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(54) **Sorting machine**

(57) Sorting arrangement for sorting a mixture of garbage, using a conveyor belt (1) having a progressive inclination in the transport direction. The conveyor belt (1), which is equipped with cross ribs (2), first carries off the finer garbage. Next a receptacle (6) is coupled with and moved upwards by the conveyor belt (1), collecting the coarser garbage in the process. When arriving at the top, the receptacle (6) is decoupled, and the coarser garbage is laterally pushed from the receptacle by a slide (8) on to a conveyor belt.

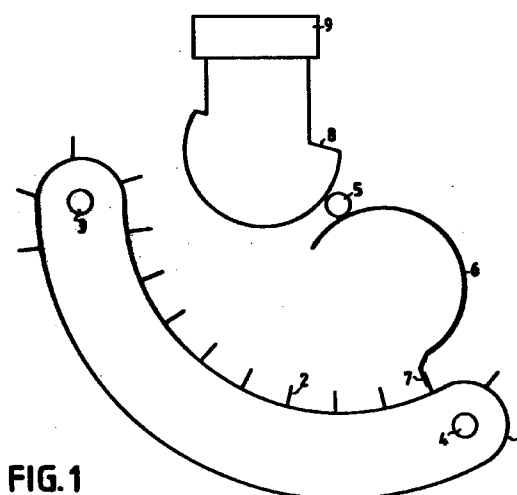


FIG. 1

EP 0 734 788 A2

Description

The present invention relates to a sorting arrangement for sorting a mixture of, for example, garbage, provided with at least a first and a second supporting roller, for supporting a conveyor belt equipped with cross ribs, the first supporting roller being positioned higher than the second supporting roller, causing the conveyor belt to exhibit a progressive inclination, and with drive means for driving the conveyor belt in the drive direction, such that from a mixture present on the conveyor belt the finer garbage is thrown off near the first supporting roller.

A sorting arrangement of this type is known from the patent specification EP-B-0 265 669. The sorting arrangement described there, too, is intended for separating garbage. To this end, the conveyor belt in the known arrangement is tilted transversely, causing coarse garbage, which cannot be moved along by the cross ribs, in due course to leave the conveyor belt at the lower side.

A drawback of the known arrangement is that the moment at which this coarse garbage leaves the conveyor belt cannot be chosen. That moment is effectively determined by the tilt and the width of the conveyor belt, both tilt and width being fixed.

The sorting arrangement according to the present invention, which is not tilted laterally, eliminates this drawback. Depending on the type of garbage to be processed the conveyor belt can be left running for a shorter or longer time, until the moment that only coarser garbage remains on the conveyor belt, when this coarser garbage can be removed separately in a virtually continuous process. To this end it is characterized in that there is provided a receptacle, which can be coupled with the conveyor belt, for collecting any remaining coarser garbage. An advantageous embodiment of the invention is characterized in that the width of the receptacle is larger than or equal to the width of the conveyor belt, and that the receptacle is provided with coupling means for coupling the receptacle with the conveyor belt. In this way the receptacle will be moved along by the conveyor belt, with the coarser garbage continuously tumbling back and ending up in the receptacle.

In another advantageous embodiment of the invention the coupling means comprise a ridge, extending along the width of the receptacle, which can hook on a rib of the conveyor belt.

A suitable point for coupling the receptacle with the conveyor belt is found at the second supporting roller, because at that point the conveyor belt is free from garbage that could thwart the coupling. Yet another advantageous embodiment of the invention is therefore characterized in that there are provided guiding means for guiding the receptacle to the second supporting roller, to enable the coupling means to hook on a rib of the conveyor belt.

Near the first supporting roller at least practically all coarser garbage has gathered in the receptacle. Yet another advantageous embodiment of the invention is characterized in that the guiding means are also arranged for decoupling the receptacle, near the first supporting roller, when the receptacle can be emptied without the need for the conveyor belt to be stopped, resulting in a virtually continuous sorting process.

