The exposure time of the water in the material to be ground 7 up to gathering by the grinding roller 2 can be influenced specifically, and water injection is focussed onto a locally limited region. Consequently, the necessary volume flow for stabilizing the grinding bed can be minimized, since orientation of the injected water volume flow onto the most effective region can take place.

According to an especially advantageous embodiment of the invention, the means 9 for rotating and/or radially displacing the water lance 3 are set, subject to at least one operating parameter. The operating parameters used may in this case be, for example, the fluctuation of the power consumption of the drive for the grinding table 1 and/or of the grinding rollers 2, fluctuations in the hydraulic pressure force of the grinding rollers 2, the grinding bed height or the theoretical rolling point of the grinding rollers 2.

The above-described rotatable water lance for water injection is appropriate especially for roller mills with changing materials to be ground or changing properties of the material to be ground.

Patentkrav

1. Valsemølle til formaling af malegods (7), med en malepande (1) og mindst en malevalse (2), som samvirker med malepanden (1), hvor en vandlanse (3) til tilførsel af vand (6) på malegodset (7) er arrangeret i malepandens (1) rotationsretning foran malevalsen (2), **kendetegnet ved, at** vandlansen (3) er udformet roterbar, og at der er tilvejebragt midler (9) til at rotere vandlansen for specifikt at påvirke vandets virkningstid på malegodset, før malegodset gribes af malevalsen.
2. Valsemølle ifølge krav 1, **kendetegnet ved, at** vandlansen (3) har flere dyser (3a) med dyseakser, der vender mod malepanden (1).
3. Valsemølle ifølge krav 2, **kendetegnet ved, at** for at påvirke vandets virkningstid på malegodset (7) er vandlansen (3) og midlerne (9) til at rotere vandlansen (3) udformet på sådan måde, at afstanden (a_1 , a_2 , a_3) mellem vandet (6), der træffer på malegodset (7), og malevalsens (2) gribning af malegodset kan ændres tilsigtet ved rotation af vandlansen (3).
4. Valsemølle ifølge krav 1, **kendetegnet ved, at** en malebane (12) er udformet på malepanden i malevalsernes (2) virkeområde, og at vandlansen (3) strækker sig hen over malebanen (12).
5. Valsemølle ifølge krav 1, **kendetegnet ved, at** vandlansen (3) også er arrangeret, så den kan glide i retning af dens længdeudstrækning.
6. Fremgangsmåde til drift af en valsemølle, hvor
- a. der findes en malepande (1) og mindst en malevalse (2), der samvirker med malepanden (2), og
- b. vand (6) påføres malegodset (7) via en vandlanse (3) arrangeret i malepandens (1) rotationsretning foran malevalsen (2), **kendetegnet ved, at** vandets påvirkningstid på malegodset før malevalsen griber malegodset påvirkes af det forhold, at afstanden (a_1 , a_2 , a_3) mellem vandet (6), der træffer på malegodset (7), og malevalsens (2) gribning af malegodset kan ændres tilsigtet ved rotation af vandlansen (3).
7. Fremgangsmåde til drift af en valsemølle ifølge krav 6, **kendetegnet ved, at** afstanden (a_1 , a_2 , a_3) mellem vandets træfning på malegodset (7) og det punkt,

ved hvilket materialet, der skal males, gribes af malevalsen (2), indstilles ved rotation af vandlansen (3).

5 8. Fremgangsmåde til drift af en valsemølle ifølge krav 6, **kendetegnet ved, at** vandlansens (3) rotation sker under den løbende drift af møllen i afhængighed af mindst en driftsparameter.

10 9. Fremgangsmåde til drift af en valsemølle ifølge krav 6, **kendetegnet ved, at** malevalsen (2) og malepanden (1) er arrangeret i et malekammer, og at vandlansen (3) kan udtrækkes fra malekammeret under den løbende drift af møllen i tilfælde af vedligeholdelse og/eller reparation vedrørende vandlansen (3).

15 10. Fremgangsmåde til drift af en valsemølle ifølge krav 6, **kendetegnet ved, at** anvendes mindst to malevalser (2) med tilknyttede vandlanser (3), hvorved de to vandlanser (3) indstilles uafhængigt af hinanden.

