

A BUCKET WHEEL SLUICE FOR GRANULATED BULK MATERIALS

The invention relates to a bucket wheel sluice.

5 A bucket wheel sluice is proposed in DE 3445710 C2. The particular design of the construction prevents grains of bulk material being sheared off between the leading edges of the end of the webs of the bucket wheel and the first edge of the sluice housing over which they pass. The jamming-in and shearing of grains of bulk materials cause not only an increased demand for driving power, but also a
10 characteristic chopping noise as the sluice operates, as well as increased wear and tear. In the case of the prior art bucket wheel sluice, in addition to the disposition of a preliminary stripper edge and a V-shaped stripper edge it is necessary to provide a displacement member in the inlet cross-section of the feed shaft. The dimensions of
15 this displacement member are such that underneath it, in the bulk material, a banked cavity is created which is at least equal to the volume of the bulk material scraped off by the stripper edge in the direction of this banked cavity. Without this displacement member, other structural measures would be required to ensure that, at least at
20 the rated rotary speed of the bucket wheel, the quantity of bulk material fed through the inlet cross-section is always less than the volume of the bucket wheel chamber, which is wiping over the inlet cross-section. This is so that the chambers are only partially filled, so that sufficient space remains to accommodate the granulate displaced
25 at the stripper edge. Whereas in the latter case the dispensing volume of the bucket wheel sluice cannot be completely exploited, the displacement provided in the inlet cross-section in accordance with the proposal of DE 3445710 C2 does necessarily impede the supply of bulk material.

30 Therefore, the invention is based on the problem of providing a bucket wheel sluice of the type indicated above, but in which the flow of bulk material into the feed shaft is not impeded. Also the maximum filling volume of the bucket wheel chambers can be utilised, but the jamming and shearing off of grains of bulk material at the first edge
35 of the sluice housing, over which the end faces of the bucket wheel webs wipe, are avoided.

According to the invention, there is provided a bucket wheel sluice

for granulated bulk materials, including a housing comprising a bucket wheel with a feed shaft which ends at an inlet cross-section, of which an edge which is last wiped over by a bucket wheel web is constructed as a preliminary stripper edge, which is situated one to two grain diameters above a cylindrical peripheral surface containing the radially outer end faces of the bucket wheel web and which is followed by a stripper edge which is constructed on the inner wall of the housing and which extends in plan view in a narrowed V-shape in the direction of rotation of the bucket wheel, the V-shape comprising two portions which are symmetrical with respect to the plane of symmetry at right-angles to a bucket wheel shaft and each of which starts at a side cover of the housing and ends at a point which is located in this plane of symmetry, so that the stripper edge portions define a pocket-shaped recess on the inner wall of the housing, each of the portions forming an angle α with the generatrix of the cylindrical peripheral face containing the end faces of the bucket wheel webs, the said angle (α) being at least equal to the friction angle between the bulk material and the sluice material, wherein the pocket-shaped recess is partially filled by a deflecting member symmetrical with the said plane of symmetry and which in plan view has a substantially V-shaped outline, the point of the V which is directed against the direction of rotation of the bucket wheel being disposed substantially below the preliminary stripper edge while the side faces which converge at this point end at a distance (d) approximately 2-6 times the average grain diameter of granulated bulk materials from the corresponding stripper edge portions, the bottom large area of the deflecting member being located in the cylindrical peripheral surface containing the end faces of the bucket wheel webs.

The basic idea underlying the invention resides in maintaining the V-shaped tip at which the two stripper edge portions meet substantially free from grains of bulk material. Thus, despite the absence of a cavity into which these grains could be displaced, the arrangement of the invention ensures that there can be no build up of grains of bulk material in the region of the tip of the 'V'. However there must remain, between the rear narrow edge of the deflecting member, which is towards the portions of the stripper edges, and the stripper edge portions, a gap which is large enough to allow individual grains of bulk material to pass through it.

Otherwise the substantially V-shaped stripper edge would be only replaced by a substantially W-shaped stripper edge, with the result that instead of one point, there would then be two points in which the grains of bulk material would collect and build up.

5 Preferably, the side faces of the deflecting member in each case enclose with the generatrix of the cylindrical peripheral face containing the end faces of the bucket wheel webs an angle (β) which is at least equal to the friction angle between the bulk materials and the sluice material. Advantageously, the rear narrow face of the
10 deflecting member which is towards the stripper edge portions consists of two surface portions which are parallel with the corresponding stripper edge portions.

The bucket wheel sluice according to the invention is explained in detail hereinafter, with reference to the accompanying drawings
15 which show by way of example a diagrammatic and simplified form of embodiment. In the drawings:

Figure 1 is a cross-section through the bucket wheel sluice;

Figure 2 is a plan view of the bucket wheel sluice shown in Figure 1; and

20 Figure 3 is a partial section taken on the line B-B in Figure 1.

The bucket wheel sluice illustrated is intended for granulated bulk materials and consists of a housing 1 with a feed shaft 2 and a discharge shaft 3. The bucket wheel is composed of a bucket wheel shaft 4 and a plurality of bucket wheel webs 5. The arrow 6 indicates
25 the direction of movement of the webs 5.

