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(54) **A roll for a roller press suitable for comminution of granular material by interparticle crushing, as well as a roller press provided with such a roll.**

(57) The invention relates to a roll for a roller press suitable for comminution of granular material by interparticle crushing, as well as a roller press provided with such a roll. In certain applications and under specific operational conditions the autogenous layer starts to displace or flow between the outwardly extending wear-resistant surface studs. This flow of granular material has a low velocity relative to the roll and can cause excessive wear to the base material of the outer cylindrical pressing surface of the roll, instead of protecting it.

NL B1 2020403

TITLE

A roll for a roller press suitable for comminution of granular material by interparticle crushing, as well as a roller press provided with such a roll.

BACKGROUND OF THE INVENTION

The invention relates to a roll for a roller press suitable for comminution of granular material by interparticle crushing, as well as a roller press provided with such a roll.

Such a roll as well as such a roller press is for example disclosed in US Patent Publication No. 5,269,477 and is implemented for comminution of granular material by interparticle crushing. Granular material is fed into the nip between two opposing rotatable rollers, which are rotating in opposite directions. Under friction the material is compressed between the roller surfaces with the application of an extremely high pressure.

In this operation, the outer cylindrical pressing surfaces of each roll are exposed to extraordinarily high stressing and high wear. An improvement which has been done is to armor the roller surfaces with a wear-resistant cladding to provide a hardened outer surface.

Furthermore, in order to improve the draw-in capability of the pressing rollers that must draw the granular material product into the nip by friction and compress it, it is known to provide the outer cylindrical pressing surface of the roll with a plurality of outwardly extending wear-resistant surface studs. The granular material being drawn-in and captured between the studs forms an autogenous layer, which provides a protecting layer for the outer cylindrical pressing surface of the roll.

However, in certain applications and under specific operational conditions the autogenous layer starts to displace or flow between the outwardly extending wear-resistant surface studs. This flow of granular material has a low velocity relative to the roll and can cause excessive wear to the base material of the outer cylindrical pressing surface of the roll, instead of protecting it. This autogenous layer flow limits the life span of the roll and the roller press significantly, but also disrupts the comminution of the granular material by interparticle crushing in the nip between the opposing rolls.

It is an object of the present invention to provide a roll design as well as a roller press, which do not suffer from the above identified drawback.

In an example a roll according to the invention the cylindrical body of the roll is provided with means for restricting the flow of granular material between the outwardly extending wear-resistant surface studs along the outer cylindrical pressing surface.

Herewith excessive wear to the base material of the outer cylindrical pressing surface of the roll is significantly reduced or even prevented, as well as the comminution of the granular material by interparticle crushing in the nip between the opposing rolls is no longer disrupted.

In a further example the flow restricting means are fitted at positions on the pressing surface, where the possibility of flow of granular material in a rotational direction along the outer cylindrical pressing surface exists, whereas in another example the flow restricting means are fitted at positions on the pressing surface, where the possibility of flow of granular material in a longitudinal direction along the outer cylindrical pressing surface exists.

In both examples the autogenous layer of granular material present between the outwardly extending wear-resistant surface studs is prevented to fluidize because of the presence of the flow restricting means, thus preventing excessive wear to the base material of the outer cylindrical pressing surface of the roll.

In yet a further advantageous example the flow restricting means extends in a longitudinal direction along the outer cylindrical pressing surface. Herewith any erosive flow of autogenous layer of granular material in a rotational direction along the circumference of the outer cylindrical pressing surface is prevented.

In another advantageous example of the roll according to the invention the flow restricting means extends in a rotational direction along the outer cylindrical pressing surface. Herewith any flow of autogenous layer of granular material in a longitudinal direction along the circumference of the outer cylindrical pressing surface in the direction of the end faces thereof is prevented.

In a design example of the roll, the plurality of outwardly extending wear-resistant surface studs are positioned in a pattern consisting of parallel extending lines on the pressing surface and wherein the flow restricting means are provided between adjacent pattern lines.

An example of the roll according to the invention has the design, wherein the flow restriction means are made of one or more strip-like elements provided on the outer cylindrical pressing surface of the cylindrical body. In particular the strip-like flow restriction means are composed of a first strip-like element positioned in a longitudinal

direction on the outer cylindrical pressing surface of the cylindrical body (of the roll) and at least a further strip-like element positioned at an inclined orientation relative to the first strip-like element. With this example any damaging, erosive flow of the autogenous layer of granular layer in a rotational as well as in a longitudinal direction along the circumference of the outer cylindrical pressing surface is prevented.

In yet another advantageous example, the strip-like flow restriction means are composed of a series of strip-like elements positioned in a zig-zag orientation on the outer cylindrical pressing surface of the cylindrical body. This example of the flow restriction means is in particular useful for application on the outer cylindrical pressing surface of the roll having a more dense or an irregular pattern of outwardly extending wear-resistant surface studs.

Furthermore preferably, the wear-resistant surface studs are made from a material being harder than the material of the outer cylindrical pressing surface.

Also the flow restricting means can be made from a hard metal mixture, e.g. Tungsten Carbide based mixtures.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described in more details in reference to accompanying drawings, which drawings show in:

Figure 1 a schematic embodiment of a roller press consisting of a set of two opposing rolls according to the state of the art;

Figure 2 a schematic cross sectional detail of the roll of Figure 1;

Figure 3 a schematic detail of the flow of the autogenous layer of granular material across the cylindrical surface of the roll of Figure 1;

Figure 4 a first embodiment of a roll provided with flow restriction means according to the invention;

Figure 5 a second embodiment of a roll provided with flow restriction means according to the invention;

Figure 6 a third embodiment of a roll provided with flow restriction means according to the invention;

Figure 7 a schematic cross sectional detail of the roll of Figure 4;

DETAILED DESCRIPTION OF THE INVENTION

For a better understanding of the invention like parts in the drawings are be denoted with like reference numerals.

Figure 1 depicts in a schematic manner a roller press 1 suitable for comminution of granular material by interparticle crushing according to the state of the art. Such a roller press 1 is to be used for comminution or grinding of granular material by interparticle crushing and is composed of a set of two opposing rolls or rollers 10 and 20 respectively. Each roll 10-20 is composed of a cylindrical body having a longitudinal length dimension x and having an outer cylindrical pressing surface 11-21 and side faces 10b-20b.