Obviously, for any arbitrary inclination of the conveyor belt a trajectory can be constructed for the receptacle to move along, in order to achieve the desired guiding. In an advantageous embodiment the progressive inclination is chosen such that it follows the curvature of a circle segment, which entails that the guiding must also achieve a trajectory shaped like a circle segment. An uncomplicated implementation of the guiding means is then characterized in that the guiding means comprise a shaft, positioned in the centre of the circle segment, and provided with a drive for rotating the receptacle around the shaft.

For emptying the receptacle there are provided, according to the invention, carry-off means, which are positioned near the first supporting roller. It is very advantageous for the carry-off means to be positioned at a considerable elevation, because in a subsequent sorting process the coarser garbage is further processed, which is as a rule done by hand. By causing this sorting to take place from an elevated second conveyor belt it is possible for the sorted material to be disposed of directly into containers placed on the floor. According to the invention the sorting arrangement is thus used also as a means for transporting coarser garbage to a higher level, obviating the need for additional transport means.

In another advantageous embodiment of the invention the receptacle comprises a trough-shaped element, of which at least one end is open, the carry-off means comprising a slide, which pushes the coarser garbage laterally from the receptacle. In the process the coarser garbage will generally drop on the second conveyor belt for further processing.

The manual processing at the second conveyor belt has been found to effectively determine the capacity of the sorting arrangement. In a very advantageous embodiment of the invention, therefore, a third conveyor belt is provided and the receptacle is open at both ends, the slide pushing the coarser garbage alternately at one side on to the second conveyor belt and at the other side on to the third conveyor belt.

The invention will now be explained in detail with reference to the following figures, in which:

Fig. 1 is a schematic representation in side view of a sorting arrangement, with the receptacle in the hook-on position;

Fig. 2 is a schematic representation in side view of the sorting arrangement, with the receptacle in the carry-off position;

Fig. 3 is a schematic representation in front view of the sorting arrangement, with the receptacle in the carry-off position.

Fig. 1 shows a possible embodiment in side view of the sorting arrangement according to the invention, in which an endless conveyor belt 1, equipped with ribs 2, is guided over a first supporting roller 3 and a second supporting roller 4, preferably such that conveyor belt 1 exhibits a progressive inclination near first supporting roller 3. First supporting roller 3 and second supporting roller 4 are provided with drive means, for example hydraulic motors, and are supported in a usual manner, for example using a construction of steel beams. If near the flatter part of conveyor belt 1 a mixture of coarser and finer garbage is dumped, the finer garbage will be carried upwards by ribs 2, whereas coarser garbage tumbles back continuously, gathering on the flatter part of conveyor belt 1. When the finer garbage has been carried off to a sufficient degree, the coarser garbage gathered on the flatter part of conveyor belt 1 can be carried off by advancing a receptacle 6, with the aid of the guiding means 5, which are here implemented as a rotation shaft.

Receptacle 6 has a width which is at least equal to the width of conveyor belt 1, and is equipped with a ridge 7, which can hook on a rib 2. Thus, in cooperation with guiding means 5, receptacle 6 will be moved along by conveyor belt 1, with the coarser garbage ending up in receptacle 6. To avoid confusion guiding means 5 are here represented without the drive means, such as an hydraulic motor and supporting constructions known in the art. In order to accomplish that ridge 7 and a rib 2 converge in a predictable manner, use can be made of techniques known in the art, the drive means of guiding means 5 for example moving the receptacle 6 close to the meeting point, in anticipation of the approach of a rib 2, which approach can be detected mechanically or electrically, upon which the drive means move receptacle 6 on to the meeting point.

Since the progressive inclination of conveyor belt 1 follows the curvature of a circle segment, the simple rotation of receptacle 6 around the guiding means 5, here implemented as a shaft, is sufficient for collecting the coarser garbage. For conveyor belts with a different progressive inclination, more complex guiding means will be needed, which however can always be realized with conventional constructions such as guide rails and drive chains.

