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(56) Documents Cited

GB 2233256 A

GB 1185079 A

GB 1075025 A

GB 0805506 A

EP 0076500 A

US 3701418 A

(58) Field of Search

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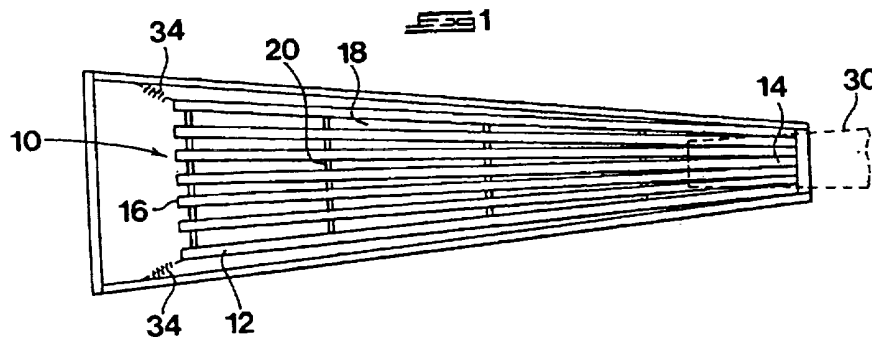
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Online: WPI, Claims

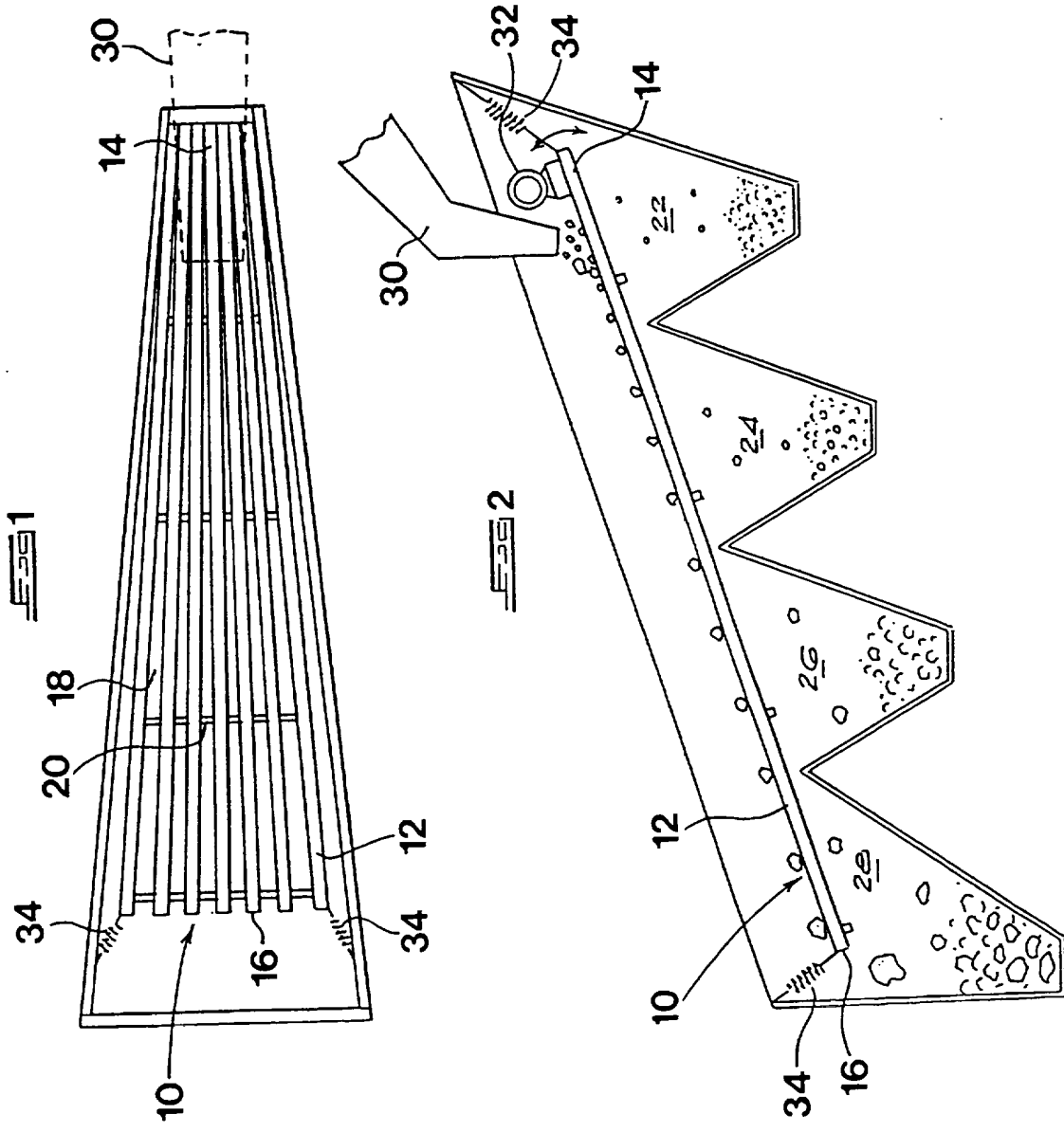
(54) Abstract Title

Sorting grate

(57) The grate has a frame supporting a plurality of grate members defining between them at least one aperture which increases in size from one end to the other of the grate. Typically the grate 10 has a set of elongate rods 12 arranged side by side. At the first end of the grate 14 the rods are more closely spaced than at the other end 16 such that the openings between the rods have gradually increasing width along the grate. The grate can be mounted for vibratory movement and may be suspended above a set of hoppers to collect the resulting classified material. Utility may be in ore classification or fruit or grain sizing.



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BACKGROUND OF THE INVENTION

THIS invention relates to sorting apparatus which can be used, for example, to sort particulate material or other items having variable size.

Sorting apparatus is known in the form of a sorting grate or grizzly which comprises sets of parallel bars which are spaced apart to define slots or openings between them. Particulate material such as crushed ore is deposited onto the grate, which is vibrated to agitate the material, and particles of the material having a size less than the width of the slots falls through the grate.

It is an object of the invention to provide apparatus of this general kind, which can classify particulate material according to the size thereof.

SUMMARY OF THE INVENTION

According to a first aspect of the invention there is provided a sorting grate comprising a frame and a plurality of grate members supported by the frame, the grate members defining between them at least one aperture which increases in size from a first end to a second end of the grate.

The sorting grate according^{ly} may comprise a plurality of elongate grate members which are arranged side by side, with respective first ends of the grate members being closer together than respective second ends of the grate members, so that between adjacent grate members are defined apertures having a width which increases from first to second ends of the grate members.

The elongate grate members are preferably bars which are arranged to define a predetermined angle between adjacent bars.

The bars may comprise steel bar or tubing welded to frame members extending transversely relative to the bars.

According to a second aspect of the invention there is provided sorting apparatus comprising:

a sorting grate as defined above;