Each roll 10-20 can be rotated around their longitudinal axis of rotation 10a-20a using suitable (non-depicted) roll driving means. For a proper operation of the roller press 1, both rolls 10-20 of the set of rolls are rotated in opposite rotational directions, as shown by the rotational arrows y and –y on the left of Figure 1.

Both rolls 10-20 are orientated parallel from each other in their longitudinal orientation and at some distance from each other, as shown in Figure 1. The distanced orientation as shown in Figure 1 creates a space between the two opposing outer cylindrical pressing surfaces 11-21 of both cylindrical bodies, which space is denoted with reference numeral 30 and also indicated as an interparticle crushing pressing nip.

During operation of the roller press granular material, which for example is being processed in the mining or cement/mortar industry, is fed into the nip 30 between the two opposing rotatable rollers 10-20, which are rotating in opposite directions y and -y. Under friction the granular material is compressed between the roller surfaces 11-21 with the application of extremely high pressures, thereby reducing the solid materials to a smaller average particle size.

During this type of mineral processing, the outer cylindrical pressing surfaces 11-21 of each roll 10-20 are exposed to extraordinarily high stressing and high wear. An improvement which has been done is to armor the roller surfaces 11-21 with a wear-resistant cladding (not shown) to provide a hardened outer surface.

In addition, in order to improve the draw-in capability of the pressing rollers 10-20 that must draw the granular material product into the nip 30 by friction and compress it, it is known to provide the outer cylindrical pressing surface 11-21 of each counter-rotating roll 10-20 with a plurality of outwardly extending wear-resistant surface studs 12-22. Usually the outwardly extending wear-resistant surface studs 12-22 are

made from a material being harder than the material of the outer cylindrical pressing surface 11-21 and the studs 12-22 extends at a height h of approx. 5-10 mm from the surface 11-21.

The granular material being drawn-in and captured in the spaces 13-23 between the studs 12-22 forms an autogenous layer 40, which provides a protecting layer for the outer cylindrical pressing surface 11-22 of the roll 10-20. See Figure 2. Herewith the lifespan of the roll 10-20 is extended and the comminution of granular material by interparticle crushing is improved.

However, in certain applications and under specific operational conditions the autogenous layer 40 starts to displace or flow in the spaces 13-23 between the outwardly extending wear-resistant surface studs 12-22. This flow of granular material is depicted in Figure 3 with arrows 40a and 40b and is opposite to the direction of rotation (-y or y) of the respective roll (10 or 20).

In this example Figure 3 depicts roll 20 of the roller press of Figure 1, and as such flow arrows 40a denote an autogenous material flow in rotational direction opposite to the rotational direction y of the roll 20 around its longitudinal axis 20a across the outer cylindrical pressing surface 22 of the roll 20, whereas flow arrows 40b denote an autogenous material flow in a (more or less skewed) longitudinal direction x across the outer cylindrical pressing surface 11-22 of the roll 10-20 in the direction x (or its opposite direction –x) of the side faces 10b-20b of the roll 10-20.

The autogenous material flows 40a-40b exhibit a low velocity relative to the roll surface 11-22 and can cause excessive wear to the base material of the outer cylindrical pressing surface 11-22 of the roll 10-20, instead of protecting it. This autogenous layer flow 40a-40b thus limits the life span of the roll 10-20 and the roller press 1 significantly, but also disrupts the comminution of the granular material by interparticle crushing in the nip 30 between the opposing rolls 10-20.

As a solution for the above described phenomenon of autogenous layer flow Figure 4 depicts an example of a roll 10-20 according to the invention. In this Figure roll 20 is depicted as can be observed from its rotational direction y (see also Figure 1). The cylindrical body of the roll 10-20 is provided with means 50 for restricting the flow of granular material in the spaces 13-23 between the outwardly extending wear-resistant surface studs 12-22 along the outer cylindrical pressing surface 11-21.

In particular the flow restricting means 50 are fitted at positions on the pressing surface 11-21, where the possibility of flow 40a of granular material in a rotational direction opposite the rotational direction y of the roll 10-20 along the outer

cylindrical pressing surface 11-21 exists, whereas in another example the flow restricting means 50 are fitted at positions on the pressing surface 11-21, where the possibility of flow 40b of granular material in a longitudinal direction x (or –x) along the outer cylindrical pressing surface 11-21 exists.

Embodiments of these example are shown in Figures 4-5-6. In Figure 4 the plurality of outwardly extending wear-resistant surface studs 12-22 are positioned in a pattern consisting of parallel extending pattern lines i1-i2-i3-i4-i5-etc.-etc. on the pressing surface 11-21 and the flow restricting means 50 are provided between adjacent pattern lines, here between pattern lines i1 and i2 and between pattern lines i4 and i5. See also Figure 7.

In this the design the flow restriction means are made of one or more strip-like elements 50 provided on the outer cylindrical pressing surface 11-21 of the cylindrical body of the roll 10-20. In particular the strip-like flow restriction means 50 are composed of assembly-strip consisting of a first strip-like element 50a1-50a2-etc.-etc. positioned in a longitudinal direction x on the outer cylindrical pressing surface 11-21 of the cylindrical body (of the roll 10-20) and at least a further strip-like element 50b1-50b2-50b3-etc.-etc. positioned at an inclined orientation relative to the first strip-like element 50a1-50a2-etc.-etc. Both the first strip-like element 50a1-50a2-etc.-etc. and the at least further strip-like element 50b1-50b2-50b3-etc.-etc. are interconnected or converge at their connections 50c1-50c2-etc.-etc. With this example any damaging, erosive flow of the autogenous layer 40 of granular layer in a rotational direction y (flow arrow 40a) as well as in a (more or less) longitudinal direction x (flow arrow 40b) towards the side faces 10b-20b of the roll 10-20 along the circumference (seen in rotational or longitudinal direction) of the outer cylindrical pressing surface 11-21 is prevented.

Another advantageous example is shown in Figure 6, wherein the strip-like flow restriction means 50 are composed of a series of strip-like elements 50d1-50d2 positioned in a zig-zag orientation between the outwardly extending wear-resistant surface studs 12-22 on the outer cylindrical pressing surface 11-21 of the cylindrical body. This example of the flow restriction means 50d1 is in particular useful for application on the outer cylindrical pressing surface 11-21 of the roll 10-20 having a more dense or an irregular pattern of outwardly extending wear-resistant surface studs 12-22. Also in this example the pattern of outwardly extending wear-resistant surface studs 12-22 is composed of closely positioned pattern lines i1-i2-i3-i4-i5-i6-etc.-etc., with the zig-zag orientated strip-like elements 50d1-50d2 being positioned between pattern lines i1-i2 and i5-i6.