Fig. 2 shows the same embodiment of the sorting arrangement in side view, with the guiding means 5 and conveyor belt 1 having moved the receptacle 6 to its highest position. Owing to the advantageous embodiment of guiding means 5, the decoupling of ridge 7 and rib 2 has taken place spontaneously at the spot where conveyor belt 1 no longer follows the curvature of a circle segment, which occurs near first supporting roller 3. In order to ensure that the decoupling takes place smoothly, the speeds of conveyor belt 1 and ridge 7 of

receptacle 6 are balanced such that the coupling of ridge 7 and rib 2 is at least substantially maintained all the time, but when approaching the decoupling point ridge 7 is advancing relative to rib 2.

Also visible is a slide 8, which is positioned in line with receptacle 6, and which can push the coarser garbage collected in receptacle 6, with the aid of a linear drive 9, for example an hydraulic pressure cylinder, laterally from receptacle 6. For this purpose the sides of receptacle 6 have been left open. When receptacle 6 has been emptied, guiding means 5 can, for example by completing the rotation around the guiding means 5, which are implemented here as a rotation shaft, move receptacle 6 again in the direction of the second supporting roller 4, in preparation for the next sorting cycle.

Fig. 3 shows the same embodiment in front view, with receptacle 6 in the highest position above the rib-clad conveyor belt 1, and with the guiding means 5, which are shown here for the sake of clarity without the drive means and supporting constructions known in the art. Also visible are the slide 8, which is attached to linear drive 9, a second conveyor belt 10 and a third conveyor belt 11, those conveyor belts, in successive sorting cycles, being alternately loaded with coarser garbage by slide 8. It is of course also possible to implement the arrangement with conveyor belt 11 only, but in that case slide 8 needs to be moved back to its starting position every time after pushing the coarser garbage from receptacle 6.

