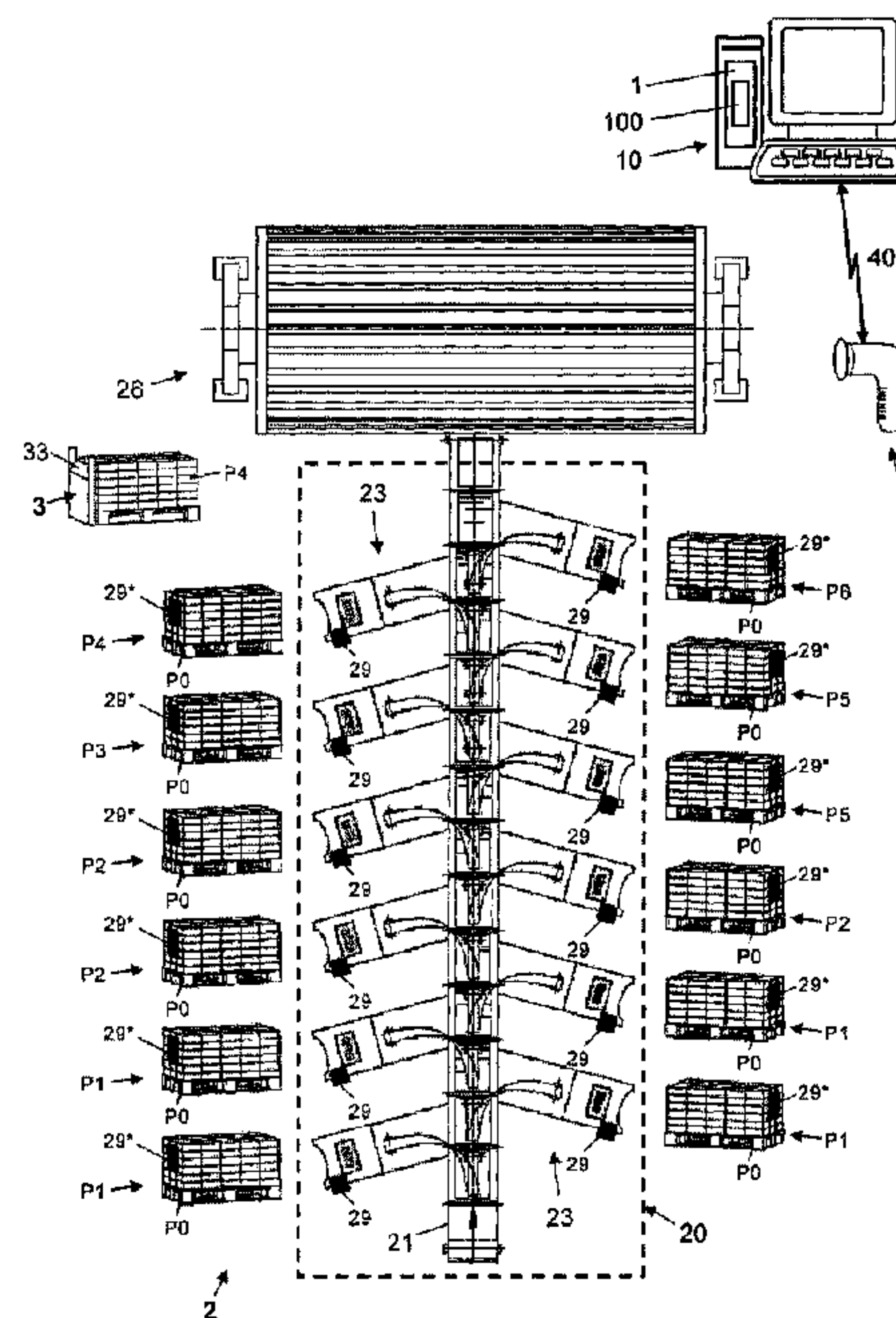




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(57) **Abrégé/Abstract:**

For the control of a printed product processing system (2), which comprises a collecting system (20) having a conveyer (21) and a plurality of feed conveyers (23) for creating product collections from products (P1, P2, P3, P4, P5, P6) fed by the feed conveyers (23), occupancy plans are generated and stored which specify, for the feed conveyers (23), in each case a chronological sequence of the products (P1, P2, P3, P4, P5, P6) to be fed by the feed conveyer (23) to the conveyer (21) to create the product collections. On the basis of the occupancy plans, for the feed conveyers (23), in each case one product (P1, P2, P3, P4, P5, P6) to be fed is determined and transmitted to mobile transport devices (3). The occupancy plans enable the operating personnel to announce early and in good time which products (P1, P2, P3, P4, P5, P6) the feed conveyers (23) are to be occupied with and which must for this purpose be supplied thereto on pallets (P0).

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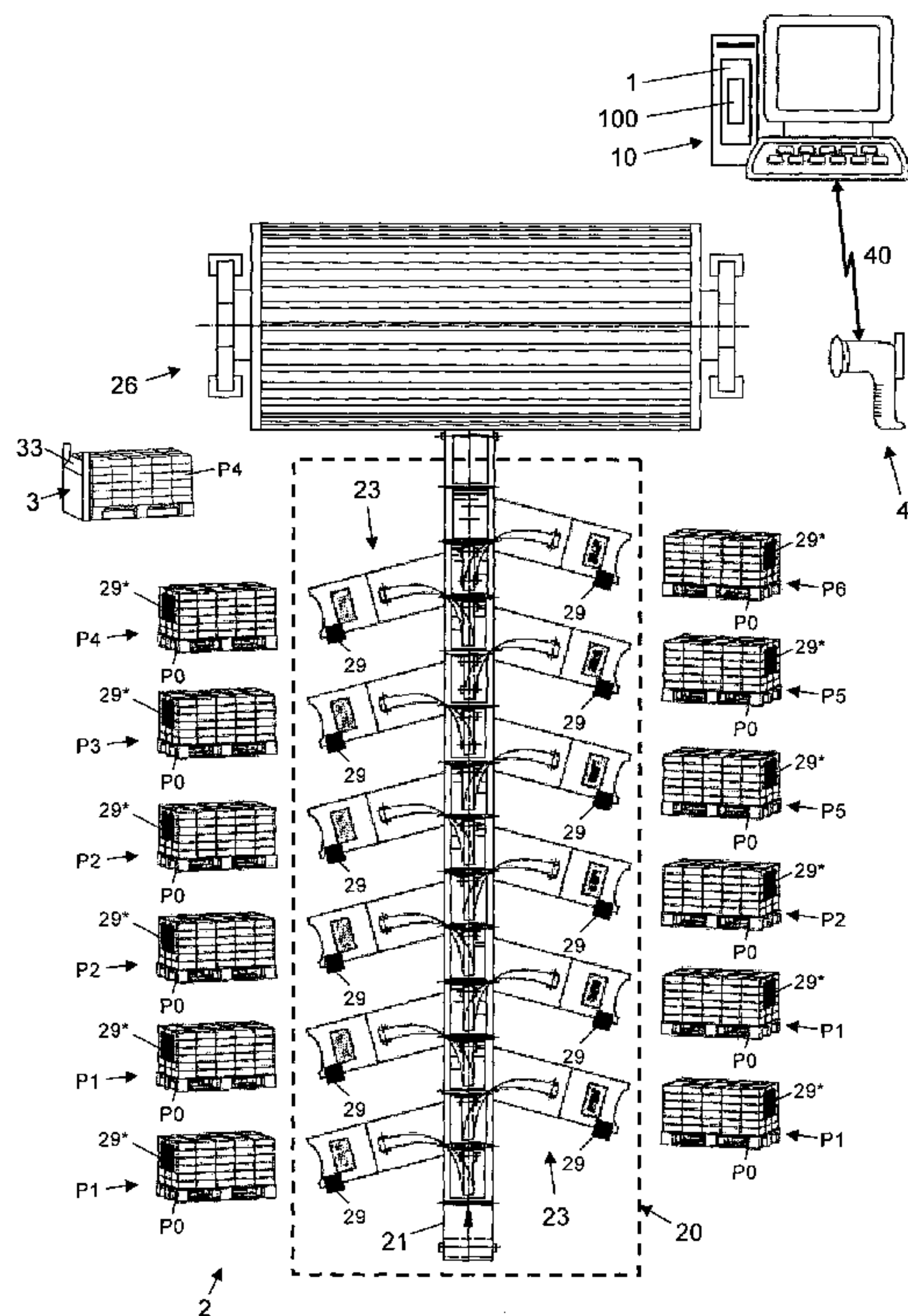
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Fig. 6