a plurality of receptacles for sorted material below the grate, the receptacles being disposed side by side between the first and second ends of the grate;

mounting means for supporting the grate movably above the receptacles; and

vibrator means for imparting vibrating motion to the grate.

The receptacles are preferably staggered vertically with respect to one another and the sorting gate is inclined correspondingly, with the first end thereof uppermost, so that particulate material deposited on the grate migrates downwardly along the length thereof towards the second end of the grate, with smaller particles passing through the grate near the first end thereof and larger particles passing through the grate further away from the first end thereof.

The apparatus may include feed means adjacent the first end of the grate for depositing material to be sorted thereon, such as a conveyor discharge chute arranged above the first end of the grate.

The mounting means may comprise a set of springs.

The vibrator means preferably comprises a vibratory motor at or near the first end of the grate, arranged to cause vibration of the grate in a direction transverse to a plane defined by the grate.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a schematic plan view of sorting apparatus according to the invention; and

Figure 2 is a schematic side view of the apparatus.

DESCRIPTION OF AN EMBODIMENT

The illustrated sorting apparatus comprises a grate or grizzly 10 which consists of a set of elongate rods or bars 12 of uniform cross section which are arranged side by side, as best seen in Figure 1. At a first end 14 of the grate, the bars are closer together than at a second end 16, defining a predetermined angle between adjacent bars, with the result that the slots or openings 18 between the bars 12 have a width which gradually increases from the first end to the second end.

The bars 12 typically comprise mild steel bar or rectangular section steel tubing, and are connected together by cross members 20 welded to their undersides, effectively defining a vestigial frame which supports the bars.

The grate or grizzly 10 is mounted for vibratory movement above a set of four hoppers 22, 24, 26 and 28. For example, the corners of the grate can be suspended by a set of springs 34 from the upper edges of the hoppers. The hoppers are staggered vertically relative to one another, and the grate 10 is inclined correspondingly, with its first end 14 uppermost, above the first hopper 22. A conveyor discharge chute 30 is disposed above the first end of grate 10 and deposits particulate material onto the portion of the grate above the hopper 22, as best seen in Figure 2. A vibratory motor 32 or other vibrator means is mounted on or connected to the grate at or near the first end thereof to cause it to vibrate, preferably in a direction transverse to the plane defined by the grate, as indicated by the arrows in Figure 2.