With the examples above excessive wear to the base material of the outer cylindrical pressing surface 11-21 of the roll 10-20 is significantly reduced or even prevented, as well as the comminution of the granular material by interparticle crushing in the nip 30 between the opposing rolls 10-20 is no longer disrupted. Furthermore the autogenous layer 40 of granular material present in the spaces 13-23 between the outwardly extending wear-resistant surface studs 12-22 is prevented to fluidize because of the presence of the flow restricting means 50 (50a1-50a2-etc.; 50b1-50b2-etc.; 50d1-50d2-etc.), thus preventing erosive flow 40a-40b and excessive wear to the base material of the outer cylindrical pressing surface of the roll 10-20.

Preferably, the flow restricting means can be made from a hard metal mixture, e.g. Tungsten Carbide based mixtures.

LIST OF REFENCE NUMERALS

1	Roller press
10/20	First/second roll of set of rollers
10a/20a	Axis of rotation
10b/20b	Side face of cylindrical body of roll
11/21	Outer cylindrical pressing surface of cylindrical body
12/22	Outwardly extending wear-resistant surface stud
13/23	Space between adjacent outwardly extending wear-resistant surface studs
30	Nip between first and second roll
40	Autogenous layer of granular material
40a	Flow of granular material between the surface studs in circumferential direction
40b	Flow of granular material between the surface studs in longitudinal direction (in the direction of the side faces)
50	Means for restricting the flow of granular material (first embodiment)
50a1-2	Fist strip element of flow restriction means (second embodiment)
50b1-2-3	Second strip element of flow restriction means (second embodiment)
50c1-c2	Interconnection between first and second strip-elements
i1-i2-etc.	pattern lines of studs on the pressing surface

CONCLUSIES

1. Een rol voor een rollenpers geschikt voor het verkleinen van granulair materiaal door verbrijzeling van het granulaire materiaal, waarbij de rol omvat:

een cilindrisch lichaam met een cilindrisch buitenste persoppervlak voor samenwerking met een tegenoverliggende rol met een tussenruimte ertussen voor het met drukkracht verbrijzelen van het granulaire materiaal;

een aantal zich naar buiten uitstrekkende slijtvaste oppervlakte-nokken gepositioneerd op het drukoppervlak; waarin

het cilindrische lichaam is voorzien van middelen voor het beperken van stroming van granulair materiaal tussen de zich naar buiten uitstrekkende slijtvaste oppervlakte-nokken langs het buitenste cilindrische drukoppervlak.

2. Een rol volgens conclusie 1, waarbij de stromingsbeperkende middelen zijn aangebracht op posities op het drukoppervlak, waar de mogelijkheid van optreden van stroming van granulair materiaal in een rotatierichting over het buitenste cilindrische drukoppervlak ontstaat.

3. Een rol volgens conclusie 1 of 2, waarbij de stromingsbeperkende middelen zijn aangebracht op posities op het drukoppervlak, waar de mogelijkheid van optreden van stroming van granulair materiaal in een langsrichting over het buitenste cilindrische drukoppervlak ontstaat.

4. Een rol volgens één of meer van de voorgaande conclusies, waarbij de stromingsbeperkende middelen zich uitstrekken in een langsrichting van het buitenste cilindrische drukoppervlak.

5. Een rol volgens één of meer van de voorgaande conclusies, waarbij de stromingsbeperkende middelen zich uitstrekken in een rotatierichting van het buitenste cilindrische drukoppervlak.

6. Een rol volgens één of meer van de voorgaande conclusies, waarbij het veelvoud van naar buiten zich uitstrekkende slijtvaste oppervlakte-nokken zijn gepositioneerd in een patroon dat bestaat uit evenwijdig verlopende patroonlijnen op het drukoppervlak en waarbij de stromingsbeperkende middelen zijn aangebracht tussen aangrenzende patroonlijnen.

7. Een rol volgens één of meer van de voorgaande conclusies, waarbij de stromingsbeperkende middelen zijn gemaakt van één of meer stripvormige elementen die zijn aangebracht op het buitenste cilindrische drukoppervlak van het cilindrische lichaam.

8. Een rol volgens conclusie 7, waarbij de stripachtige stromingsbeperkende

middelen zijn samengesteld uit een eerste stripvormig element gepositioneerd in een langsrichting op het buitenste cilindrische drukoppervlak van het cilindrische lichaam en tenminste een verder stripvormig element gepositioneerd onder een hoekoriëntatie ten opzichte van het eerste stripvormige element.

9. Een rol volgens conclusie 7, waarbij de stripachtige stromingsbeperkende middelen zijn samengesteld uit een reeks stripvormige elementen gepositioneerd in een zigzagoriëntatie op het buitenste cilindrische drukoppervlak van het cilindrische lichaam.

10. Een rol volgens één of meer van de voorgaande conclusies, waarbij de slijtvaste oppervlakte-nokken zijn gemaakt van een materiaal dat harder is dan het materiaal van het buitenste cilindrische drukoppervlak.

11. Een rol volgens één of meer van de voorgaande conclusies, waarbij de stromingsbeperkende middelen vervaardigd zijn van een harde metaalsamenstelling, bij voorbeeld op wolfraamcarbide gebaseerde samenstellingen.

12. Rolpers geschikt voor het verkleinen van granulair materiaal door verbrijzeling van het granulaire materiaal, waarbij de rolpers omvat:

ten minste één set van twee tegenover elkaar gelegen rollen, waarbij elke rol bestaat uit een cilindrisch lichaam met een buitenste cilindrisch drukoppervlak voor samenwerking met de tegenoverliggende rol met een tussenruimte ertussen voor het met drukkracht verbrijzelen van het granulaire materiaal; waarbij

ten minste één rol is voorzien van middelen voor het beperken van de stroming van korrelig materiaal tussen de zich naar buiten uitstrekkende slijtvaste oppervlaktenokken langs het buitenste cilindrische drukoppervlak volgens een of meer van de voorgaande conclusies.

