

(19)



Europäisches Patentamt

European Patent Office

Office européen des brevets



(11)

EP 1 099 486 A2

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:

16.05.2001 Bulletin 2001/20(51) Int Cl.7: **B07C 5/14, B07C 5/38**(21) Application number: **00850167.8**(22) Date of filing: **19.10.2000**

(84) Designated Contracting States:

**AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU
MC NL PT SE**

Designated Extension States:

AL LT LV MK RO SI(72) Inventor: **Bergene Holm, Reidar**
3255 Larvik (NO)(74) Representative: **Rosenquist, Per Olof**
Bergenstrahle & Lindvall AB,
P.O. Box 17704
118 93 Stockholm (SE)(30) Priority: **11.11.1999 NO 995522**(71) Applicant: **Bergene Holm, Reidar**
3255 Larvik (NO)(54) **Device for and method of sorting pieces of wood**

(57) A device for and a method of sorting pieces of wood, in which the device comprises a sorting device for sorting the pieces of wood and arranging these in bundles, and an interim storage device for receipt of the bundles. The interim storage device comprises a plural-

ity of interim storage conveyors, each of which is designed to receive a plurality of bundles.

By the device described, it is possible to reduce the length of the conveyor considerably, and also reduce the number of packing stations.

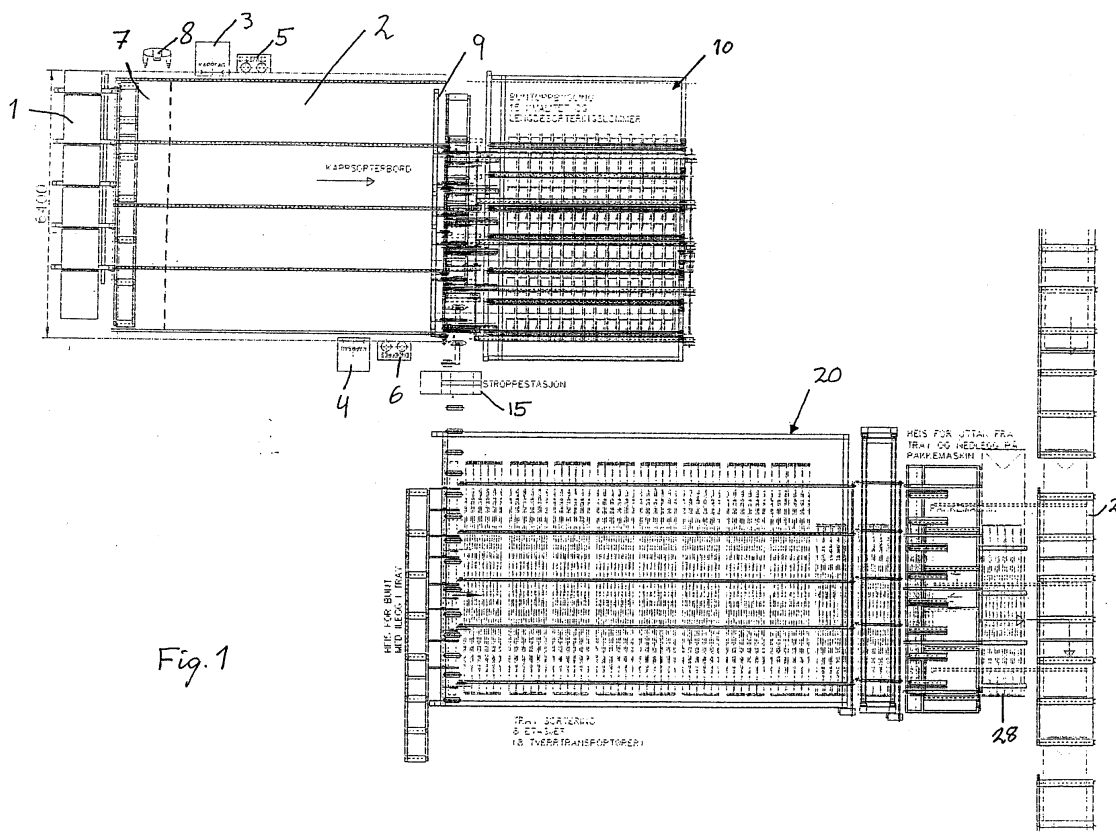


Fig. 1

EP 1 099 486 A2

Description

[0001] The present invention regards a device for sorting pieces of wood in accordance with the introduction to the following Claim 1, as well as a method of sorting pieces of wood in accordance with the introduction to the following Claim 6.