Claims

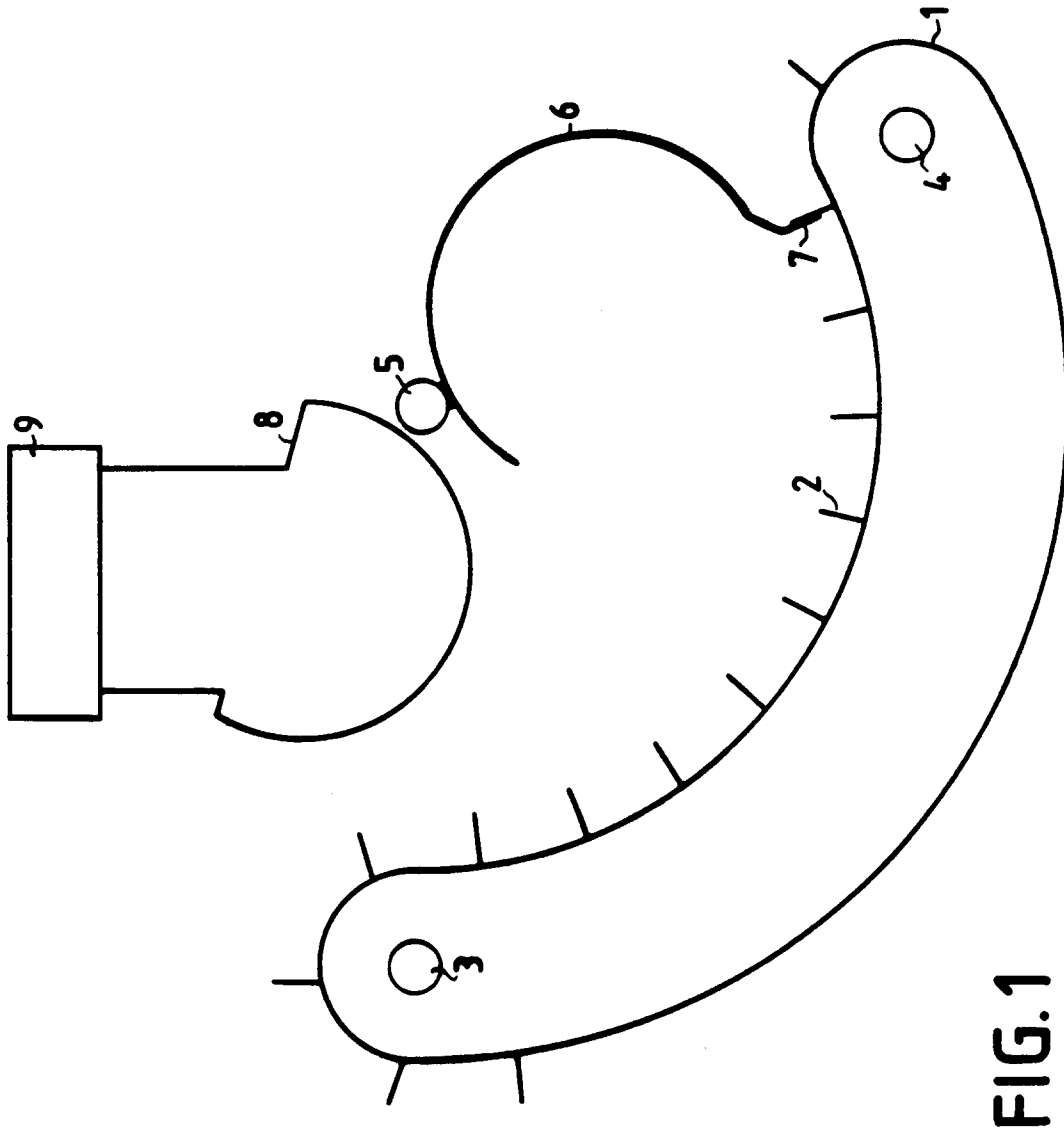
1. Sorting arrangement for sorting a mixture of, for example, garbage, provided with at least a first and a second supporting roller, for supporting a conveyor belt equipped with cross ribs, the first supporting roller being positioned higher than the second supporting roller, causing the conveyor belt to exhibit a progressive inclination, and with drive means for driving the conveyor belt in the drive direction, such that from a mixture present on the conveyor belt the finer garbage is thrown off near the first supporting roller, characterized in that there is provided a receptacle, which can be coupled with the conveyor belt, for collecting remaining coarser garbage.
2. Sorting arrangement according to claim 1, characterized in that the width of the receptacle is larger than or equal to the width of the conveyor belt.
3. Sorting arrangement according to claim 2, characterized in that there are provided coupling means for coupling the receptacle with the conveyor belt.
4. Sorting arrangement according to claim 3, characterized in that the coupling means comprise

a ridge, extending along the width of the receptacle, which can hook on a rib of the conveyor belt.

5. Sorting arrangement according to claim 3 or 4,
characterized in that there are provided guiding means for guiding the receptacle to the second supporting roller, for hooking the coupling means on a rib of the conveyor belt. 5
6. Sorting arrangement according to claim 5,
characterized in that the guiding means are also arranged for decoupling the receptacle, near the first supporting roller. 10
7. Sorting arrangement according to claim 6,
characterized in that the progressive inclination of the conveyor belt substantially follows the curvature of a circle segment. 15
8. Sorting arrangement according to claim 7,
characterized in that the guiding means comprise a shaft, positioned in a centre of the circle segment, and provided with a drive, enabling the receptacle to be rotated. 20
9. Sorting arrangement according to one of the preceding claims, characterized in that there are provided carry-off means for the removal of the coarser garbage collected in the receptacle. 25
10. Sorting arrangement according to claim 9,
characterized in that the carry-off means are positioned near the first supporting roller. 30
11. Sorting arrangement according to claim 10,
characterized in that the receptacle comprises a trough-shaped element, of which at least one end is open, and that the carry-off means comprise a slide, which pushes the coarser garbage laterally from the receptacle. 35 40
12. Sorting arrangement according to claim 11,
characterized in that the receptacle is open on two sides, and that the slide is arranged for pushing out the coarser garbage alternately at one end and at the other end of the receptacle. 45