When particulate material is deposited onto the vibrating grate, it migrates downwardly from the feed point, with smaller particles falling through the

grate nearer its uppermost end, and larger particles falling through further down. Very large particles simply fall off the end of the grate into the last hopper 28. The maximum aperture or gap size of the grate will depend on the intended application of the apparatus. For example, to sort diamond-containing gravel, a maximum gap size of about 8 mm was found to work effectively.

Although the hoppers 22 to 28 are illustrated without any conveyor means associated with them, it will be appreciated that each hopper can have an associated conveyor, such as a belt conveyor located beneath a chute or opening at the bottom of the hopper, to remove the collected material in the hopper.

The grate of the described sorting apparatus is very simple, and requires little more effort to construct than a conventional rectangular grizzly, but is able to classify particulate material according to size. The grate 10 is rigid and of simple construction, and does not require the use of rollers or other relatively complex equipment. It will be appreciated that the application of the invention is not limited to ore sorting, but that the apparatus can also be used to sort other articles having a distribution of sizes, such as grain or fruit, with suitable adjustment of the aperture size of the grate.

CLAIMS

1. A sorting grate comprising a frame and a plurality of grate members supported by the frame, the grate members defining between them at least one aperture which increases in size from a first end to a second end of the grate.
2. A sorting grate according to claim 1 comprising a plurality of elongate grate members which are arranged side by side, with respective first ends of the grate members being closer together than respective second ends of the grate members, so that between adjacent grate members are defined apertures having a width which increases from first to second ends of the grate members.
3. A sorting grate according to claim 2 wherein the elongate grate members are bars which are arranged to define a predetermined angle between adjacent bars.
4. A sorting grate according to claim 3 wherein the bars comprise steel bar or tubing, and are welded to frame members extending transversely relative to the bars.
5. A sorting grate substantially as herein described and illustrated.
6. Sorting apparatus comprising:

a sorting grate according to any one of claims 1 to 5;

a plurality of receptacles for sorted material below the grate, the receptacles being disposed side by side between the first and second ends of the grate;

mounting means for supporting the grate movably above the receptacles; and

vibrator means for imparting vibrating motion to the grate.

7. Sorting apparatus according to claim 6 wherein the receptacles comprise bins or hoppers.
8. Sorting apparatus according to claim 6 or claim 7 wherein the receptacles are staggered vertically with respect to one another and the sorting gate is inclined correspondingly, with the first end thereof uppermost, so that particulate material deposited on the grate migrates downwardly along the length thereof towards the second end of the grate, with smaller particles passing through the grate near the first end thereof and larger particles passing through the grate further away from the first end thereof.
9. Sorting apparatus according to any one of claims 6 to 8 including feed means adjacent the first end of the grate for depositing material to be sorted thereon.
10. Sorting apparatus according to claim 9 wherein the feed means is a conveyor discharge chute arranged above the first end of the grate.

11. Sorting apparatus according to any one of claims 6 to 10 wherein the mounting means comprises a set of springs.

12. Sorting apparatus according to any one of claims 6 to 11 wherein the vibrator means comprises a vibratory motor at or near the first end of the grate.

13. Sorting apparatus according to claim 12 wherein the vibratory motor is arranged to cause vibration of the grate in a direction transverse to a plane defined by the grate.

14. Sorting apparatus substantially as herein described and illustrated.



Application No: GB 9820008.2
Claims searched: All

Examiner: Michael R. Wendt
Date of search: 29 October 1998

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:
UK Cl (Ed.P): B2H (H22J,H22Q)
Int Cl (Ed.6): B07B 1/28, 13/07
Other: WPI, Claims

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
A	GB 2233256 A (DUNLOP) (& EP 0405943 A1) e.g. see Claim1 & Figure 2.	1, 6
X	GB 1185079 (N.M.R.B) e.g. see Figure 2.	1 - 3 at least
X	GB 1075025 (MOGENSEN) e.g. see Figure 1. Claims 1 & 2.	1 - 3, 6, 7
X	GB 0805506 (JOHNSON) e.g. See Figure. Page 1 lines 17 to 30.	1 - 3
X	EP 0076500 A2 (AFFELDT) e.g. Figure 2 & Abstract.	---
X	US 3701418 (SORTEX) e.g. see Figures 1 & 2. Column 4 lines 37 etc.	1, 6, 7

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.