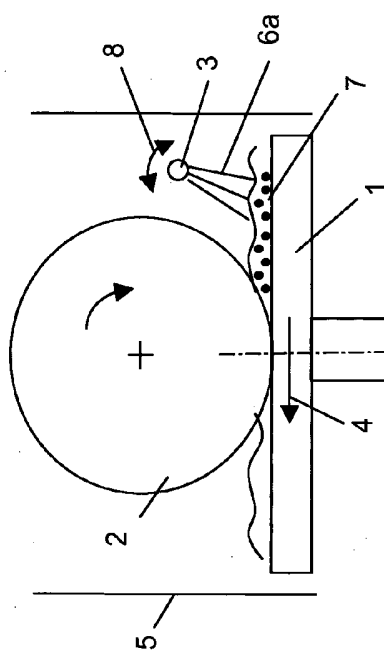


Fig. 1

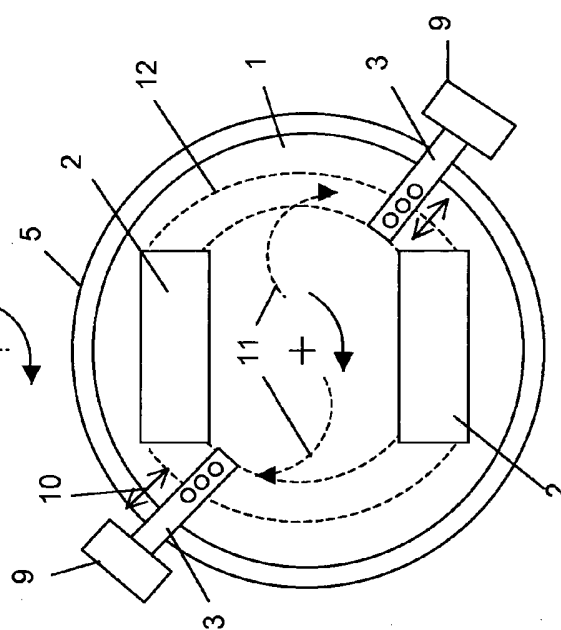


Fig. 2

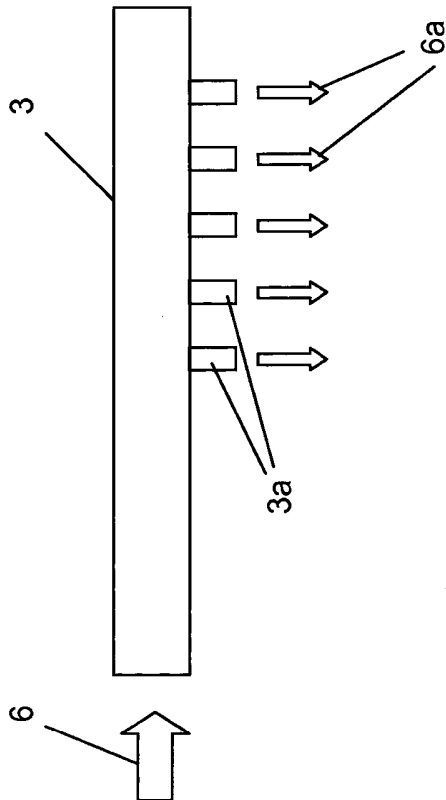


Fig. 3