(57) Abstract: For the control of a printed product processing system (2), which comprises a collecting system (20) having a conveyer (21) and a plurality of feed conveyers (23) for creating product collections from products (P1, P2, P3, P4, P5, P6) fed by the feed conveyers (23), occupancy plans are generated and stored which specify, for the feed conveyers (23), in each case a chronological sequence of the products (P1, P2, P3, P4, P5, P6) to be fed by the feed conveyer (23) to the conveyer (21) to create the product collections. On the basis of the occupancy plans, for the feed conveyers (23), in each case one product (P1, P2, P3, P4, P5, P6) to be fed is determined and transmitted to mobile transport devices (3). The occupancy plans enable the operating personnel to announce early and in good time which products (P1, P2, P3, P4, P5, P6) the feed conveyers (23) are to be occupied with and which must for this purpose be supplied thereto on pallets (P0).

(57) Zusammenfassung: Zur Steuerung einer
Druckproduktverarbeitungsanlage (2), welche eine Sammelanlage (20) mit
einem Förderer (21) und mehreren Zuförderern (23) zur Erstellung von
Produktkollektionen aus von den Zuförderern (23) zugeführten Produkten
(P1, P2, P3, P4, P5, P6) umfasst, werden Belegungspläne erzeugt und
gespeichert, welche für die Zuförderer (23) jeweils eine zeitliche Reihenfolge

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— mit internationalem Recherchenbericht (Artikel 21 Absatz 3)

— vor Ablauf der für Änderungen der Ansprüche geltenden Frist; Veröffentlichung wird wiederholt, falls Änderungen eingehen (Regel 48 Absatz 2 Buchstabe h)

der Produkte (P1, P2, P3, P4, P5, P6) angeben, die vom Zuförderer (23) dem Förderer (21) zur Erstellung der Produktkollektionen zuzuführen sind. Basierend auf den Belegungsplänen werden für die Zuförderer (23) jeweils ein zuzuführendes Produkt (P1, P2, P3, P4, P5, P6) bestimmt und an mobile Transportvorrichtungen (3) übermittelt. Die Belegungspläne ermöglichen es dem Bedienpersonal früh und rechtzeitig anzuzeigen, mit welchen Produkten (P1, P2, P3, P4, P5, P6) die Zuförderer (23) zu belegen und dazu auf Paletten (P0) herbeizuführen sind.

CONTROL DEVICE AND METHOD FOR CONTROLLING A PRINTED PRODUCT PROCESSING SYSTEM

Technical field

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The present invention relates to a computerized control device and a computer-implemented method for controlling a printed product processing system. The present invention relates in particular to a computerized control device and a computer-implemented method for controlling a printed product
10 processing system that comprises a collecting system having a conveyor and a plurality of feed conveyors for creating product collections from products, in particular printed products, supplied by the feed conveyors.

Prior art

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In known collecting systems for putting together product collections composed of a plurality of products by gathering, inserting or collating, the various products are supplied sequentially by a plurality of serially arranged feed conveyors to a conveyor, where they are gathered, inserted or collated, for
20 example on or in collection carriers such as grippers. In printed product processing systems, the products comprise in particular flat printed products of various thickness but also other flat products such as data storage media or other inserts, for example. The product collections created from the products are supplied sequentially by the conveyor to one or more finishing systems, for
25 example for the purpose of insertion, shrink-wrapping, binding, gluing, cutting and/or stacking. A collecting system configured for gathering products is typically implemented using a circulating conveyor. A circulating conveyor enables the movement of products, product collections or collection carriers along a closed curve or track cyclically past the product-supplying feed
30 conveyors. Certain products or product collections can thereby perform a plurality of cycles on the circulating conveyor, and therefore they are supplied multiple times to the gathering process before being transferred to a finishing system.

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Before and during production, the feed conveyors must be loaded manually by operating personnel of the printed product processing system with the products to be supplied. The products are typically brought to the feed conveyors on pallets, and in order to load a feed conveyor, the products are
5 packed by operating personnel in stacks or bundles from a pallet into the feed conveyor concerned. If a pallet is empty and/or if the feed conveyor is meant to be loaded with a different product, the empty or currently unused pallet must be moved away and a new pallet holding the product to be supplied must be moved to the feed conveyor, for example by means of a pallet truck. In printed
10 product processing systems having a large number of feed conveyors, for example several dozen or more than a hundred, and on which a production process shall be carried out to create a plurality of different product collections from an even greater number of different products to be supplied, for example more than a hundred or several hundred different inserts, the moving to and
15 fro of pallets using a relatively large number of feed conveyors, in particular more than twenty conveyors, and products to be supplied results increasingly in a considerable amount of work and coordination effort involving a corresponding amount of time and personnel. A delay in bringing up a single pallet and hence a delay in loading a feed conveyor with the product to be
20 supplied usually lead to production delays and/or result in creating incorrect product collections and to these product collections being discarded.

