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(54) Equipment for feeding bales of chemical and mechanical pulp into a pulper

(57) The invention relates to an apparatus for feeding bales (1) of cellulosic and groundwood pulp sheets into a pulper (2). An essential part of the apparatus comprises a substantially horizontal conveyor (3) for receiving and transporting the bales. Situated along the travel path of the conveyor and located operable in a succession, are adapted a bale reshaping device (4) and a device (5) for stripping the strapping wires off from the bales. The bale reshaping device comprises two upright plates (6,7) located at the opposite sides of the conveyor in regard to the conveyor travel path and having a surface area substantially equal to the side surface area of the bales, of which plates at least one is adapted movable by a powered actuator means in a perpendicular direction to the conveyor travel direction. Both ones of the plates (6,7) in the bale reshaping device are provided with a plurality of fins (8) that are aligned parallel to the strapping wires and extend substantially from the middle region of the plate to one edge of the plate, which is parallel to the center line of the plate and is staggered in regard to the respective area of the opposite plate.

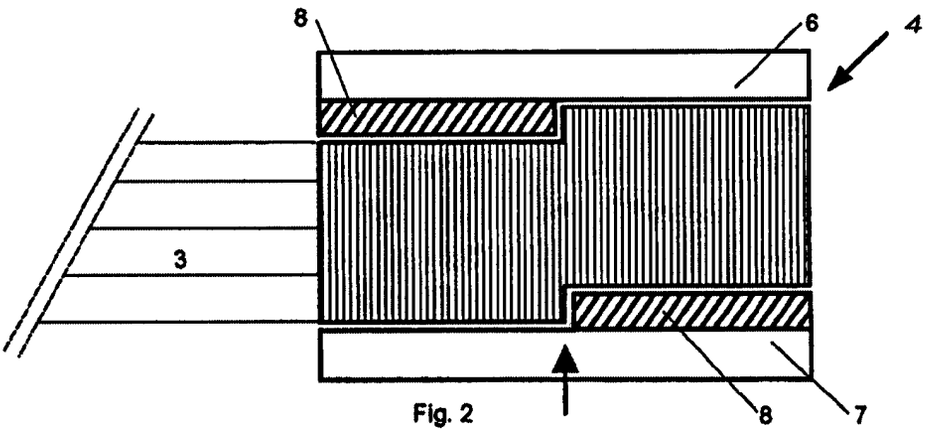

Fig. 2

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Description

[0001] The invention relates to an apparatus suited for feeding into a pulper bales of cellulosic, groundwood, mechanical or chemimechanical pulp used as raw material at a papermaking plant. The bales have been manufactured at a pulp plant, a groundwood plant or a mechanical pulp plant. The bales are comprised of sheets cut from, e.g., a fibrous material web that prior to sheeting is dried at least partially. The number of sheets in a bale is controlled such that the bale reaches a predetermined, generally constant weight. Alternatively, the fibrous material may be delivered as pulp packaged in a wrapper. The bale of predetermined weight is strapped for transportation with wires or bands running about the bale at a given distance from each other. Prior to feeding the bales into a pulper for repulping, the strapping wires/bands must be stripped from about the bales.

[0002] Removal of wires/bands is generally arranged to take place on the conveyor feeding the bales into the pulper. The length of the conveyor is dimensioned to carry simultaneously a plurality of bales that have been loaded onto the receiving end of the conveyor by means of a truck or suitable lift. The pulper feed hopper is situated at the delivering end of the conveyor. The wires/bands may be cut with manual tools suited for cutting/stripping the wires from about the bale. To reduce the manual labor requiring a great number of personnel, apparatuses have been developed in which the conveyor is equipped with a wire cutting/stripping device. Preceding this device, the conveyor may additionally be complemented with a bale aligning device, by means of which the bales moving on the conveyor are restored to correct shape and their position in regard to the conveyor travel direction is aligned. The reshaping/aligning device reduces disorders in the operation of the wire stripping device. Conventionally, this device comprises two plates that are placed on the opposite sides of the conveyor and have dimensions substantially compatible with the size of the bales to be transported in the bale feeder apparatus. At least one of the plates is adapted movable by a powered actuator toward the other plate, whereby the bale traveling between the plates will be aligned parallel to the plates. Simultaneously, a deformed bale is reshaped.