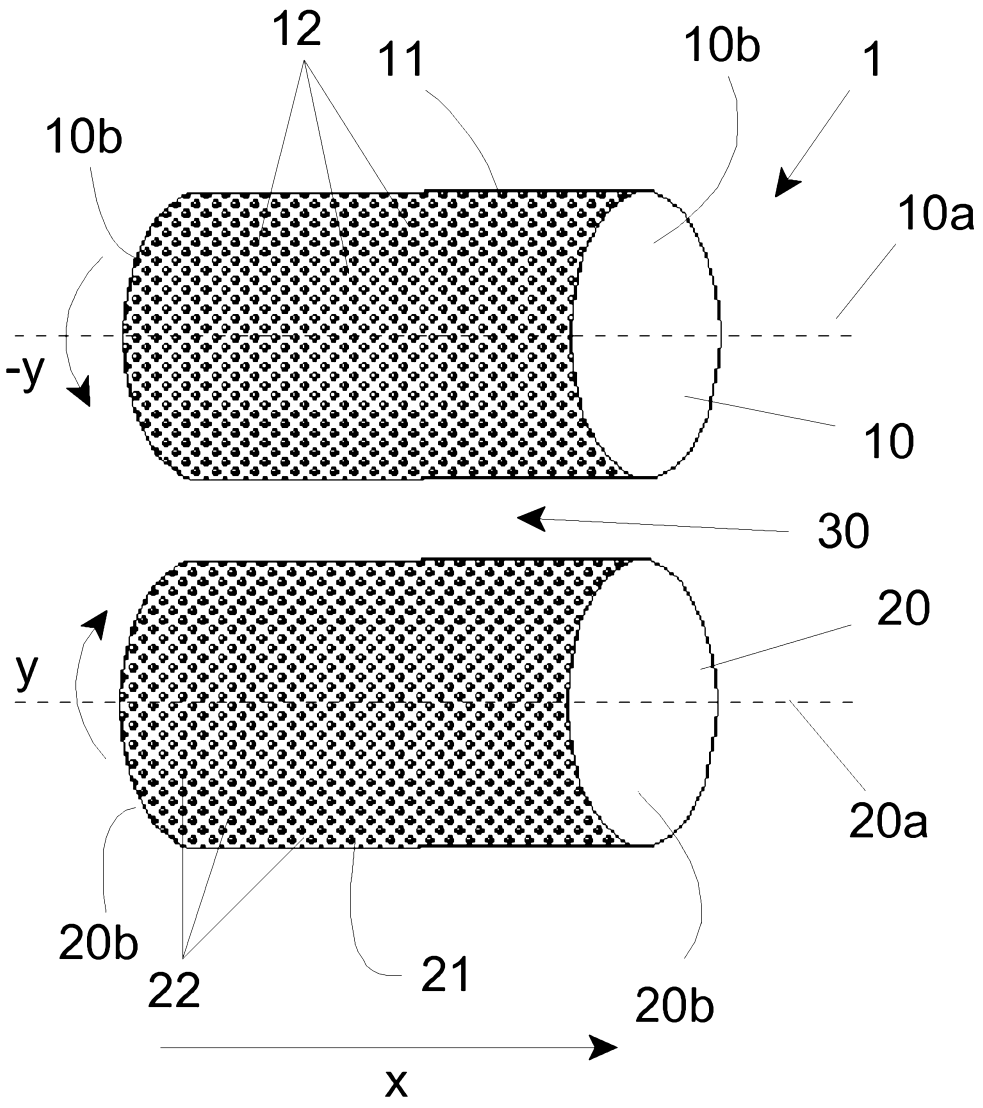

Fig. 1

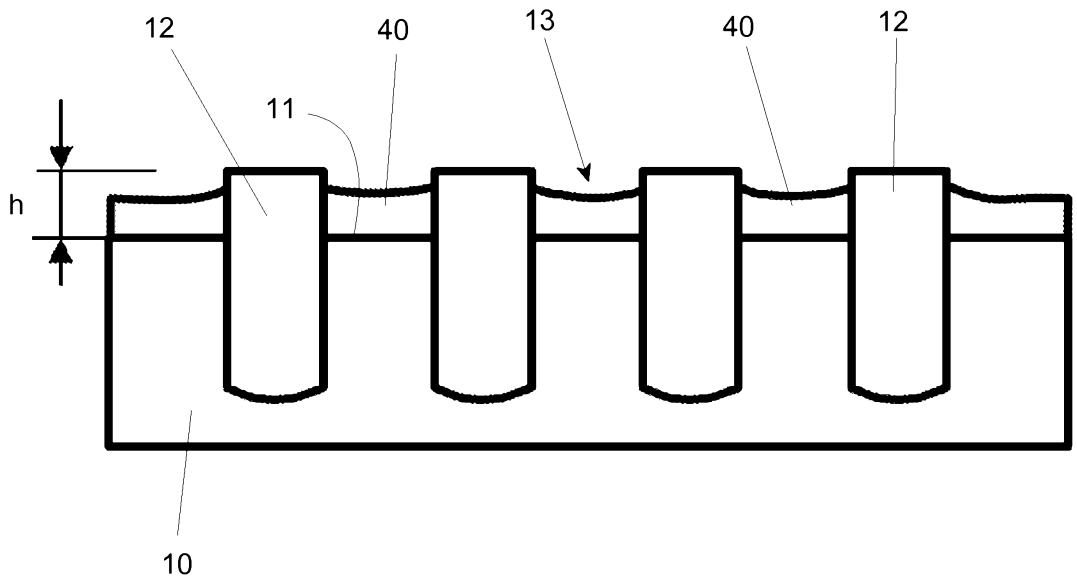

Fig. 2

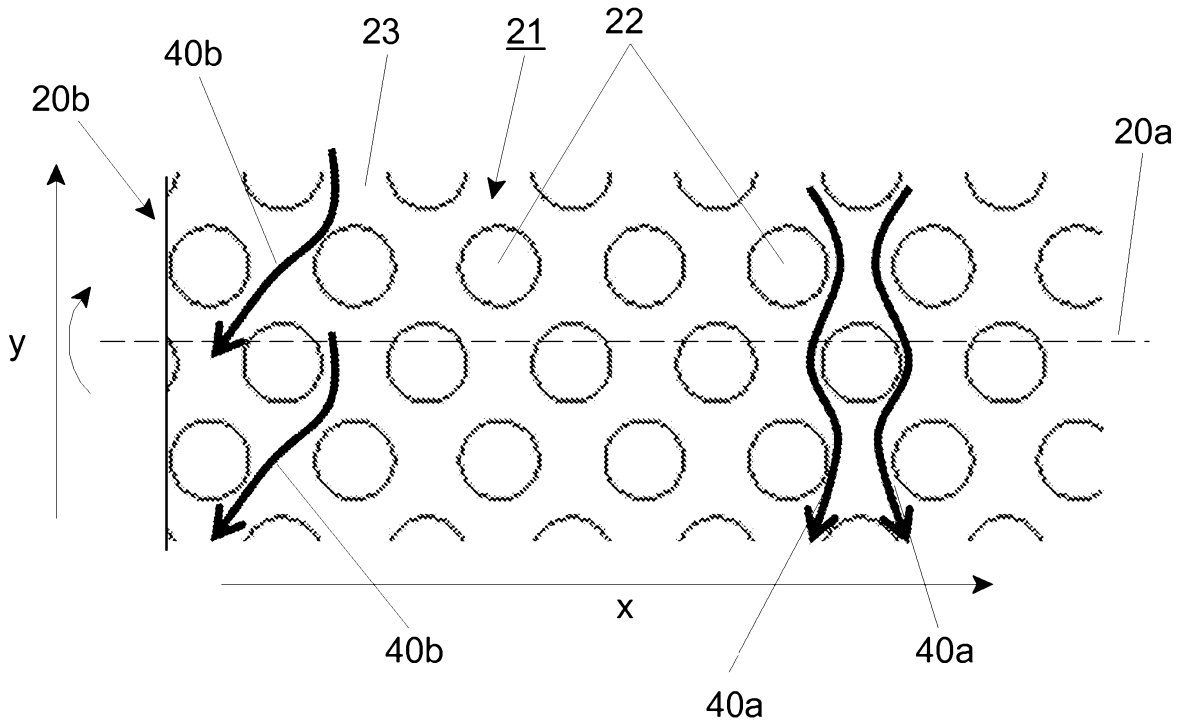

Fig. 3

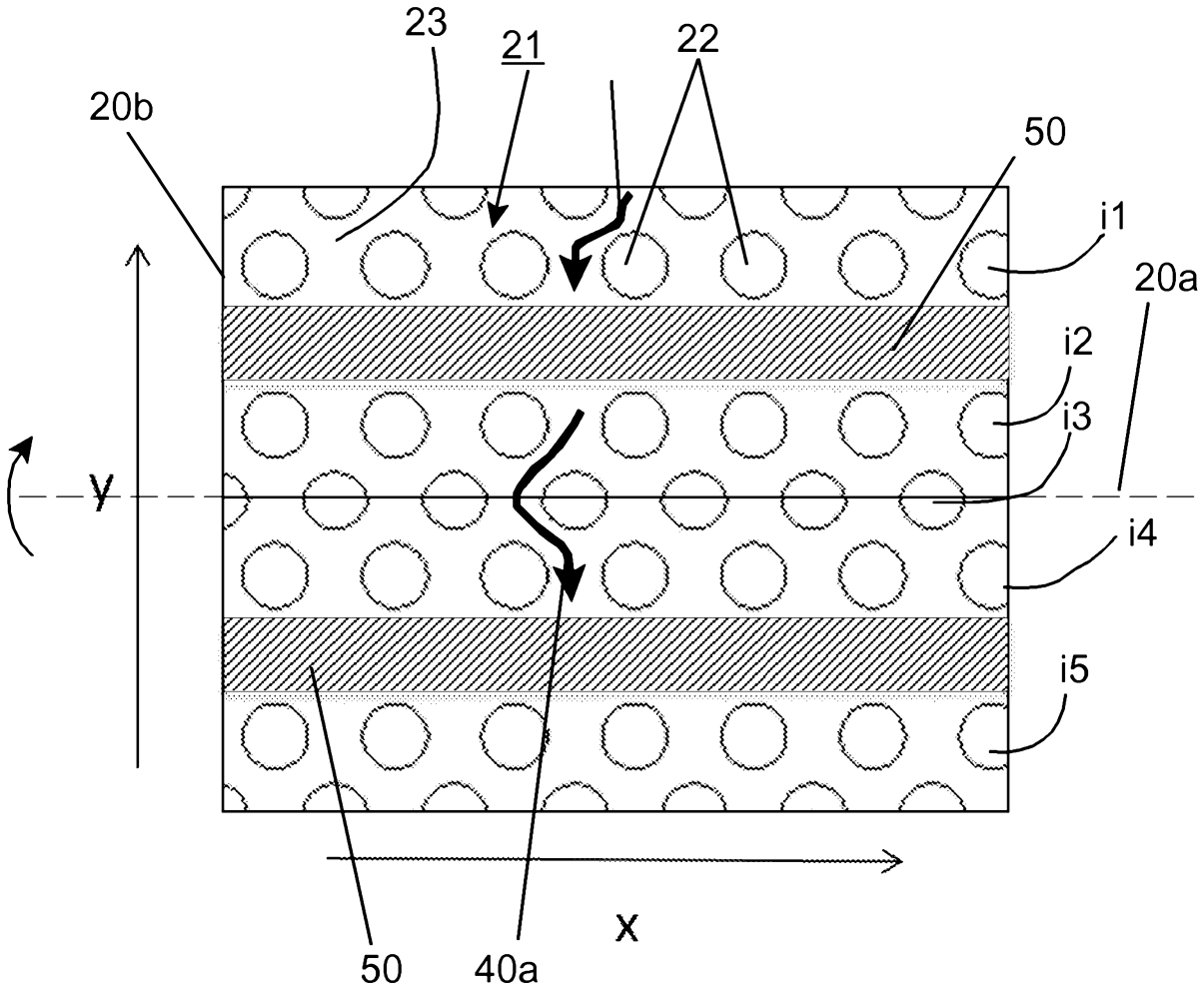

Fig. 4

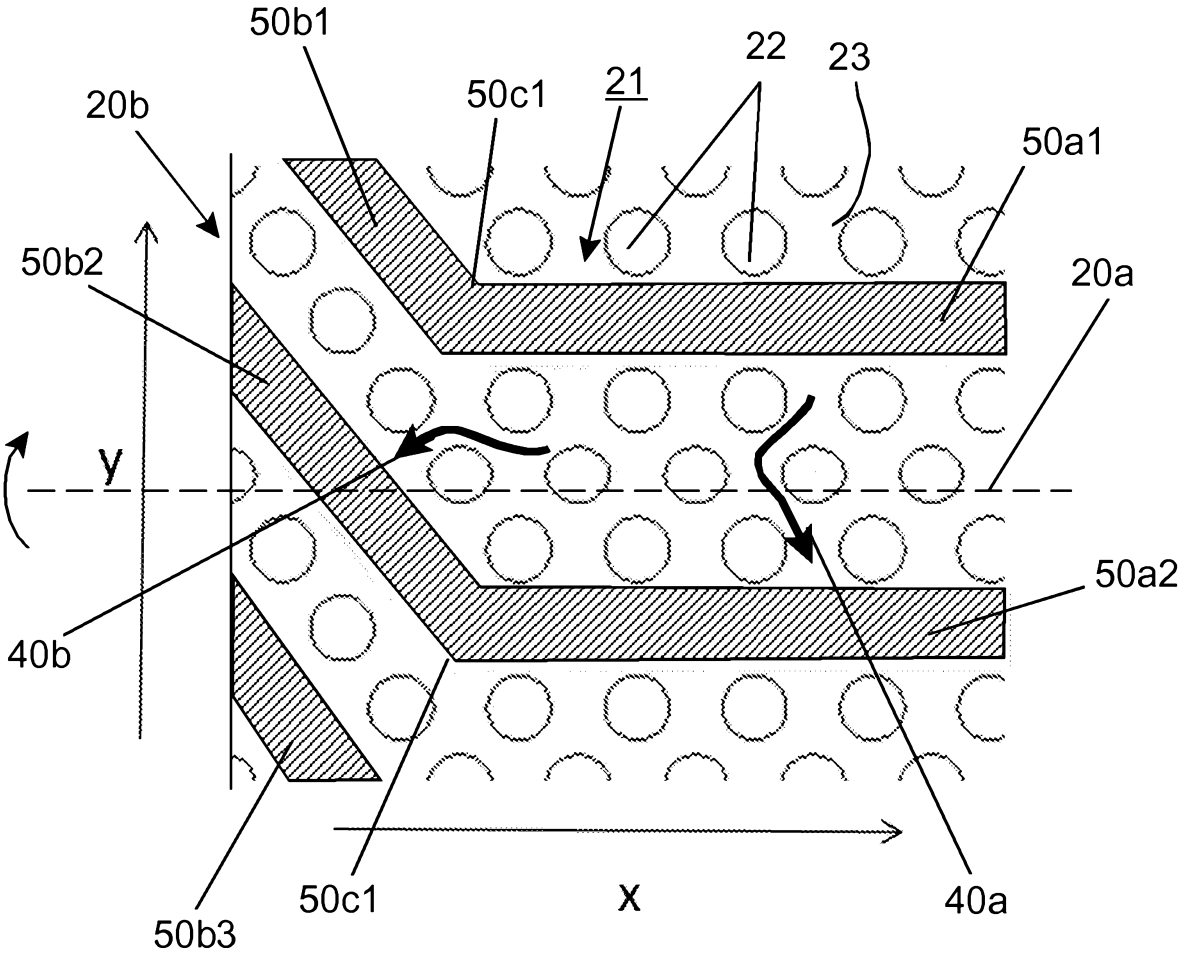

Fig. 5

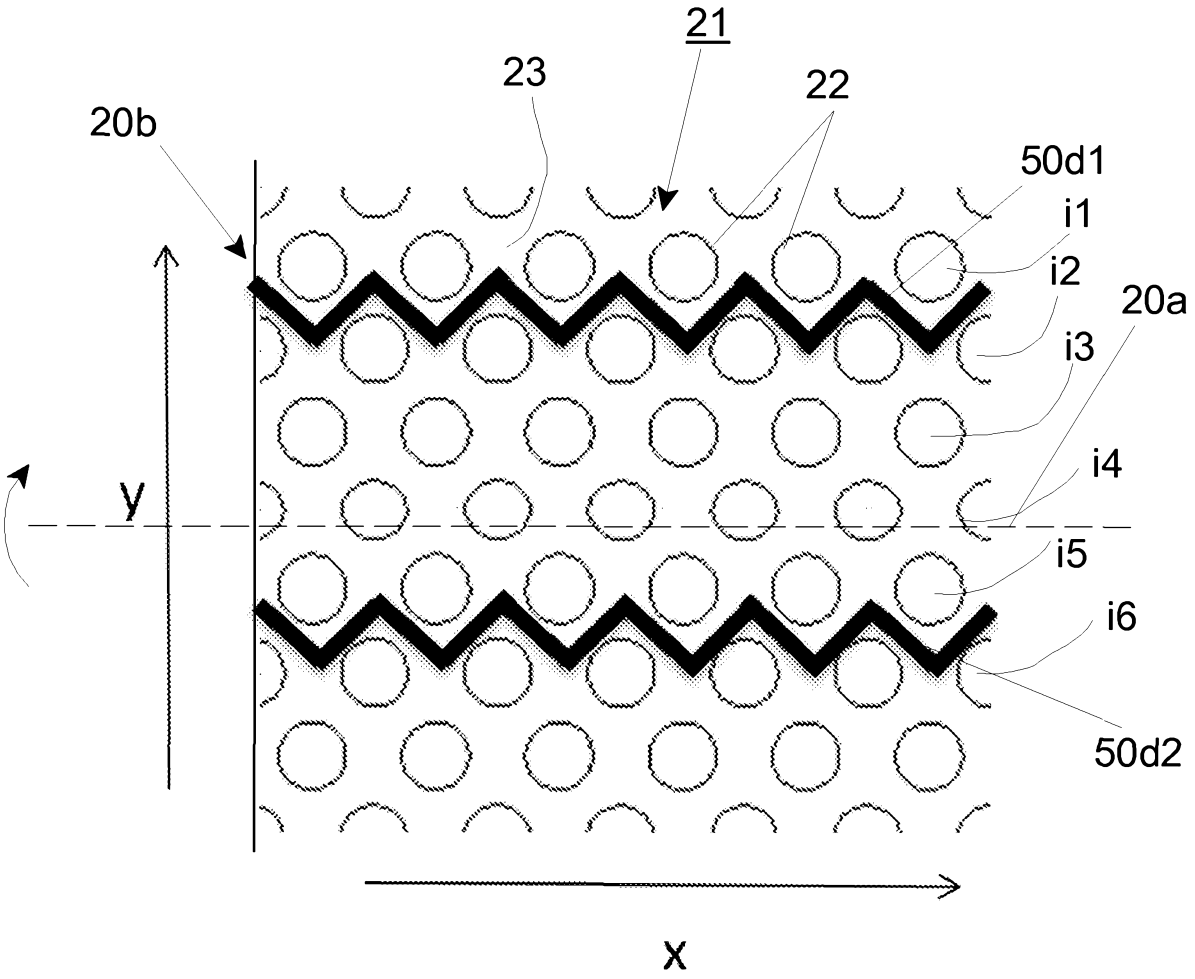

Fig. 6

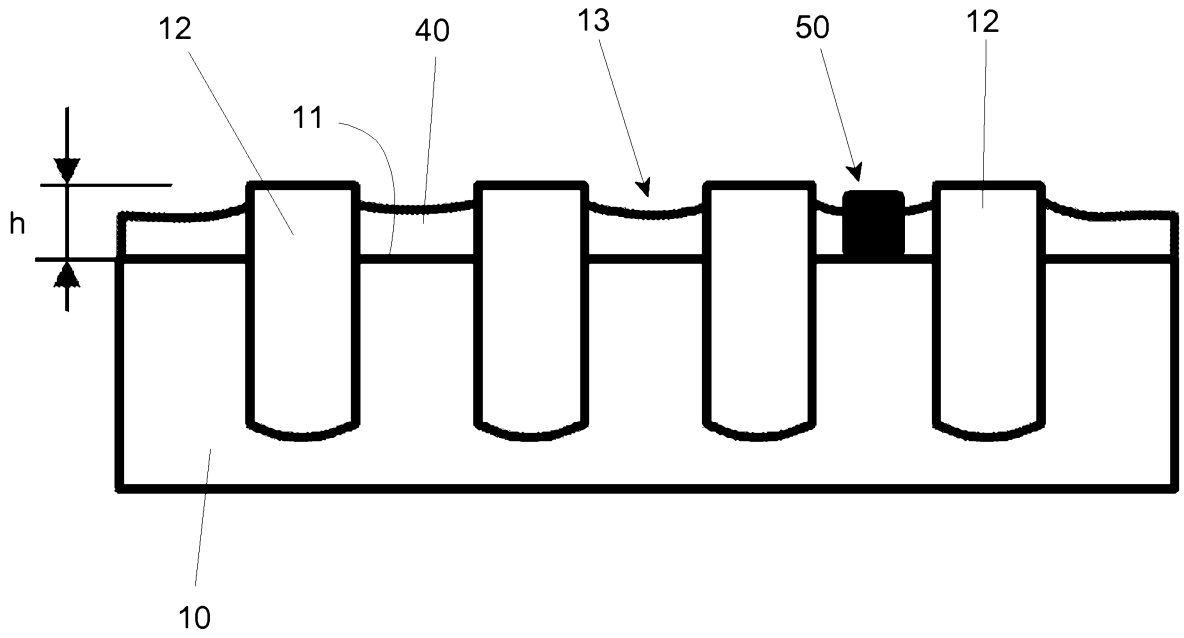

Fig. 7

ABSTRACT

The invention relates to a roll for a roller press suitable for comminution of granular material by interparticle crushing, as well as a roller press provided with such a roll. In certain applications and under specific operational conditions the autogenous layer starts to displace or flow between the outwardly extending wear-resistant surface studs. This flow of granular material has a low velocity relative to the roll and can cause excessive wear to the base material of the outer cylindrical pressing surface of the roll, instead of protecting it.