Presentation of the invention

The object of the present invention is to propose a computerized control
25 device and a computer-implemented method for controlling a printed product processing system comprising collecting system which does not have at least some of the disadvantages of the known systems. In particular it is an object of the present invention to propose a computerized control device and a computer-implemented method for controlling a printed product processing
30 system comprising collecting system that enable improved and coordinated loading of feed conveyors of the collecting system in order to achieve a higher net performance of the printed product processing system.

According to the present invention, these objects are achieved by the elements of the independent claims. The dependent claims and the description also contain further advantageous embodiments.

- 5 The above-mentioned objectives are achieved by the present invention, for the purpose of controlling a printed product processing system that comprises a collecting system having a conveyor and a multiplicity of feed conveyors for creating product collections from different types of products supplied by the feed conveyors, in particular by generating and saving in a computerized
10 control device one or more loading plans, which define for each of the feed conveyors a time sequence of the products that are to be supplied to the conveyor by the feed conveyor for a defined production process of a plurality of different product collections, each to be created from a plurality of supplied products. In the computerized control device, the products to be supplied,
15 which are each to be supplied by one of the feed conveyors to the conveyor for creating the product collections, are determined on the basis of the loading plans. Information about the determined products to be supplied is transmitted via a wireless communications channel in each case to a mobile display device for displaying the products to be supplied to the feed conveyor
20 concerned. The information about the determined products to be supplied is transmitted via the wireless communications channel for example in each case to the display device of a mobile handling device for bringing up to the feed conveyor concerned the products to be supplied. Generating loading plans for the feed conveyors of the collecting system and determining on the basis
25 thereof products to be supplied sequentially to the conveyor by the feed conveyors make it possible to display to the operating personnel or to the mobile handling devices which product in each case is to be supplied to the conveyor by one of the feed conveyors at the present and/or imminent moment in time. The operating personnel or the mobile handling devices can
30 thereby be informed in advance and in good time, which products are to be loaded on the feed conveyors.

In a preferred embodiment variant, during the defined production process the products supplied by the feed conveyors to the conveyor are recorded, an

imminent change in the type of the product to be supplied for one of the feed conveyors is determined in the computerized control device on the basis of the loading plans, and information about the product to be loaded on the feed conveyor for the imminent change is transmitted via the wireless communications channel to the mobile display device. The information about the product to be loaded on the feed conveyor for the imminent change is transmitted via the wireless communications channel for example to the display device of a mobile handling device. The number of products that are conveyed is thereby determined and continuously updated. The loading plans and the continuous recording of the products supplied by the feed conveyors make it possible to establish, for each feed conveyor with reference to the allocated loading plan, the current production status and an imminent product change. The operating personnel or the mobile handling devices can thereby be informed in advance and in good time about an imminent product change and the associated movement of product pallets up to/away from the feed conveyor.

In one embodiment variant, in the computerized control device, during the defined production process and on the basis of the loading plans, a time interval until an imminent change in the type of product to be supplied for one of the feed conveyors is determined, and the time interval transmitted to the mobile display device via the wireless communications channel. The time interval is transmitted via the wireless communications channel for example to the display device of a mobile handling device. The additional information about the time period or the point in time of the imminent product change enables the operating personnel or the mobile handling devices to schedule and perform in good time the moving-up and -back of product pallets and the subsequent loading of the feed conveyor.

A graphical representation and the orientation of the products to be supplied are preferably displayed on a display of the feed conveyor concerned, and information about the products to be supplied is transmitted to the mobile display device, for instance the display device of a mobile handling device, via

the wireless communications channel for the purpose of graphical display of the products to be supplied.

5 In a preferred embodiment variant, the loading plans for the defined production process are generated in the computerized control device according to defined optimization rules. The optimization rules that are used to generate the loading plans are preferably determined from the defined optimization rules on the basis of one of a plurality of possible optimization objectives. By optimizing the loading of the feed conveyors, the production process on the printed product
10 processing system is improved in accordance with the selected optimization objectives, i.e. the available resources such as production time, operating personnel, printed product processing system, system components etc. are used as efficiently as possible according to a selected optimization objective.

15 In a further embodiment variant, in the computerized control device a plurality of records containing different loading plans for the feed conveyors are generated and saved for different possible production conditions. The production conditions here define in each case a possible configuration of the printed product processing system, the availability of operating personnel of
20 the printed product processing system and/or an optimization objective. In the computerized control device, current production conditions of the printed product processing system for the defined production process are recorded and one of the records of the loading plans is selected for the defined production process on the basis of the current production conditions.
25 Generating and saving loading plans for different production conditions enables an efficient and flexible configuration of the feed conveyors for a production process under different production conditions. This also allows for problem situations that occur outside the printed product processing system to be taken into account, for instance a late arrival of a heavy goods vehicle.

30 In one embodiment variant, in the computerized control device during the defined production process, current production conditions of the printed product processing system are recorded that define the current configurations of the printed product processing system, the current availability of operating

staff of the printed product processing system and/or a current optimization objective, and the loading plans are adapted in the computerized control device during the defined production process on the basis of the current production conditions of the printed product processing system. Adapting
5 loading plans during the production process to current production conditions enables dynamic reconfiguration of the feed conveyors to changed production conditions. This allows both system-internal and external factors and problems to be taken into account.

10 In a further embodiment variant, in the computerized control device a plurality of records containing different loading plans for the feed conveyors are generated for the defined production process. The defined production process is simulated for the different records of the different loading plans and each simulation determines a system-specific simulated production time period. The
15 record containing loading plans having the shortest simulated production time period is used for the defined production process.

In addition to a computerized control device and a computer-implemented method for controlling a printed product processing system, the present
20 invention also relates to a computer program product which comprises a handleable computer-readable storage medium containing stored computer code. The computer code is configured to control one or more processors of the control device such that the processors, or the control device, execute a method for controlling a printed product processing system that comprises a
25 collecting system having a conveyor and a multiplicity of feed conveyors for creating product collections from various types of products supplied by the feed conveyors. The processors, or the control device, here generate and save one or more loading plans, which define for each of the feed conveyors a time sequence of the products that are to be supplied to the conveyor by the
30 feed conveyor for a defined production process of a plurality of different product collections each to be created from a plurality of supplied products. The processors, or the control device, determine on the basis of the loading plans the products to be supplied, each of which are to be supplied by one of the feed conveyors to the conveyor for creating the product collections, and

transmit information about the defined products to be supplied to the feed conveyor concerned via a wireless communications channel in each case to a mobile display device, for example to the mobile display device of a mobile handling device for bringing up to the feed conveyor concerned the products to be supplied.