[0002] A sorting device is known from the present applicant's own published Norwegian patent application no. 19803904, where pieces of wood are sorted singly and placed on interim storage conveyors arranged above each other. After reaching a sufficient number of pieces to make a bundle on an interim storage conveyor, the pieces of wood are retrieved one by one from the interim storage conveyor and stacked on top of each other.

[0003] NO 135704 shows a device for stacking pieces of wood on top of each other and next to each other into a packet.

[0004] CH 664710, DE 2939720 and US 4159058 show other devices that perform the same task as NO 135704.

[0005] Apart from NO 19803904, none of the above publications show any sorting of wood.

[0006] NO 19803904 is most suited for smaller wood-working businesses with a relatively small volume of production.

[0007] For larger businesses with a greater volume of production, it is more common to use a long conveyor of e.g. 6 - 15 metres. Underneath the conveyor is arranged a plurality of packers corresponding at least to the number of different qualities into which the pieces of wood are to be sorted. The pieces of wood are passed down to the packing station that is designated for packing the quality in question.

[0008] A device is also known which comprises several interim storage conveyors arranged above each other, each of which may have a length of from several 10s of metres up to 100 metres, in order to be able to hold a number of pieces of wood corresponding to one packet.

[0009] It should be noted that when the preceding and following text refers to bundles, this refers to a collection of pieces of wood, the number of which may vary from 2 to 20, all depending on the size of the pieces. A bundle is preferably of a size that may be handled manually. The term packet refers to a collection of bundles. One packet may contain from 10 to several hundred bundles, all depending on the size of the bundles, and is primarily suited for handling by fork lift truck or similar.

[0010] By the latter device, it is in principle possible to manage the task of packing by using one packing station only, while the device mentioned prior to this requires several packing stations.

[0011] In the past, and to some extent still, pieces of wood were packed in layers in large packets of up to several hundred or even more than a thousand pieces of wood, depending on size. As an ever-increasing pro-

portion of the sale of wood products takes place through a retailer, the need for simpler handling has become stronger. The wood trade considers a solution where whole packets of single pieces of wood have to be handled, and the pieces then removed one by one from the packet before use, to be very cumbersome. This method of packing is serviceable in those cases where the packet is to be transported directly to a building site, where a large number of pieces of wood are required in a relatively limited area. For a wood trader however, this entails cumbersome handling and poor control of any wastage. It also entails a lot of work with regards to measuring out the required amount of wood.

[0012] In most cases, the number of pieces of wood required at the building site will be smaller than that which is found in a whole packet, and pieces of wood will often have to be transported by hand across certain distances. The consumer pattern has also changed with time; these days it is not uncommon to find that persons building their own house are responsible for the purchase, transport and use of the pieces of wood. Items such as floorboards are therefore to a large extent sold in bundles of from 4 to 7 boards. These bundles are normally enveloped in plastic or cardboard, and may be handled manually. For the wood trade, this means getting a better idea of stocks and a simpler measuring system, as the total length of the contents of the bundle will be given.

[0013] One bundle will almost always contain pieces of wood of a predetermined quality. The quality is primarily determined by the inherent characteristics of the pieces of wood, such as appearance and strength. These qualities are often divided into from 3 to 5 categories. In addition, the length of the piece of wood is decisive for the quality. It has become more and more common to cut the pieces of wood so that the lengths are predetermined, and so that all the pieces of wood in one bundle have approximately the same length, i.e. within a given length interval. Thus the length also becomes a quality criterion. A predetermined length interval in each bundle will make it possible to greatly reduce the need for cutting pieces of wood.

