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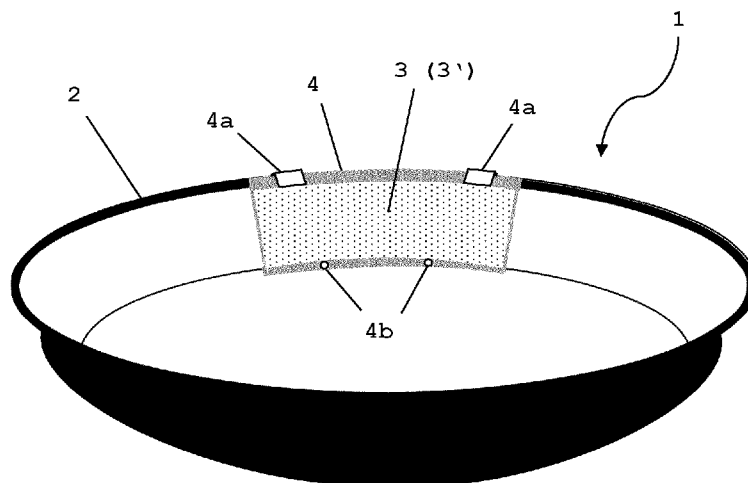
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(81) Designated States (*unless otherwise indicated, for every  
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AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ,  
CA, CH, CL, CN, CO, CR, CU, CV, CZ, DE, DJ, DK, DM,  
DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,  
HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, JO, JP, KE,  
KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU,  
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UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,  
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MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,

(54) Title: IMPACT RING AND IMPROVED DEHULLING DEVICE

Fig. 1a



(57) Abstract: The present invention relates to an impact ring (1) for a device (S) for dehulling of granular good, comprising a ring-shaped body (2) of metal and a polymer layer (3) on its entire inner surface, wherein the polymer layer (3) is releasably arranged on the inner surface of the ring-shaped body (2). The present invention further relates to a device (S) for dehulling of granular material with such an impact ring and/or sensors (20, 21) for monitoring the condition of the impact ring (1), which are selected from the group consisting of load sensors (20) and vibration sensors (21).



TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,  
KM, ML, MR, NE, SN, TD, TG).

**Declarations under Rule 4.17:**

- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

**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))*

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## INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2022/025450

## A. CLASSIFICATION OF SUBJECT MATTER

INV. B02B3/00

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)

B02B A23P A23N 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 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         | GB 583 188 A (QUAKER OATS CO)<br>11 December 1946 (1946-12-11)<br>cited in the application                                                                        | 1, 2, 4, 6, 8         |
| Y         | page 2, line 125 - page 3, line 30;                                                                                                                               | 3, 4                  |
| A         | figures 2, 7                                                                                                                                                      | 5, 7                  |
| X         | US 4 800 810 A (MASUMOTO TOYOJIRO [JP])<br>31 January 1989 (1989-01-31)<br>column 4, line 50 - line 61<br>column 8, line 37 - line 51<br>claims 1, 5; figures 1-3 | 1, 4, 8               |
| Y         | US 1 267 110 A (PARSONS SIDNEY H [US] ET AL)<br>21 May 1918 (1918-05-21)<br>page 2, line 15 - line 17; figures 1, 2                                               | 3, 4                  |



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

"&amp;" document member of the same patent family

Date of the actual completion of the international search

25 January 2023

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24/03/2023

Name and mailing address of the ISA/

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2022/025450

| Patent document<br>cited in search report |   | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|-------------------------------------------|---|---------------------|----------------------------|---------------------|
| GB 583188                                 | A | 11-12-1946          | NONE                       |                     |
| -----                                     |   |                     |                            |                     |
| US 4800810                                | A | 31-01-1989          | CN 87105187 A              | 10-02-1988          |
|                                           |   |                     | GB 2192779 A               | 27-01-1988          |
|                                           |   |                     | KR 880001331 A             | 22-04-1988          |
|                                           |   |                     | US 4800810 A               | 31-01-1989          |
| -----                                     |   |                     |                            |                     |
| US 1267110                                | A | 21-05-1918          | NONE                       |                     |
| -----                                     |   |                     |                            |                     |

## FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-8

Impact ring (1) for a device (S) for dehulling of granular material, comprising a ring-shaped body (2) of metal and a polymer layer (3) on its entire inner surface, characterized in that the polymer layer (3) is releasably arranged on the inner surface of the ring-shaped body (2), as well as a device (S) for dehulling of granular goods, comprising- a material inlet (9),- a rotor (12) arranged below the material inlet (9) which has an interior for accommodating granular material from the material inlet (9) and outlet openings in its side wall communicating with the interior (13a), and- an impact ring (1) which surrounds the rotor (12) at a distance in a ring-shaped manner, characterized in that the impact ring (1) is an impact ring according to any one of claims 1 to 7.

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2. claims: 9-15

Device (S) for dehulling of granular goods, comprising

- a material inlet (9),
- a rotor (12) arranged below the material inlet (9) which has an interior for accommodating granular material from the material inlet and outlet openings in its side wall communicating with the interior (13a), and
- an impact ring (1), in particular an impact ring according to any one of claims 1 to 7, which surrounds the rotor (12) at a distance in a ring-shaped manner, wherein a polymer layer (3) is attached to the entire surface of the impact ring facing the rotor (1),

characterized in that

the device (S) comprises one or more sensors (20, 21) for monitoring the condition of the impact ring (1), wherein the sensors are selected from the group consisting of load sensors (20) and vibration sensors (21), as well as

a method for monitoring the condition of an impact ring (1) of a device (S) for dehulling granular goods, comprising the step of determining the wear of the impact ring (1) by means of one or more sensors (20, 21), wherein the sensors (20, 21) are selected from the group consisting of load sensors (20) and vibration sensors (21).

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# INTERNATIONAL SEARCH REPORT

International application No.  
**PCT/EP2022/025450**

## 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.:

**1-8**

### 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.