In one embodiment, there is provided a computerized control device for controlling a printed product processing system that includes a collecting system having a conveyor and a plurality of feed conveyors for creating product collections from different types of products supplied by the feed conveyors. The device includes a loading planner for generating and saving one or more loading plans, which define for each of the feed conveyors a time sequence of the products that are to be supplied to the conveyor by the feed conveyor for a defined production process of a plurality of different product collections, each to be created from a plurality of supplied products. The device further includes a control module configured to: determine, based on the loading plans, the products to be supplied, which are each to be supplied to the conveyor by one of the feed conveyors for creating the product collections; and transmit in each case information concerning the determined products to be supplied in question, via a wireless communications channel, to a mobile display device of a mobile handling device for bringing the products to be supplied to the feed conveyor in question, in order to display the products to be supplied to the corresponding feed conveyor.

In another embodiment, there is provided a computer-implemented method for controlling a printed product processing system that includes a collecting system having a conveyor and a multiplicity of feed conveyors for creating product collections from different types of products supplied by the feed conveyors. The method involves generating and saving, in a computerized control device, one or more loading plans which define for each of the feed conveyors a time sequence of the products that are to be supplied to the conveyor by the feed conveyor for a defined production process of a plurality of different product collections, each to be created from a plurality of supplied products. The method further involves: determining, in the computerized

- control device on the basis of the loading plans, the products to be supplied, which are each to be supplied by one of the feed conveyors to the conveyor for creating the product collections; and transmitting in each case information concerning the determined products to be supplied, via a wireless communications channel, to a mobile display device of a mobile handling device for bringing the products to be supplied to the feed conveyor in question, in order to display the products to be supplied to the corresponding feed conveyor in question.
- 5
- 10 In another embodiment, there is provided a computer program product including a tangible computer-readable storage medium containing stored computer code. The code is configured to control one or more processors of a control device for controlling a printed product processing system, such that the processors execute the method described above or any of its variants. The
- 15 printed product processing system includes a collecting system having a conveyor and a multiplicity of feed conveyors for creating product collections from products supplied by the feed conveyors.

Short description of the drawings

An embodiment of the present invention is described below with reference to an example. The example given by the embodiment is illustrated by the following enclosed figures:

Figure 1: shows a block diagram which illustrates schematically a computer-controlled printed product processing system which comprises a collecting system having a conveyor and a plurality of feed conveyors for creating product collections.

Figure 2: shows a block diagram which illustrates schematically a further computer-controlled printed product processing system which comprises a collecting system having a conveyor and a plurality of feed conveyors for creating product collections and comprises a plurality of downstream stacking stations.

Figure 3: shows a block diagram which illustrates schematically a computerized control device that is configured to control a printed product processing system which comprises a collecting system having a conveyor and a multiplicity of feed conveyors for creating product collections.

Figure 4: shows a flow diagram that illustrates an example of a sequence of steps for generating loading plans for a multiplicity of feed conveyors of a printed product processing system for

creating product collections from products supplied by the feed conveyors.

5 Figure 5: shows a flow diagram that illustrates an example of a sequence of steps for configuring and controlling a printed product processing system for creating product collections which are supplied by a multiplicity of feed conveyors.

10 Figure 6: shows a block diagram which illustrates schematically a further computer-controlled printed product processing system which comprises a collecting system having a conveyor and a plurality of feed conveyors, which are provided with identifying devices, for creating product collections.

Ways of implementing the invention

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In figures 1, 2 and 6, reference sign 2 denotes a computer-controlled printed product processing system comprising a collecting system 20. The collecting system 20 comprises at least one conveyor 21 and a multiplicity of supply conveyors 23, which each supply different products P1, P2, P3, P4, P5, P6 (P1-P6) to the conveyor 21 according to which product is loaded on the respective supply conveyor. The collecting system 20 comprises, for example, several dozen or more than one hundred supply conveyors 23. Depending on the application, a plurality of supply conveyors 23 are loaded with the same product (split operation), for example for thick products P3, P4, where manual loading of an individual supply conveyor 23 by operating personnel of the printed product processing system 2 is too slow to cover the non-stop supply of products P1-P6 to the conveyor 21 by a single feed conveyor 23 (uninterrupted production), or as a backup to compensate for any failures of feed conveyors 23 (maximum production reliability). The number of different products P1-P6 that are meant to be supplied during a production process for creating different product collections is typically greater than the number of feed conveyors 23 of the printed product processing system 2.

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In different embodiment variants, the collecting system **20** is configured to create combinations of products, here referred to as product collections, by gathering, inserting or collating products or by other product-combining operations, and accordingly comprises a conveyor **21** having a gathering line
5 comprising circulating conveying means, a collecting drum, a belt conveyor for gathering shingled streams or a collecting line, each with or without collection carriers, for example grippers.

The examples of the collecting systems **20** shown in figures **1**, **2** and **6** each comprise a conveyor **21** having a plurality of serially arranged collection
10 carriers, for example grippers, pods, pockets or saddles, which are carried along a closed line cyclically past the feed conveyors **23** and which receive the supplied products **P1-P6**. A product collection is assembled on the conveyor **21**, in particular on or in the collection carriers, by the sequential supply of the products **P1-P6**.

15 As shown schematically in figures **1**, **2** and **6**, the printed product processing system **2** comprises in different embodiment variants one or more finishing systems, which are connected downstream of the collecting system **20**, for example via a transfer unit. Such finishing systems comprise, for example, one
20 or more stacking stations **24**, a packaging facility **25** e.g. a shrink-wrap machine, an apparatus **26**, for example a rotating insertion drum, for inserting additional products **P1-P6** or product collections into a main product **HP** from a corresponding feed conveyor **23'**, a binding machine.

25 The fully assembled product collections, which may also have undergone finishing processes, are supplied, for example as illustrated in figure **2**, via a further conveyor **27**, for example a chain conveyor having grippers, to one of, for instance, a plurality of stacking stations **24**, which creates a package **PP** containing a defined number of product collections, and supplies said package
30 to an outgoing conveyor **28** in order to be carried away, which conveyor, for instance, is a belt conveyor and supplies the package to an allocated heavy goods vehicle **5** for dispatch according to a planned route.

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In order to count supplied products P1-P6, incorrect product collections, incomplete and surplus product collections, and/or created packages PP, the printed product processing system 2 additionally comprises various counters, which are not shown. Incorrect product collections in the printed product
5 processing system 2 are here detected by various sensors (not shown) and supplied, for example by a wastepaper shunt line, away from the conveyor 21 to a wastepaper reject gate.