SAMENWERKINGSVERDRAG (PCT)

RAPPORT BETREFFENDE NIEUWHEIDSONDERZOEK VAN INTERNATIONAAL TYPE

IDENTIFICATIE VAN DE NATIONALE AANVRAGE	KENMERK VAN DE AANVRAGER OF VAN DE GEMACHTIGDE
	73942NL
Nederlands aanvraag nr. 2020403	Indieningsdatum 08-02-2018
	Ingeroepen voorrangsdatum
Aanvrager (Naam) Weir Minerals Netherlands B.V.	
Datum van het verzoek voor een onderzoek van internationaal type 28-04-2018	Door de Instantie voor Internationaal Onderzoek aan het verzoek voor een onderzoek van internationaal type toegekend nr. SN71177

I. CLASSIFICATIE VAN HET ONDERWERP (bij toepassing van verschillende classificaties, alle classificatiesymbolen opgeven)

Volgens de internationale classificatie (IPC)

B02C4/30

II. ONDERZOCHTE GEBIEDEN VAN DE TECHNIEK

Onderzochte minimumdocumentatie

Classificatiesysteem	Classificatiesymbolen
IPC	B02C;B30B

Onderzochte andere documentatie dan de minimum documentatie, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen

III. ☐	GEEN ONDERZOEK MOGELIJK VOOR BEPAALDE CONCLUSIES	(opmerkingen op aanvullingsblad)
IV. ☐	GEBREK AAN EENHEID VAN UITVINDING	(opmerkingen op aanvullingsblad)

ONDERZOEKSRAPPORT BETREFFENDE HET RESULTAAT VAN HET ONDERZOEK NAAR DE STAND VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE

Nummer van het verzoek om een onderzoek naar de stand van de techniek
NL 2020403

A. CLASSIFICATIE VAN HET ONDERWERP
INV. B02C4/30
ADD.

Volgens de Internationale Classificatie van octrooien (IPC) of zowel volgens de nationale classificatie als volgens de IPC

B. ONDERZOCHTE GEBIEDEN VAN DE TECHNIEK

Onderzochte minimum documentatie (classificatie gevolgd door classificatiesymbolen)
B02C B30B

Onderzochte andere documentatie dan de minimum documentatie, voor dergelijke documenten, voor zover dergelijke documenten in de onderzochte gebieden zijn opgenomen

Tijdens het onderzoek geraadpleegde elektronische gegevensbestanden (naam van de gegevensbestanden en, waar uitvoerbaar, gebruikte trefwoorden)
EPO-Internal

C. VAN BELANG GEACHTE DOCUMENTEN

Categorie °	Geciteerde documenten, eventueel met aanduiding van speciaal van belang zijnde passages	Van belang voor conclusie nr.
X	EP 1 502 650 A1 (POLYSIUS AG [DE]) 2 februari 2005 (2005-02-02) * alinea [0015] - alinea [0026]; figuren * -----	1,3,5,7, 10-12
X	WO 2014/173877 A2 (THYSSENKRUPP IND SOLUTIONS AG [DE]) 30 oktober 2014 (2014-10-30) * het gehele document * -----	1-10,12
X	EP 0 830 897 A1 (DEUTZ AG [DE]) 25 maart 1998 (1998-03-25) * kolom 4, regel 24 - kolom 6, regel 1; figuren * -----	1-5,10, 12