[0003] Yet, the operation of the wire stripping apparatus still remains hampered by the sinking of the strapping wires/bands below the surface of the bale. This is because the bale is kept slightly compressed in the direction of the strapping wires during their winding and securing about the bale thus assuring the formation of a tight bale having a good resistance to transport stresses. However, the expansion of the bale after the release of compression naturally causes the wires to sink below the outer surface of the bale. As a result, the wire stripping apparatus is hampered as to to the operation of its units including the wire cutting device and the wire stripping device. These devices must slightly penetrate under the outer surface of the bale in order to grasp the wire which is to be cut or already has been cut. Especially in the case of hard bales, such as dry and frozen bales, this step has been complicated. Since not all wires can be necessarily cut, uncut wires cannot be withdrawn or the stripping device fails to grasp the cut wire properly. The problematic wires remain inside the bale thus needing their removal to be performed as a manual postoperation. Penetration of the cutting/grasping tool into the bale may also cause adherence of the pulp to the tool. Later on, the accumulation of pulp into the apparatus may cause problems in its operation.

[0004] The apparatus according to the invention for feeding bales for shredding in a pulper offers significant benefits in reducing the above-described operational problems.

[0005] The apparatus is based on the basic apparatus described in the foregoing, the apparatus comprising a conveyor for moving bales and, operational in conjunction with the same, a bale reshaping device and a strapping wire stripping device. In accordance with the concept of the invention, both ones of the plates in the bale reshaping device are provided with a plurality of fins that are aligned parallel to the strapping wires and extend substantially from the middle region of the plate to one edge of the plate, which is parallel to the center line of the plate and is staggered in regard to the respective area of the opposite plate. A bale reshaping device having this kind of construction makes possible to compress the bale sidewise slightly out of shape such that, starting from its leading edge, one side of the bale is indented substantially up to the middle region of the bale at indents formed by the fins, while the opposite side of the bale is respectively indented from the middle region up to the trailing edge of the bale. Resultingly, on both sides of the bale, at the transition region between the indented area and the nonindented, flat area of the bale side, is created a discontinuity at which the strapping wires of the bale will unavoidably be slightly elevated outward from the bale surface. Such an elevated wire is substantially easier to grasp by the wire cutting device and the wire stripping device.

[0006] In the following, the invention is described in more detail by making reference to the appended drawings, in which

FIG 1 shows a general view of a bale conveyor layout as seen from above;

FIG 2 shows the basic construction of a bale reshaping device in more detail as seen from above;

FIG 3 shows one type of bale suitable for being handled in the apparatus according to the invention; and

FIG. 4 shows another type of bale suitable for being handled in the apparatus according to the invention.

[0007] Referring to FIG. 1, the apparatus shown therein comprises a substantially horizontally operating conveyor 3, onto which bales 1 to be pulped are transferred at a suitable distance from each other by suitable means such as a truck or lift. On this conveyor, the bales travel into a pulper 2. Upstream of the pulper, at the side of the conveyor, is located first a bale reshaping device 4 followed by a wire stripping device.

[0008] The principal members of the bale reshaping device 4 comprise two compression plates 6 and 7 located at the opposite sides of the conveyor. The plates 6 and 7 are dimensioned so that they extend substantially over the side surfaces of the bales to be handled. One of the plates, e.g. plate 7, is provided with suitable means for actuating the plate in a transverse direction to conveyor 3. By virtue of this actuated movement, the plate can be driven toward the other plate 6 so as to compress bale 1 between the plates. The alignment of plates 6 and 7 is such that they in turn straighten the sides of the bale parallel to the travel direction of conveyor 3. By the same token, the bale is reshaped free from any side deformations.