[0014] In order to achieve a predetermined quality for the pieces of wood in one bundle, these must be sorted with regard to one or more of the above quality criteria before the pieces are bundled together. After bundling, the bundles are stacked together to form a packet that may contain several 10s or more than 100 bundles, depending on the size of the pieces of wood and the size of the bundles. Then each packet will contain bundles of pieces of wood of a predetermined quality.

[0015] Predetermined quality here refers to pieces of wood having characteristics, such as appearance and length, which fall within certain criteria.

[0016] None of the known devices are capable of performing this task of sorting, bundling and packing to reasonable satisfaction.

[0017] Thus there is a great need for a device that is

able to perform this task while requiring a minimum of space and a minimum of machinery.

[0018] The present invention solves this problem through the characteristics stated in the characterising part of the following Claim 1 or Claim 6.

[0019] The present invention will first and foremost give both a reduction in the space required, particularly in the longitudinal direction of the machine, and in the requirement for packing stations, as only one packing station will normally be required.

[0020] The invention will now be described in greater detail with reference to the accompanying drawings, in which:

Figure 1 shows a top view of a sorting, bundling and packing installation in accordance with the principles of the present invention,

figure 2 shows a side view of a sorting and bundling installation, as part of an installation according to figure 1,

figure 3 shows a side view of a sorting device with interim storage conveyors, as part of an installation according to figure 1, and

figure 4 shows a comparison between an interim storage conveyor for bundled pieces of wood and an interim storage conveyor for single pieces of wood.

[0021] Figure 1 shows a longitudinal conveyor 1 that receives pieces of wood issuing e.g. from a planer (not shown).

[0022] A sorting table 2 follows after the longitudinal conveyor. On this, the pieces of wood are transported in the transverse direction. At the edges of the sorting table 2 there is provided a respective end cross-cut saw 3 and 4 and end mill 5 and 6, for cutting and milling the ends of the pieces of wood.

[0023] When the piece of wood is within a certain area 7 of the sorting table 2, an operator 8 performs a visual evaluation of the piece of wood. He presses a button corresponding to the quality class to which he judges the piece of wood to belong. The quality class is communicated to a computer (not shown) that also keeps track of the location of the piece of wood at all times.

[0024] A length meter 9 is provided at the end of the sorting table, which meter may be a rod equipped with sensors in the form of pins that hang down at intervals of e.g. 30 cm. The length of the piece of wood is assigned in the same manner as the quality class.

[0025] Reference number 10 denotes a bundle sorting machine. This is best seen in figure 2. The bundle sorting machine 10 comprises a plurality of pockets 11 that correspond at least to the number of qualities into which the pieces of wood are to be sorted, i.e. the number of quality classes multiplied by the number of

length classes. Each piece of wood is fed onto a conveyor 12 arranged above the pockets 11, and then dropped into the pocket that is reserved for that particular quality.

[0026] When a pocket has been filled with the number of pieces of wood that is to be bundled together, the bundle is carried out of the pocket and down onto an underlying conveyor 13, in the same manner as the bundle 14. The bundle is then passed through a strapping station 15, where the bundles are held together by means of straps, tape, plastic film, cardboard or other suitable materials.

[0027] The previous will be well known to a person skilled in the art, and will therefore not be explained in greater detail. In the following however, the novel and distinctive features of the present invention will be explained.

[0028] Reference number 20 denotes an interim storage device (see also fig. 3). This comprises a number of interim storage conveyors 21 arranged above each other. Each interim storage conveyor can hold a number of bundles corresponding to at least the number of bundles that is to be packed to form a packet. In order to bring the bundles 14 up to the respective interim storage conveyors, a first elevator 22 is provided by the interim storage device 20. Each interim storage conveyor has an intake end and a delivery end.