In figures 1 and 2, the reference signs 22 denote displays, which are each
10 mounted at or on one of the feed conveyors 23 so as to be easily visible for the operating personnel of the printed product processing system 2. The displays 22 are LCD or LED displays, for example. In figure 6, the reference signs 29 denote identifying devices, which depending on the embodiment variant are implemented as machine-readable identifiers, for example a
15 barcode or an RFID (Radio Frequency IDentifier), or as an identifier reader, for example a barcode reader, an RFID reader or an image sensor (digital camera). To aid understanding, it should be mentioned here that, depending on the embodiment variant, the feed conveyors 23 shown in figures 1 and 2 can each be provided with identifying devices 29, and that also the feed
20 conveyors 23 shown in figure 6 can each be provided with a display 22, even if this is not shown explicitly in figures 1, 2 or 6.

For the purpose of control, the printed product processing system 2 comprises a control computer 10, which is connected to the various components and
25 units of the printed product processing system 2 via communications links, in particular to the collecting system 20, the conveyor 21, the supplying feed conveyors 23 and associated displays 22, and to any finishing systems, controllable transfer units and/or wastepaper shunt lines, stacking stations 24, further conveyors 27, 28 and to the mentioned sensors and counters. As
30 shown schematically in figure 6, the control computer 10 comprises a function module, verification module 100, the function of which will be described in detail later.

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5 The control computer **10** is configured to track the product collections or incomplete collections conveyed on the conveyor **21** as regards the position of said collections on the conveyor **21**, the content and structure of said collections (i.e. products and order), the intended and/or modified collection type (having defined collection structure) and/or the number of completed cycles on the conveyor **21** (tracking information). In order to create customized product collections, which are provided for example with the individual address of a recipient and/or are provided with content, and hence structure of the product collection, that is customized to the recipient concerned, a product collection is identified and tracked in the printed product processing system **2** by the control computer **10** over the entire creation time of said collection from the first supplying conveyor **23** on the conveyor **21** to stacking on a specified package PP.

15 The reference sign **1** denotes a computerized control device which is implemented as part of the control computer **10** or on one or more separate computers connected to the control computer **10**. The control device **1** is connected by means of communications links directly or via the control computer **10** to the components and units of the printed product processing system **2**, in particular to the supplying feed conveyors **23** and associated displays **22**.

25 The control device **1** and/or the control computer **10** can preferably be connected to a higher-level computerized control system (not shown). The control device **1** and/or the control computer **10** can additionally be connected via one or more wireless (contactless) communications channels, for example via a WLAN (Wireless Local Area Network), Bluetooth or another radio-based communications link, to mobile display devices **33**, for example to mobile display devices **33** which are each built into a mobile handling device **3** or implemented as a portable computerized hand-held unit.

30 The mobile handling devices **3** are handling vehicles, for example pallet trucks **3**, in particular low-loader pallet trucks, for handling pallets **P0** each holding one or more stacks of one of the products **P1-P6** in each case. The mobile

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handling devices **3** have an electrical drive, for example, and are controlled by an operating person or by an automatic handling controller, depending on the embodiment variant. The mobile handling devices **3** or computerized hand-held units each comprise a communications module for exchanging data with the control device **1** and/or the control computer **10** via the wireless communications channel. The mobile handling devices **3** or computerized hand-held units additionally each comprise a display device (display) **33** for displaying information about the products **P1-P6** that must be moved to the feed conveyors **23, 23'**, in particular a graphical representation of the product **P1-P6** to be moved and a graphical and/or numerical representation of the point in time and/or the time interval until the product **P1-P6** concerned must be available at a specific feed conveyor **23, 23'**. The mobile handling devices **3** or the computerized hand-held units preferably also comprise input means for confirming completed product handling jobs and/or requesting new product handling jobs.

As shown schematically in figure **3**, the control device **1** comprises various function modules, in particular a production configurator **11**, a loading planner **12**, a simulator **120**, a rules editor **13**, a system configurator **14** and a control module **15**, and also data memories or program memories for storing production configurations **16**, loading plans **17**, optimization rules **18** and production conditions **19**. In one embodiment variant, the control device **1** additionally comprises the verification module **100** mentioned above in connection with the control computer **10**. The production configurations **16** comprise production configuration parameters, which define at least one production process of a plurality of different product collections, each to be created from a plurality of supplied products **P1-P6** and each allocated an appropriate collection type. The production configuration parameters furthermore comprise route data, which defines the dispatch of created packages **PP** and includes an allocation of product collections to routes. The loading plans **17** define for each of the feed conveyors **23** a time sequence of the products **P1-P6** that are to be supplied to the conveyor **21** by the feed conveyor **23** concerned to create the defined product collections of a production process. The optimization rules **18** comprise data and/or

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executable/interpretable code which defines the creation of loading plans for the feed conveyors **21**, which loading plans have been optimized to meet as closely as possible one or more defined optimization objectives. The production conditions **19** comprise system configuration parameters, which
5 define the configuration of the printed product processing system **2**, information about the availability of operating personnel of the printed product processing system **2** and at least one optimization objective.

The function modules of the control device **1** or of the control computer **10** are
10 preferably implemented as programmed software modules which comprise computer program code for controlling one or more processors of one or more computers. The computer program code is stored on one or more (handleable) computer-readable storage media connected permanently or removably to the processors. A person skilled in the art will understand, however, that the
15 function modules can be implemented in alternative embodiment variants partially or entirely by hardware components.

The various functions, for the execution of which the function modules are configured, are described in the following paragraphs with reference to figures
20 **4** and **5**, which illustrate flow diagrams containing examples of sequences of possible steps for generating loading plans **16** or for configuring and controlling the printed product processing system **2**.

The production configurator **11** is configured to define production
25 configurations **16** in step **S1**.

For this purpose, in step **S11**, the production configurator **11** records and saves product parameters containing information about the individual products **P1-P6**. The product parameters comprise, for example, the geometric
30 dimensions, in particular thickness, width and length, the weight, the type, a product identifier and a displayable electronic image of a product **P1-P6**.

In step **S12**, the production configurator **11** in addition records and saves definitions of product collections (collection type) containing information about

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the structure of a product collection, each structure comprising an identifier of the individual products **P1-P6** and, if applicable, a stipulated and therefore monitored order of the products **P1-P6** in the product collection.

- 5 In step **S13**, the production configurator **11** records and saves definitions of production configurations **16** containing production configuration parameters, which define at least one production process, i.e. one production run, of a plurality of different product collections. In one embodiment variant, the production configurator **11** records and saves production configurations **16**
- 10 which comprise a plurality of sub-production processes, where each of the sub-production processes corresponds to one self-contained production process of a plurality of different product collections each to be created from a plurality of supplied products, i.e. each sub-production process has a production time period having a production start and a production end, during
- 15 which no product collections from a different sub-production process are created.