[0009] As shown in FIG. 2, the apparatus according to the invention has the compression plates 6 and 7 of the bale reshaping device 4 provided with fins 8 projecting outward from the compressing surfaces of the plates. The fins 8 have a length substantially equal to half the longitudinal dimension of the compression plates in the travel direction of the conveyor. More specifically, the fins are located on staggered areas of the plates, whereby the finned areas of plates will not be opposed to each other. In the illustrated embodiment, the fins are aligned substantially horizontal and spaced at a distance from each other in the vertical direction on the surfaces of the plates. The number and mutual spacing of the fins are adjusted such that, during the handling of the bales, the fins will penetrate into the surface areas remaining free between the strapping wires (as shown in FIG. 3, for instance). The number of the fins is advantageously selected such that both the surface areas between each pair of adjacent wires as well as the bale side edge areas at its top and bottom will be subjected to compression by the fins. To cope with the varying strapping wire locations of different bales, the height position of the fins is advantageously made adjustable.

[0010] In FIG. 3 is shown a typical bale of cellulosic pulp formed by vertically aligned sheets stacked parallel on one another by sufficient number to give the bale a desired nominal weight. After stacking the bale is laterally compressed into smaller thickness in a direction perpendicular to the vertical plane of the sheets, whereupon the compressed bale is packaged with parallel loops of strapping wires 9. Obviously, strapping bands may be used in lieu of wires. At the removal of the lateral compression applied in foregoing fashion on the bale, the bale tends to expand, whereby the strapping wires 9 are tensioned resulting in a bale resistant to handling and transportation stresses.

[0011] In FIG. 4 is respectively shown another type of bale used for packaging sheets of groundwood pulp. Such a unitized bale used in transportation and storage is comprised of plural smaller bales bonded into a larger unit bale by horizontal strapping wires in the same fashion as the bale shown in FIG 3. In this unitized bale, the number of strapping wires is generally greater than the number of strapping wires in the bale of FIG. 3.

[0012] The apparatus according to the invention may also be implemented suitable for handling bales strapped with wires running in directions different from those shown in the diagrams. This kind of implementation requires proper modification of the other units of the apparatus to cope with such bales, in addition to the obvious alignment of the compression plate fins of the bale reshaping device 4 parallel to the direction of the strapping wires wound about the bale.

Claims

1. An apparatus for feeding bales (1) of cellulosic and groundwood pulp sheets into a pulper (2), the apparatus comprising a substantially horizontal conveyor (3) for receiving the bales and transporting the same into the pulper as well as, situated along the travel path of the conveyor and located operable in a succession, a bale reshaping device (4) and a device (5) for stripping the strapping wires off from the bales, in which configuration the bale reshaping device comprises two upright plates (6, 7) located at the opposite sides of the conveyor in regard to the conveyor travel path and having a surface area substantially equal to the side surface area of the bales, of which plates at least one is adapted movable by a powered actuator means in the transverse direction to the conveyor travel direction, **characterized in that** both ones of the plates (6, 7) in the bale reshaping device are provided with a plurality of fins that are aligned parallel to the strapping wires and extend substantially from the middle region of the plate to one edge of the plate, which is parallel to the center line of the plate and is staggered in regard to the respective area of the opposite plate.

2. The apparatus of claim 1, **characterized in that** the height position of the fins is adapted adjustable in both ones of the plates (6, 7).

3. The apparatus of claim 1 or 2, **characterized in that** the number of the fins exceeds the number of strapping wires in the bales by at least one.