[0029] Each interim storage conveyor 21 is designed to receive bundles of a predetermined quality at its intake end. Preferably, a number of bundles 14 corresponding to one layer 23 in a packet, e.g. five bundles 14, lie close together on the interim storage conveyor 21. A space 24 may be provided between each layer 23, although this is not strictly necessary. When an interim storage conveyor 21 has been filled with the number of layers that is to make a packet, the layers 23 are carried to a second elevator 25 one by one, which elevator is located at the delivery ends of the interim storage conveyors. This elevator 25 carries the layer to a packing station 26 via a conveyor 27. Here, the layers 23 are stacked on top of each other until a packet 28 has been formed. After the packet 28 has been formed, it is transported to a longitudinal conveyor 29 that transports it onwards to storage or to customer transport.

[0030] The upper part of figure 4 shows an interim storage conveyor 30 for bundled pieces of wood in accordance with the present invention, while the lower part of the figure shows an interim storage conveyor 31 for single pieces of wood according to prior art. It is clear to see that the interim storage conveyor 30 is considerably shorter than the interim storage conveyor 31, more specifically $\frac{1}{5}$ of the length. The extra length of the known interim storage conveyor constitutes a significant area that by the present invention may be used for other purposes. Moreover, the sorting and packing line becomes clearer and easier to keep track of, and the walking time for the personnel that has to move between the various units is reduced.

[0031] The principles of the present invention bring a number of additional advantages. If single pieces of wood equipped with a tongue and groove, e.g. floorboards, are placed side by side on a conveyor, these must be placed a certain distance apart. If the boards are placed against each other, the tongue may easily get hooked into the groove of an adjacent board. When bundled boards are placed against each other on a conveyor, the danger of the boards getting caught in each other is negligible.

[0032] When the pieces of wood have been bundled, the feed rate will be reduced to a fraction of the feed rate for single pieces. This is of great importance to the driving mechanism, wear and not least the ability of the machinery to absorb errors without the entire machinery having to be shut down. The reduced feed rate will be of particular importance when handling small-sized pieces of wood and in the case of wood with a non-rectangular cross section.

[0033] By the present invention, it is also possible to operate with a larger number of sort qualities without having to alter the layout of the machinery. This may simply be done by arranging more interim storage conveyors upwards. The headroom at the premises will not normally restrict the height, but in special cases it is obviously also possible to arrange interim storage conveyor in two or more "stacks" next to each other.

[0034] The packing machine does not necessarily operate continuously. It may pack everything off one interim storage conveyor, and then wait for the next one to fill up. This lessens the requirements for monitoring the packing machine, as this will be at a standstill for some of the time.

[0035] By use of the present invention, electronic monitoring of the packing machine and/or other parts of the machinery becomes considerably simpler. Bundles are much easier to handle than single pieces of wood, and the risk of malfunction, and thus the requirements for monitoring, are therefore greatly reduced.

Claims

1. A device for sorting pieces of wood, which device comprises a sorting device for sorting the pieces of wood and arranging them in bundles, **characterised in** that it also comprises an interim storage device for receipt of the bundles, which interim storage device comprises a plurality of interim storage conveyors, each designed to receive a plurality of bundles.
2. A device according to Claim 1, **characterised in** that the interim storage conveyors are arranged above each other in elevation.
3. A device according to Claim 1 or 2, **characterised in** that each interim conveyor has a length at least

equal to the total width of the number of bundles that is to make up one packet.