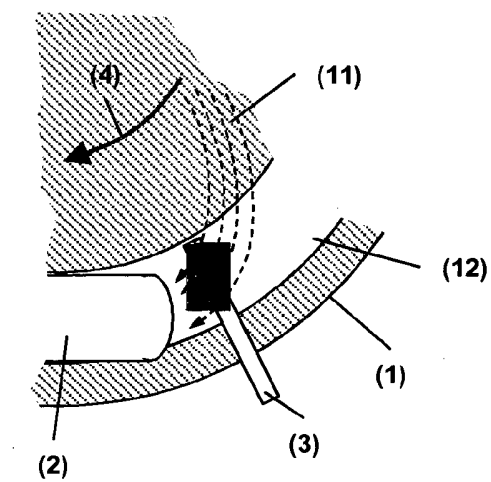


Fig. 4a

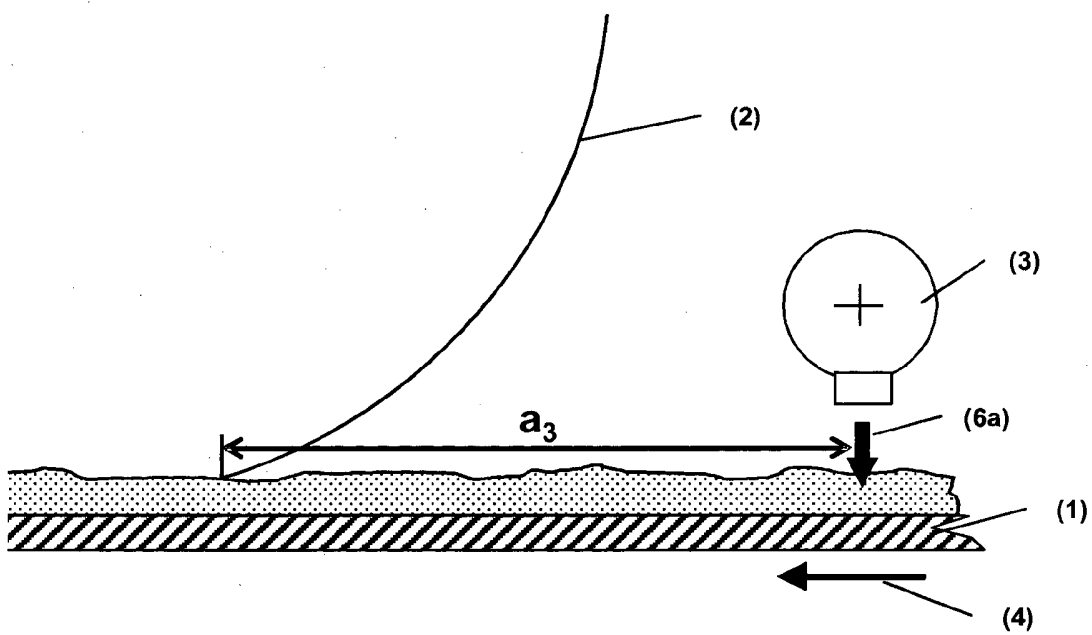


Fig. 4b

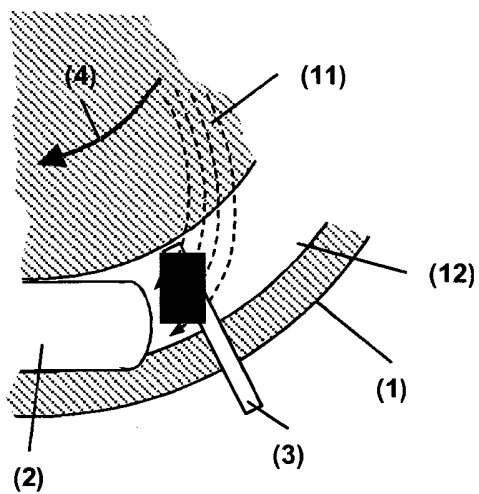


Fig. 5a