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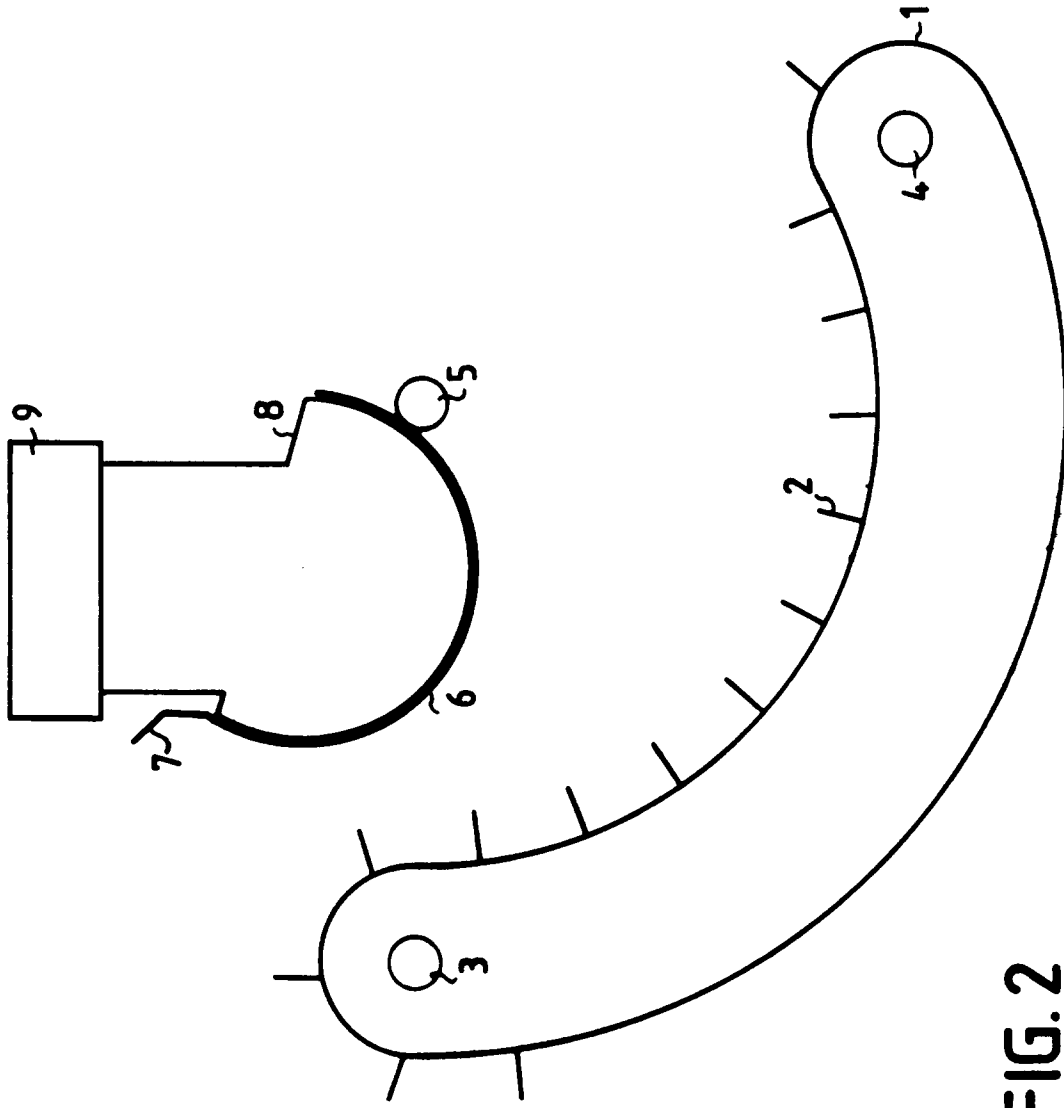


FIG. 2