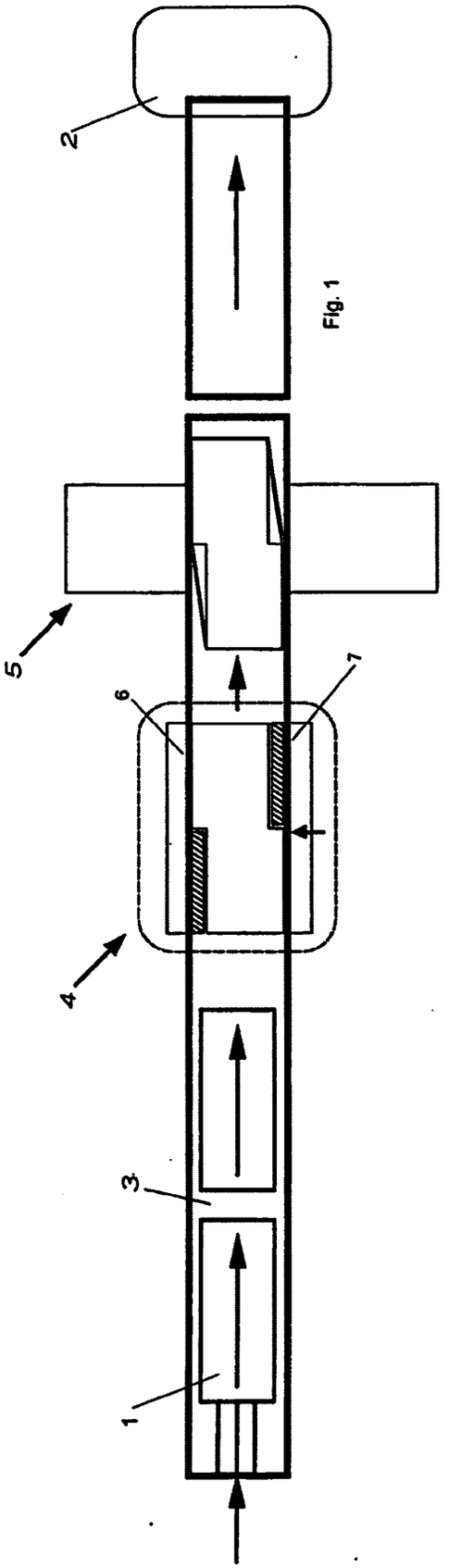

Fig. 1

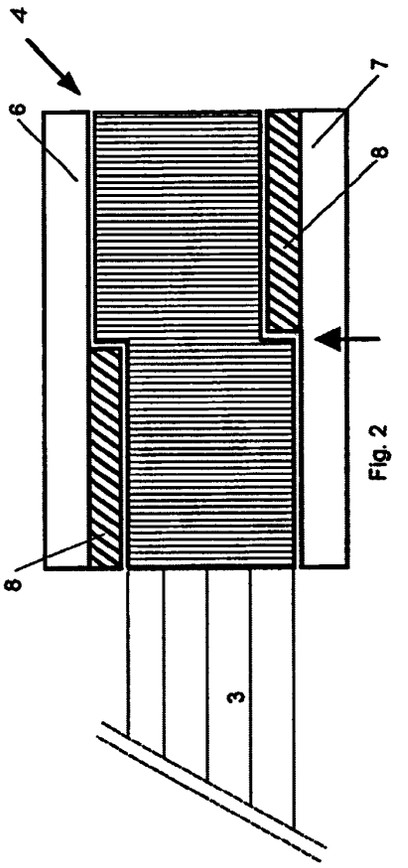

Fig. 2

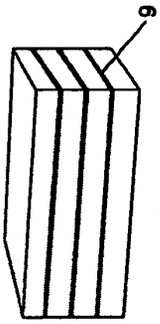

Fig. 3

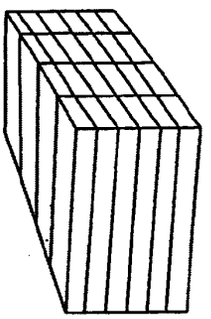

Fig. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 03 39 6114

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
A	GB 2 184 704 A (VOITH GMBH J M) 1 July 1987 (1987-07-01) * page 1, lines 73-114 * * figure 1 * -----	1	D21B1/02

TECHNICAL FIELDS SEARCHED (Int.Cl.7)

D21B
B65B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	31 March 2004	Pregetter, M

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 03 39 6114

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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31-03-2004

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