The production configuration parameters in each case comprise the quantity and an identifier (collection type) of the different product collections in a

20 production process or sub-production process. Depending on the embodiment variant, the production configuration parameters additionally comprise route information for the efficient dispatch of packages **PP** containing product collections and/or comprise address information for dispatching packages **PP** or product collections.

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In one variant, at least some of the production configuration parameters are transmitted from the higher-level control system to the production configurator **11**.

- 30 The production configurator **11** preferably comprises a user interface (for example a graphical user interface) having display and controls for entering, by adding, editing and/or deleting, the production configurations **16** described above, for example during preparation for the production process and/or during the production process. The production configurator **11** is moreover

configured to receive and save production configuration parameters, for example product parameters, in the form of files.

The rules editor **13** is configured to define optimization rules **18** in step S2.

5

For this purpose, in step S21, the rules editor **13** records and saves definitions of optimization objectives. The optimization objectives specify an optimization priority, which shall be used as the basis for planning, for a production process or sub-production process, a loading of the feed conveyors **21** that is optimized to the maximum possible extent. Possible optimization objectives comprise, for example, "minimum number of operating personnel", "number of available operating personnel", "uninterrupted production process", "uninterrupted sub-production process", "maximum production reliability", "minimum production time", "maximum production speed", "minimum waste",
10 "optimum stacking according to route planning", "avoiding downtime during product change", etc.

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In step S22, the rules editor **13** records and saves definitions of optimization rules **18**, each of which can be allocated to one of the defined optimization objectives. The optimization rules **18** comprise, for example, a rule identifier, a rule name and preferably executable or interpretable rule code, for instance rule programs containing executable or interpretable rule instructions. The rule code can be imported, for example, as a file or entered by means of a text editor or program editor. A general optimization rule, for example named
20 "homogeneity maximization", comprises, for instance, rule code which sorts the product collections to be created in a production process or sub-production process such that the products which must be supplied most frequently are supplied as far as possible without interruption and without a product change by the same feed conveyor(s) **23**. A general optimization rule, for example
25 named "uninterrupted product change", comprises, for instance, rule code that schedules in the loading plan a product change for a feed conveyor such that it falls within a production phase in which the product collections to be created are covered by products P1-P6 being fed from other feed conveyors **23**, thereby avoiding any gap in production.

30

The rule editor **13** preferably comprises a user interface (for example a graphical user interface) having display and controls for entering, by adding, editing and/or deleting, the optimization rules **18** described above prior to production planning. The optimization rules **18** are typically relatively static and are rarely changed if they have been tried and tested in production or on the basis of a simulation by the simulator **120**. For this purpose, quantitative experience-based values are preferably saved in association with the optimization rules **18**, for example a production speed as a number of processed products and/or created production collections per production time period, a personnel efficiency as a number of operating persons per number of processed products and/or created product collections, loading efficiency as a number of product changes for the feed conveyors **23** per production time period, number of processed products and/or created product collections, a production efficiency as a number of production interruptions per number of processed products, created product collections and/or per production time period, etc.

The system configurator **14** is configured to define production conditions **19** in step **S3**. The system configurator **14** is configured in particular to define, save and retrieve production conditions **19** for a plurality of different production scenarios.

For this purpose, in step **S31**, the system configurator **14** records and saves system configuration parameters which define the configuration of the printed product processing system **2**. The system configuration parameters comprise, for example, information about the quantity, the type and/or the function of the feed conveyors **23**, the position of the feed conveyors **23** on the conveyor **21**, e.g. a sequential position number, the quantity and the type of operational and/or activatable stacking stations **24**, the position with respect to the conveyor **21**, **27** of the activatable stacking stations **24**, the quantity of wastepaper shunt lines, the position of the wastepaper shunt lines, the quantity, type (function) and/or position of the finishing systems and activatable processing devices, etc.

In step **S32**, the system configurator **14** in addition records and saves the availability of operating personnel for the printed product processing system **2**. The availability information comprises, for example, the number of operating
5 persons who are available or are meant to be available for manual loading of feed conveyors **23** with the products to be supplied during specified time periods.

In step **S33**, the system configurator **14** records and saves a defined
10 optimization objective, which shall be used as the basis for planning, for a production process or sub-production process, a loading of the feed conveyors **21** that is optimized to the maximum possible extent. A plurality of possibly conflicting optimization objectives each having a different allocated priority can also be recorded and saved. One or more optimization objectives are
15 selected, for example, from a list containing defined optimization objectives. The optimization objectives hence specify an optimization priority and comprise, for example, "minimum number of operating personnel", "number of available operating personnel", "uninterrupted production process", "uninterrupted sub-production process", "maximum production reliability",
20 "minimum production time", "maximum production speed", "minimum waste", "optimum stacking according to route planning", "avoiding downtime during product change", etc.

In one variant, at least some of the production conditions **19** are transmitted
25 from the higher-level control system to the system configurator **14**.

The system configurator **14** preferably comprises a user interface (for instance a graphical user interface) having display and controls for entering, by adding, editing and/or deleting, the production conditions **19** described above, for
30 example during installation of the printed product processing system **2**, during preparation for the production process and/or during the production process. In one variant, the system configurator **14** is also configured to record and save at least some system configuration parameters automatically by retrieval from the various components of the printed product processing system **2** via

communications links, these system configuration parameters of the printed product processing system **2** being not only static but also dynamic, whereby the system configuration is updated at the time of production automatically, in particular also with regard to available or failing system components. Dynamic
5 recording of system configuration parameters is performed, for example, cyclically and/or on request or on user instruction. The production conditions for various production scenarios are recorded and saved preferably "off-line", not during a production run.

10 The loading planner **12** is configured to generate in step **S4** loading plans **17** for a specific production process or sub-production process defined by a saved production configuration **16**.

For this purpose, in step **S41**, the loading planner **12** selects one of the
15 configurations of the printed product finishing system **2** that are defined by the saved system configuration parameters.

In step **S42**, the loading planner **12** selects one of the defined variants of the available operating personnel of the printed product finishing system **2**.

20 In step **S43**, the loading planner **12** selects one of the defined optimization objectives or a defined record of differently prioritized or weighted optimization objectives.

25 The parameters selected in steps **S41**, **S42** and **S43** define production conditions **19** for a specific production scenario.