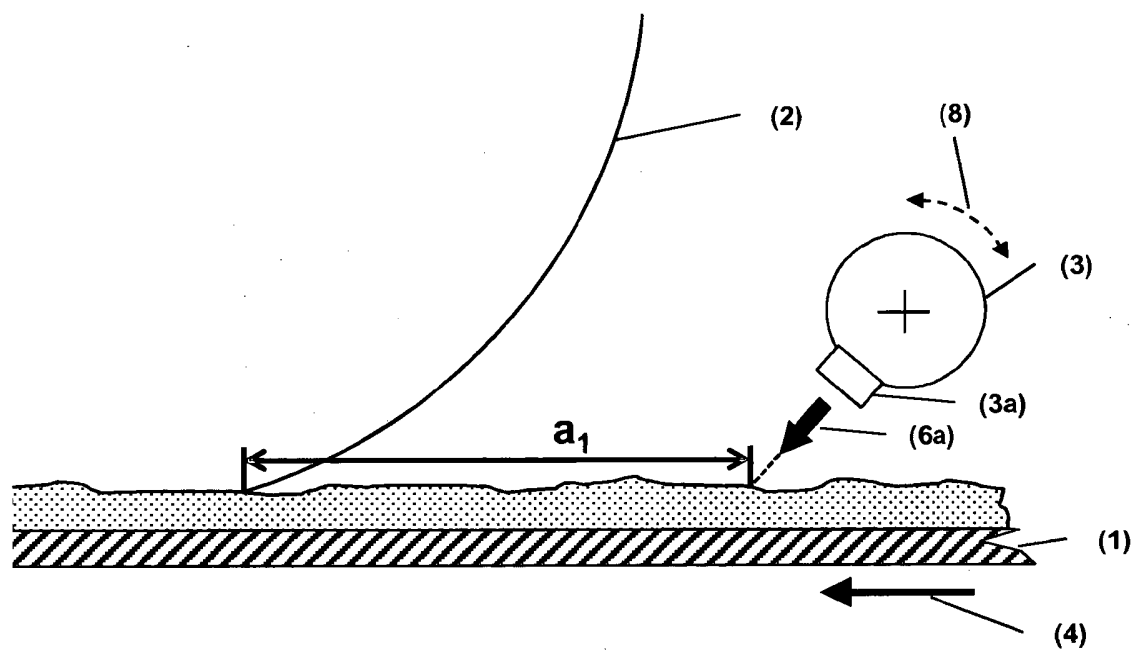


Fig. 5b

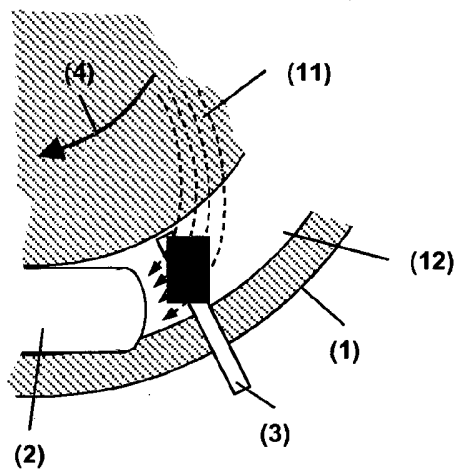


Fig. 6a

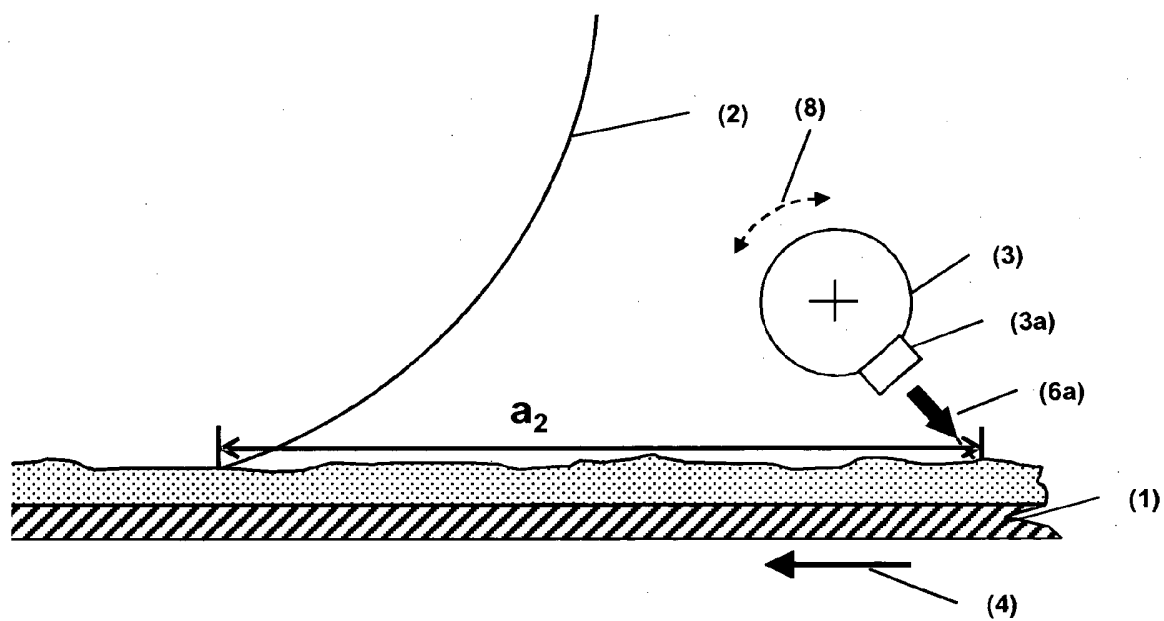


Fig. 6b