4. A device according to Claim 1, 2 or 3, **characterised in** that the interim storage conveyors have a through feed, i.e. they are designed to receive bundles at their intake end and release them at the delivery end, which is situated at the opposite end of the intake end.
5. A device according to Claim 1, 2, 3 or 4, **characterised in** that a packing station is arranged at the delivery ends of the interim storage conveyors, which packing station is designed to serve all the interim storage conveyors.
6. A device according to Claim 1, 2, 3; 4 or 5, **characterised in** that a first elevator for bundles is provided by the intake ends of the interim storage conveyors, and that a second elevator for one layer of bundles that is to make up one layer in a packet, is provided by the delivery ends of the interim storage conveyors.
7. A method of sorting pieces of wood, in which the pieces of wood are first sorted and placed in bundles, **characterised in** that the bundles are then carried to an interim storage device comprising a plurality of interim storage conveyors.
8. A method according to Claim 7, **characterised in** that bundles sorted according to a predetermined quality are placed on the same interim storage conveyor.
9. A method according to Claim 7 or 8, **characterised in** that a space for defining different layers is provided between bundles that are to constitute different layers in a packet.
10. A method according to Claim 7, 8 or 9, **characterised in** that the bundles placed on one interim storage conveyor are retrieved at the delivery end of the interim storage conveyor when the interim storage conveyor is filled with at least the number of bundles that is to make up one packet.
11. A method according to Claim 7, 8, 9 or 10, **characterised in** that the bundles are retrieved from the interim storage conveyors to the number of bundles corresponding to one layer in a packet, which bundles lie next to each other.