☐ Verdere documenten worden vermeld in het vervolg van vak C

☒ Leden van dezelfde octrooifamilie zijn vermeld in een bijlage

° Speciale categorieën van aangehaalde documenten

"A" niet tot de categorie X of Y behorende literatuur die de stand van de techniek beschrijft

"D" in de octrooiaanvrage vermeld

"E" eerdere octrooi(aanvrage), gepubliceerd op of na de indieningsdatum, waarin dezelfde uitvinding wordt beschreven

"L" om andere redenen vermelde literatuur

"O" niet-schriftelijke stand van de techniek

"P" tussen de voorrangsdatum en de indieningsdatum gepubliceerde literatuur

"T" na de indieningsdatum of de voorrangsdatum gepubliceerde literatuur die niet bezwarend is voor de octrooiaanvrage, maar wordt vermeld ter verheldering van de theorie of het principe dat ten grondslag ligt aan de uitvinding

"X" de conclusie wordt als niet nieuw of niet inventief beschouwd ten opzichte van deze literatuur

"Y" de conclusie wordt als niet inventief beschouwd ten opzichte van de combinatie van deze literatuur met andere geciteerde literatuur van dezelfde categorie, waarbij de combinatie voor de vakman voor de hand liggend wordt geacht

"&" lid van dezelfde octrooifamilie of overeenkomstige octrooipublicatie

Datum waarop het onderzoek naar de stand van de techniek van internationaal type werd voltooid	Verzenddatum van het rapport van het onderzoek naar de stand van de techniek van internationaal type
5 oktober 2018	

Naam en adres van de instantie	De bevoegde ambtenaar
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Leitner, Josef

Formulier PCT/ISA/201 (tweede blad) (januari 2004)

ONDERZOEKSRAPPORT BETREFFENDE HET RESULTAAT VAN HET ONDERZOEK NAAR DE STAND VAN DE TECHNIEK VAN HET INTERNATIONALE TYPE

Informatie over leden van dezelfde octrooifamilie

Nummer van het verzoek om een onderzoek naar de stand van de techniek
NL 2020403

In het rapport genoemd octrooigeschrift	Datum van publicatie	Overeenkomend(e) geschrift(en)	Datum van publicatie
EP 1502650 A1	02-02-2005	AU 2004203273 A1	17-02-2005
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		RU 2015150043 A	24-05-2017
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		DK 0830897 T3	06-08-2001
		EP 0830897 A1	25-03-1998
		US 5860609 A	19-01-1999

WRITTEN OPINION

File No.	Filing date *(day/month/year)*	Priority date *(day/month/year)*	Application No.
SN71177	08.02.2018		NL2020403

International Patent Classification (IPC)
INV. B02C4/30

Applicant
Weir Minerals Netherlands B.V.

This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the application
- ☐ Box No. VIII Certain observations on the application

Examiner
Leitner, Josef

Application number

WRITTEN OPINION

NL2020403

Box No. I Basis of this opinion

1. This opinion has been established on the basis of the latest set of claims filed before the start of the search.

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material:

   ☐ a sequence listing

   ☐ table(s) related to the sequence listing

   b. format of material:

   ☐ on paper

   ☐ in electronic form

   c. time of filing/furnishing:

   ☐ contained in the application as filed.

   ☐ filed together with the application in electronic form.

   ☐ furnished subsequently for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

Box No. V Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty	Yes:	Claims	
	No:	Claims	1-12
Inventive step	Yes:	Claims	
	No:	Claims	1-12
Industrial applicability	Yes:	Claims	1-12
	No:	Claims	

2. Citations and explanations

see separate sheet

WRITTEN OPINION

Box No. VII Certain defects in the application

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Reference is made to the following documents:

D1	EP 1 502 650 A1 (POLYSIUS AG [DE]) 2 februari 2005 (2005-02-02)
D2	WO 2014/173877 A2 (THYSSENKRUPP IND SOLUTIONS AG [DE]) 30 oktober 2014 (2014-10-30)
D3	EP 0 830 897 A1 (DEUTZ AG [DE]) 25 maart 1998 (1998-03-25)

2. Lack of novelty and inventive step

The present application does not meet the criteria of patentability, because the subject-matter of claim 1 is not new.

D1 discloses (the references in parentheses applying to this document):

een rol (1, 2) voor een rollenpers geschikt voor het verkleinen van granulair materiaal door verbrijzeling van het granulaire materiaal, waarbij de rol omvat:
een cilindrisch lichaam (see figures) met een cilindrisch buitenste persoppervlak voor samenwerking met een tegenoverliggende rol met een tussenruimte ertussen voor het met drukkracht verbrijzelen van het granulaire materiaal;
een aantal zich naar buiten uitstrekkende slijtvaste oppervlakte-nokken (11, 12, 13, 14) gepositioneerd op het drukoppervlak; waarin
het cilindrische lichaam is voorzien van middelen (11) voor het beperken van stroming van granulair materiaal tussen de zich naar buiten uitstrekkende slijtvaste oppervlakte-nokken langs het buitenste cilindrische drukoppervlak (see paragraph 26 and figures 3, 4).

Thus, D1 discloses all the features of **independent claim 1**, which therefore lacks novelty.

The features of claim 1 are also known from the prior art documents D2 and D3, the claim lacks therefore novelty in view of these documents.

In fact every arrangement with offset, displaced or staggered wear inserts as represented as prior art in figure 3 of the present application or in the figures of US 5,269,477, cited in the present application, are novelty destroying for claim 1, because they all limit the flow of granular material between the protruding wear inserts.

The **dependent claims 2 - 12** do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of novelty, because the features of these claims are also known from at least one of the documents D1 - D3 and therefore not novel.

Re Item VII

Certain defects in the application

The relevant background art disclosed in D1 - D3 is not mentioned in the description, nor are these documents identified therein.

The features of the claims are not provided with reference signs placed in parentheses.

Independent claim 1 is not in the two-part form, which in the present case would be appropriate, with those features known in combination from the prior art being placed in the preamble and the remaining features being included in the characterising part.