In step **S44**, the loading planner **12** generates loading plans **17** for the feed conveyors **23** for the defined production process or sub-production process
30 and the production conditions selected in steps **S41**, **S42** and **S43**. The loading planner **12** here generates the loading plans **17** on the basis of the optimization rules **18** allocated to the optimization objective selected in step **S43**. If a plurality of optimization rules are allocated to an optimization objective, those optimization rules that are allocated the highest experience-

- based values are selected. The loading plans **17** are generated by executing or interpreting the defined optimization rules **18**. The loading plans **17** define for each of the feed conveyors **23** a time sequence of the products P1-P6 that are to be supplied to the conveyor **21** by the feed conveyor **23** concerned for creating the product collections of the production process. Depending on the embodiment variant, the loading plans **17** for all the feed conveyors **23** are combined in a common loading master plan or divided into individual loading sub-plans.
- 10 A loading plan **17** defines for a feed conveyor **23** the supply sequence of the products P1-P6. This specifies, for example, as illustrated in table 1, the quantity of products P1, P3, P4 that are to be supplied to the feed conveyor **23** without interruption by a different product before it is necessary to perform a product change and hence load the feed conveyor **23** with a different product
- 15 **P1-P6**.

Loading plan for a feed conveyor		
Time/Cycle	Product/Break	Quantity/ time length
1	P3	4000
4001	-	200
4201	P1	2000
6201	-	100
6301	P4	1500
7801	-	200
...	...	...

Table 1

In addition to specifying the order of the products in a loading plan table, the loading plan **17** can also specify, for instance, the time sequence by giving extra details about the time of supply or the first supply cycle. Any planned
5 interruptions in supply "-" between two products to be supplied successively are specified explicitly or follow implicitly from the specified time of supply or supply cycle.

The record of individual loading plans **17** for the feed conveyors, or the loading
10 master plan, is saved in association with the production conditions **19** of the production process or sub-production process that were defined in steps **S41**, **S42** and **S43**.

In step **S46**, the production process is simulated for the allocated production
15 conditions **19** by the simulator **120** according to the loading plans **17** generated in step **S44**. In the simulation, each load change for a feed conveyor **23** is based on a defined expected duration of a supply interruption caused by this load change and which depends, for example, on the type of the new product **P1-P6** to be supplied.

20 In step **S47**, an expected production time period is determined on the basis of the simulation carried out and is saved in association with the loading plans **17**.

25 Depending on the optimization rules **18** to be applied, by repeating the step sequence **S44**, **S45**, **S46**, a plurality of different loading plans **17** for the feed conveyors **23** are generated for the selected production conditions, and corresponding values for the production time periods are determined and stored. In one embodiment variant, the optimization rules **18** here define
30 specific variables and parameters, each value of which is defined in multiple passes, for example by a random number generator or according to stipulated rules, so as to generate different records of loading plans **17** each containing different simulated production time periods. Finally, the record of loading plans

17 having the shortest simulated production time period is saved as the preferred variant for the selected production conditions **19**.

5 In step **S47**, the loading planner **12** checks whether there are further saved optimization objectives that have not yet been taken into account which are allocated further optimization rules **18**. If there exists at least one further optimization objective, the loading planner **12** continues in step **S43** in order to determine further loading plans **17** for the production process on the basis of the optimization rules **18** defined by the further optimization objective.
10 Otherwise the loading planner **12** continues in step **S48**.

In step **S48**, the loading planner **12** checks whether there are further saved variants of the available operating personnel of the printed product finishing system **2** that have not yet been taken into account. If there exists at least one
15 further variant of available operating personnel, the loading planner **12** continues in step **S42** in order to determine for this variant of available operating personnel further loading plans **17** for the production process. Otherwise the loading planner **12** continues in step **S49**.

20 In step **S49**, the loading planner **12** checks whether there are further saved system configuration parameters that have not yet been taken into account which define a further configuration of the printed product finishing system **2**. If there exists at least one further configuration of the printed product finishing system **2**, the loading planner **12** continues in step **S41** in order to define for
25 this configuration further loading plans **17** for the production process. Otherwise the loading planner **12** finishes generating loading plans **17**.

The control module **15** is configured to configure and control the printed product processing system **2** for and during a production process.

30 For this purpose, the control module **15** activates the production configurator **11**, as illustrated in figure **5**, in order to define in step **S51** the current production configuration **16** for the planned production process or sub-production process. The current production configuration **16** is defined by the

production configurator **11**, as described above in connection with step **S1** (steps **S11**, **S12** and **S13**), by entering individual parameters or by selecting an already defined production configuration **16** of a production process or sub-production process.

5

In step **S52**, the control module **15** activates the system configurator **14** in order to define the current production conditions **19**. The current production conditions **19** are defined by the system configurator **14**, as described above in connection with step **S3** (steps **S31**, **S32** and **S33**), by entering individual parameters or by selecting already defined production conditions **19**.

10

In step **S53**, the control module **15** determines the loading plans **17** to be used for the feed conveyors **23** with regard to the current production configuration **16** and the current production conditions **19**. For this purpose, the control module **15** selects the loading plans **17**, which may already be allocated to the current production configuration **16** and the current production conditions **19**, or activates the loading planner **12** in order to generate the loading plans **17** for the current production configuration **16** and the current production conditions **19**, as described above in connection with step **S4** (steps **S44**, **S45** and **S46**).

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In step **S54**, the control module **15** determines, from the loading plans **17** to be used, for each of the feed conveyors **23** the first product **P1-P6** to be loaded on the feed conveyor **23** for the production process. In the example of the loading plan in table **1**, this is the product **P3**, which must be supplied first to the conveyor **21** by the feed conveyor **23** concerned.

25

In step **S55**, the control module **15** displays on the displays **22** of the feed conveyors **23** in each case the product **P1-P6** that must be loaded as the first product, for instance before the start of the production process, on the feed conveyors **23** concerned. The product **P1-P6** is displayed on the display **22** for example as text information and/or as an image, preferably based on a saved digital image of the product **P1-P6** or on a symbolic representation of the product **P1-P6**, for example a company logo of the company responsible for

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the product **P1-P6**, wherein the orientation of the product **P1-P6** in which the product **P1-P6** is meant to be loaded on the feed conveyor **23** is also preferably displayed. The control module **15** in addition transmits information about the product **P1-P6** to be supplied as a product handling job via the
5 wireless communications channel to the mobile display devices **33** of the handling devices **3** or of the computerized hand-held units, which are used, for example, in the stock-management or goods-inwards department. The products **P1-P6** to be supplied and which are meant to be moved by the mobile handling devices **3** to the feed conveyors **23** are preferably each
10 displayed graphically on the display **33** of the mobile handling device **3** concerned (or of the computerized hand-held unit). The products **P1-P6** to be supplied initially are assigned, for example to the mobile handling devices **3**, such that feed conveyors **23**, which are each arranged in a common, defined, contiguous local area, are operated by the same mobile handling device **3**.