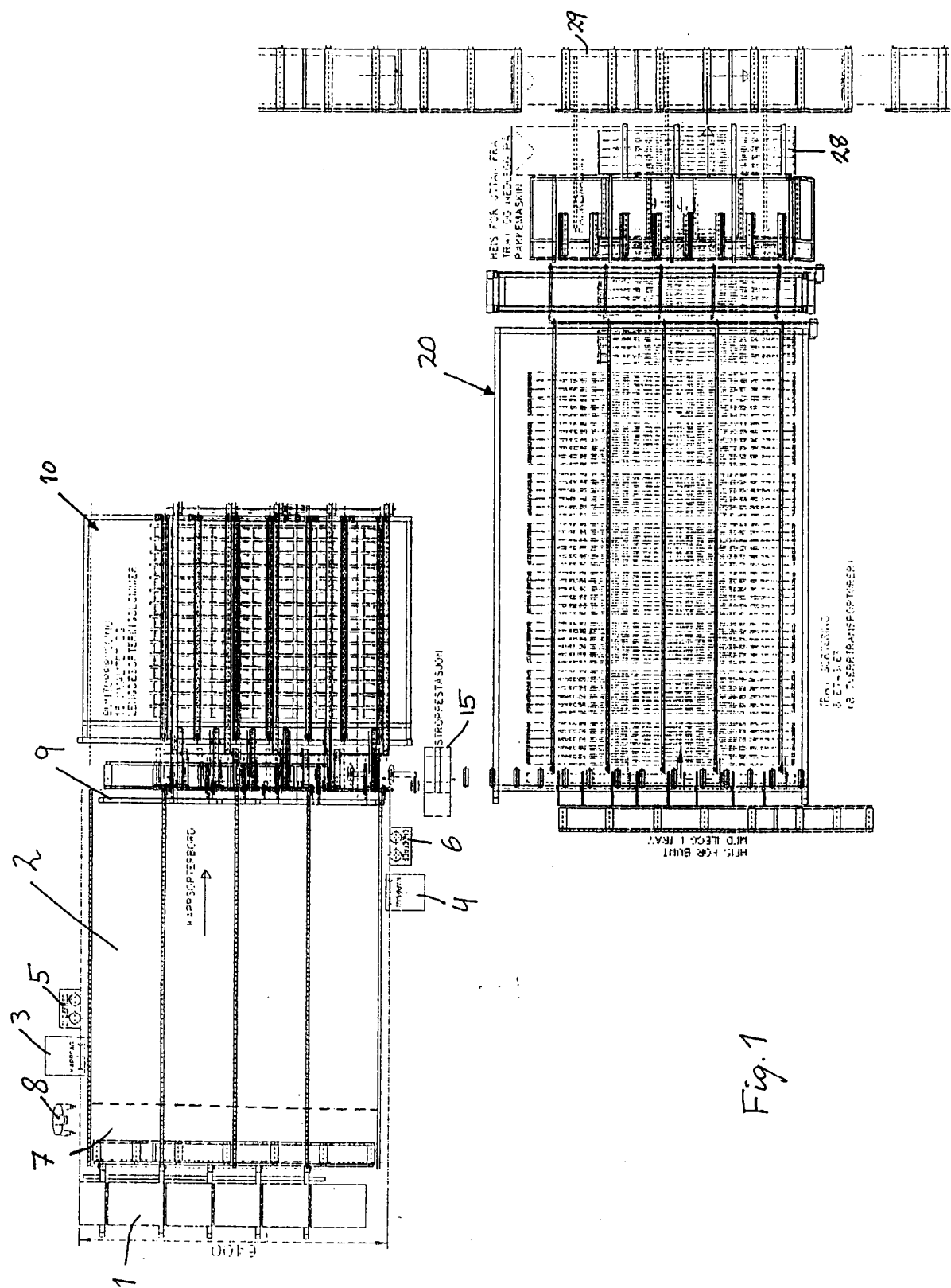


Fig. 1

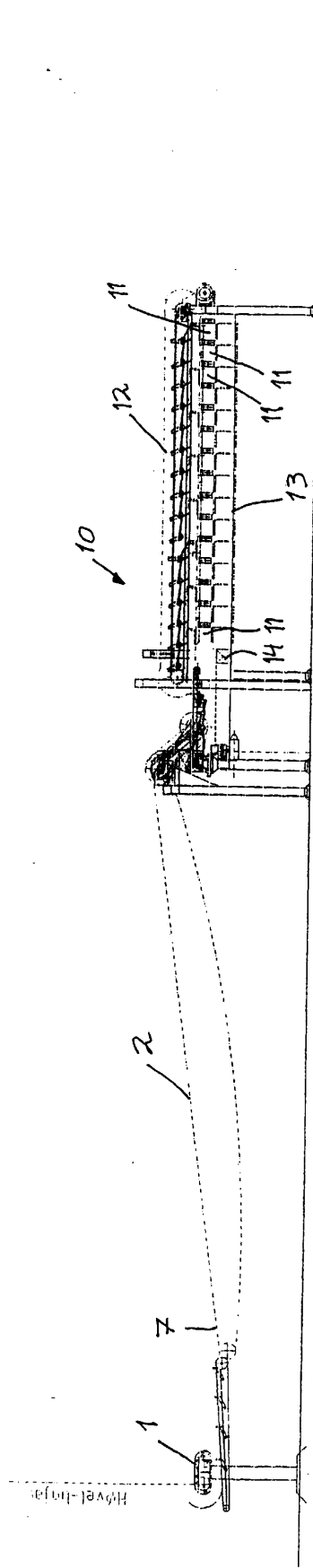


Fig. 2