In the embodiment shown in the drawings, the feed shaft 2 is on the inside, i.e. on its side which is the last to be wiped over by the bucket wheel webs, provided with a sloping surface so that the feed shaft 2 is symmetrical with a central plane passing through
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the bucket wheel shaft 4 while the free inlet cross-section is however asymmetrically offset to the direction of movement of the bucket wheel. However, this feature is of little importance within the framework of the invention. Instead, the feed shaft may equally well be constructed with four straight (perpendicular) inner walls which are disposed symmetrically or even asymmetrically relative to the central plane of the sluice. What is solely essential is that the inlet cross-section, on its side which is the last to be wiped over by the bucket wheel webs 5 in the direction of movement 6, is constructed as a preliminary stripper edge 7 which is situated one to two times the grain diameter above the cylindrical peripheral face containing the radially outer end faces of the bucket wheel webs 5. Adjacent the preliminary stripper edge 7 there is a pocket-shaped recess. This is bounded by a stripper edge which is arrow-shaped like a V in plan view (see Figures 2 and 3), consisting in fact of two symmetrical portions 8a, 8b which terminate at a point 8c. Each of the stripper edge portions 8a, 8b forms with the generatrix of the cylindrical peripheral face containing the end faces of the bucket wheel webs and thus, in the position shown in Figure 2, also with the respective front edge of a bucket wheel web 5, an angle α which is at least equal to the friction angle between the bulk material and the sluice material.

The pocket-shaped recess is partially filled by a deflecting body 9 which in plan view (see Figure 2) has a substantially V-shaped outline, its point 9c being opposite the direction of rotation 6 of the bucket wheel. The side faces 9a and 9b of the deflecting body 9, which converge at this point 9c, respectively enclose, with the generatrix of the cylindrical peripheral face containing the end faces of the bucket wheel webs 5, an angle β which is at least equal to the friction angle between the bulk goods and the sluice material, which means that it can be equal to the angle α but it is chosen to be markedly greater in the example of embodiment shown. The deflecting member 9 does not extend as far as the stripper edge portions 8a and 8b but ends before them, leaving a gap d the width of which is preferably in the range between 2 to 6 times the mean grain diameter of the bulk material for which the bucket wheel sluice is designed. This dimensioning is however also true for other parts of the gap. In the embodiment, the gap is of the same width throughout because

the corresponding narrow side of the deflecting member 9 consists of two surface portions 8a and 8b. The lower large area 9d of the deflecting member lies in the cylindrical peripheral surface containing the end faces of the bucket wheel webs 5.



CLAIMS

1. A bucket wheel sluice for granulated bulk materials, including a housing comprising a bucket wheel and with a feed shaft which ends at an inlet cross-section, of which an edge which is last wiped over by a bucket wheel web is constructed as a preliminary stripper edge, which is situated one to two grain diameters above a cylindrical peripheral surface containing the radially outer end faces of the bucket wheel web and which is followed by a stripper edge which is constructed on the inner wall of the housing and which extends in plan view in a narrowed V-shape in the direction of rotation of the bucket wheel, the V-shape comprising two portions which are symmetrical with respect to the plane of symmetry at right-angles to a bucket wheel shaft and each of which starts at a side cover of the housing and ends at a point which is located in this plane of symmetry, so that the stripper edge portions define a pocket-shaped recess on the inner wall of the housing, each of the portions forming an angle α with the generatrix of the cylindrical peripheral face containing the end faces of the bucket wheel webs, the said angle (α) being at least equal to the friction angle between the bulk material and the sluice material, wherein the pocket-shaped recess is partially filled by a deflecting member symmetrical with the said plane of symmetry and which in plan view has a substantially V-shaped outline, the point of the V which is directed against the direction of rotation of the bucket wheel being disposed substantially below the preliminary stripper edge while the side faces which converge at this point end at a distance (d) approximately 2-6 times the average grain diameter of granulated bulk materials from the corresponding stripper edge portions, the bottom large area of the deflecting member being located in the cylindrical peripheral surface containing the end faces of the bucket wheel webs.

2. A bucket wheel sluice according to claim 1, wherein the side faces of the deflecting member in each case enclose with the generatrix of the cylindrical peripheral face containing the end faces of the bucket wheel webs an angle (β) which is at least equal to the friction angle between the bulk materials and the sluice material.



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3. A bucket wheel sluice according to claim 1 or 2, wherein the rear narrow face of the deflecting member which is towards the stripper edge portions consists of two surface portions which are parallel with the corresponding stripper edge portions.

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4. A bucket wheel sluice, substantially as hereinbefore described with reference to the accompanying drawings.