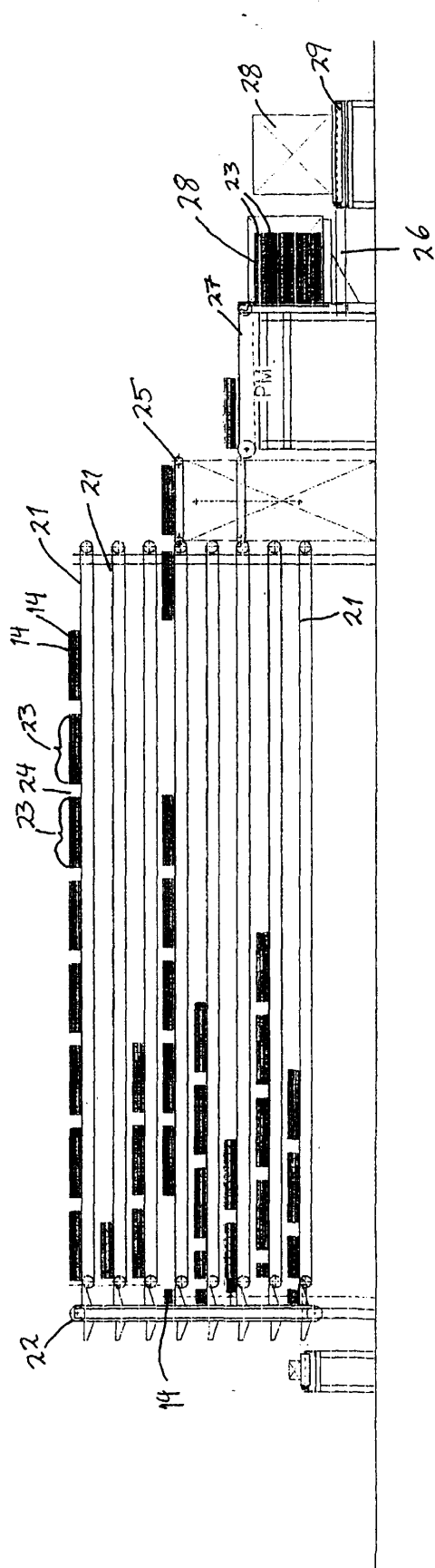


Fig.3

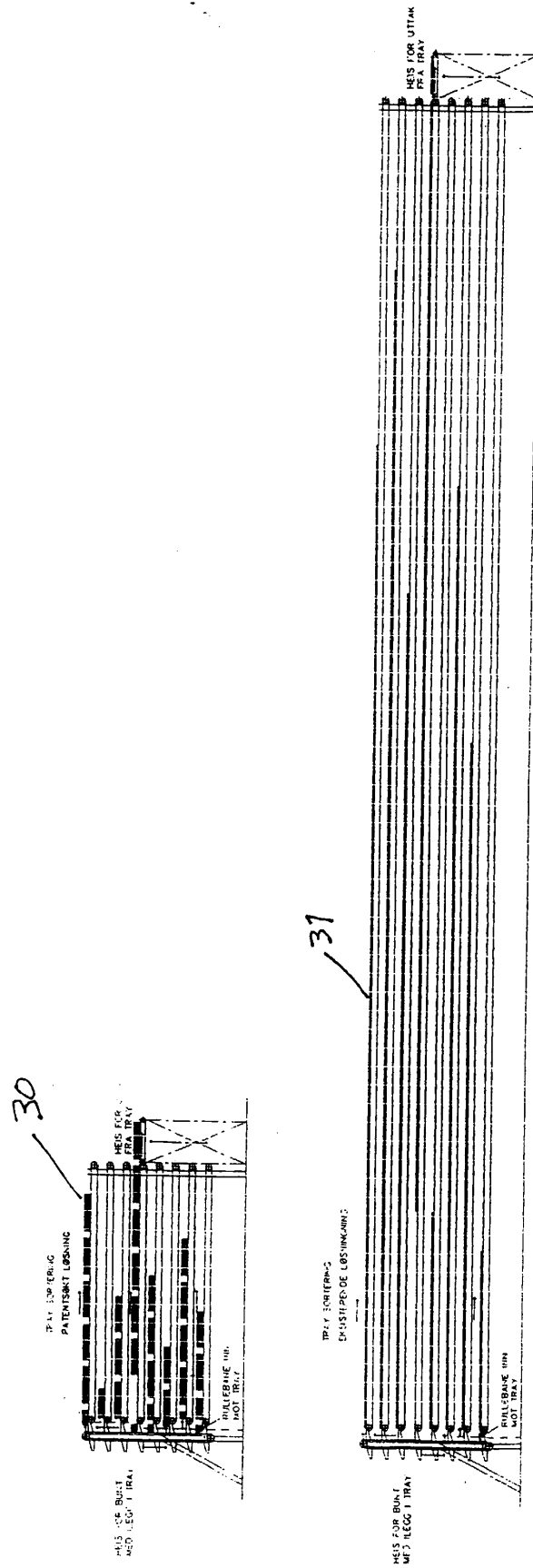


Fig. 4