15 In step **S56**, the feed conveyors **23** are manually loaded by the operating personnel with the displayed products **P1-P6** to be supplied. For this purpose, the pallets **P0** holding the products **P1-P6** to be supplied are first moved to the feed conveyors **23** by the mobile handling devices **3**, and then the feed
20 conveyors **23** are loaded with the products **P1-P6** from the pallets **P0**. The control device **1** and/or the control computer **10** preferably receive confirmation both that the product handling job has been carried out, i.e. one or more requested pallets **P0** have been provided, and that the feed conveyors **23** have been loaded with the products **P1-P6**. Confirmation is performed, for
25 example, manually by the operating personnel or by suitable sensors or the automatic controller of the handling device **3**.

In step **S57** the production process starts, with the products **P1-P6** being supplied to the conveyor **21** by the feed conveyors **23** under the control of the
30 control computer **10** or the control device **1** in accordance with the production configuration in order to create product collections.

In step **S58**, the control module **15** checks whether there is a change in the current production conditions **19**, for example as a result of an intended

change, e.g. made by manual intervention, or a change caused by a fault situation or problem, to system configuration parameters and hence to the configuration of the printed product processing system **2**, as a result of a changed number of available operating personnel for the printed product processing system **2** or as a result of a changed optimization objective. In other words, the control module **15** or the system configurator **14** continuously monitors and logs the production process and the status of the printed product processing system **2** in order to adapt the current production conditions **19** accordingly if necessary, for example if there are problems with a feed conveyor **23**, with processing equipment or with conveying away, or when routes are altered because of changed weather conditions or changes in the availability of a heavy goods vehicle, etc. If the production conditions **19** are unchanged, the control module **15** continues in step **S60**, otherwise in step **S59**.

In step **S59**, the control module **15** determines adapted, updated loading plans **17** from the changed production conditions. The control module **15** here generates for the changed current production conditions **19** a record containing adapted loading plans **17** for the feed conveyors **23**, taking into account already supplied products **P1-P6** or generated product collections and, if applicable, also already existing loads on the feed conveyors **23**, and not regenerating or modifying same. The aim of this process, as a general optimization rule for updating loading plans **17** when production conditions are changed, is to minimize the number of product changes for loading of the feed conveyors **23**. Depending on the situation, a running sub-production process is also finished using the existing loading plans **17**, and the control module **15** selects a new record of loading plans **17** for the current production conditions only for the next sub-production process, in other words the loading plans **17** are not changed until the point in time or sequence number of the next sub-production process, if certain defined conditions are met, for example the remaining production time for the running sub-production process is less than a defined threshold, or completion of the running sub-production process is technically feasible for the changed production conditions, etc.

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In step **S60**, the control module **15** checks against the current possibly changed loading plans **17** whether further loading of the feed conveyors **23** with products **P1-P6** is necessary. For this purpose, sensors, for example, are also used on the feed conveyors **23**, which determine and check the current loading of a feed conveyor **23**. Depending on the design of the loading sensor, a load amount is here specified as a length dimension, weight and/or quantity, and in one variant, the specific product **P1-P6** loaded on the feed conveyor **23** concerned is also determined. If the loading plan **17** of a feed conveyor **23** has not yet been completed, i.e. the feed conveyor **23** for the running production process or sub-production process still needs to be loaded with additional products **P1-P6**, the control module **15** continues in step **S61**.

In step **S61**, the control module **15** checks for each of the feed conveyors **23** on the basis of the loading plans **17** and the current status of the running production process or sub-production process whether and when a product change is imminent for the feed conveyor **23** concerned. In this step, it is determined on the basis of the current number of created product collections for which the feed conveyor **23** concerned is supplying products **P1-P6**, and on the basis of the loading plan **17** allocated to the feed conveyor **23** concerned, how many of the products **P1-P6** in the current loading of the feed conveyor **23** are still meant to be supplied by the feed conveyor **23** before the feed conveyor **23** must supply a different product **P1-P6**. The control module **15** also checks for the feed conveyors **23**, for which a product change is imminent, according to defined conditions whether or not the imminent product change shall already be displayed to the operating personnel of the printed product processing system **2**. A product change is displayed, for example, if it must be performed immediately after the current load on the conveyor concerned has been processed. The control module **15** also determines, for example on the basis of the movement route or movement time of a product **P1-P6** from its storage location to the feed conveyor **23** concerned and/or on the basis of the current utilization of the mobile handling devices **3**, whether communication of an imminent product change and hence a product handling job shall be transmitted already to one or more mobile handling devices **3** (or computerized hand-held units). In one variant, a defined advance warning

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time, for example ten or fifteen minutes, is used to communicate each imminent product change as a product handling job to one of the mobile handling devices **3**. As a general rule it holds that one or more pallets **P0** holding the correct product to be supplied are provided at the correct point in time, i.e. when the loading plan specifies loading with the product to be supplied, and at the right location, i.e. at the intended feed conveyor **23**. The advance warning time for a product handling job for moving up to a feed conveyor **23** a pallet **P0** by a mobile handling device **3** for a product change or replenishment of a product to be supplied is longer than that needed for announcing a product change on a display **22** on a feed conveyor **23**, for example twice the value of the time period that is needed, after transmitting a product handling job, by a mobile handling device **3** for the movement to the feed conveyor **23** concerned.

15 In step **S62**, the control module **15** transmits a product handling job for an imminent product change or product replenishment in each case to the mobile display device **33** of one of the handling devices **3** (or of the computerized hand-held units). Depending on the advance warning time, the control module **15** additionally transmits information about an imminent product change on the feed conveyor **23** concerned. In this step is transmitted an identifier of the conveyor **23** concerned, an identifier of the product **P1-P6** to be moved up or supplied, a graphical representation of this product **P1-P6** and a value for the point in time and/or the time period until the product **P1-P6** concerned must be available at a specified feed conveyor **23**, **23'** (supply time). The product **P1-P6** to be moved up and the time values are displayed on the display **33** of the mobile handling device **3** concerned or of the computerized hand-held unit concerned. The control module **15** also displays, if applicable, on the display **22** of the feed conveyors **23** concerned an imminent product change. An image of the product **P1-P6** which is to be loaded on the feed conveyor **23** is preferably displayed on the display **22**. In one variant, the orientation of the product **P1-P6** in which the product **P1-P6** concerned is meant to be loaded on the feed conveyor **23** is also displayed. In one embodiment variant, the control module **15** also displays on the display **22** a time indicator for the imminent product change, for example the number of remaining products **P1-P6** that will

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still be supplied to the conveyor **21** by the feed conveyor **23** before the product change, or a time period that depends thereon. The display **22** is continuously updated so that a decreasing time value synchronized with the production process or a decreasing product quantity is displayed to the operating personnel, for example as a numerical value or graphically.

In a further embodiment variant, the control module **15** is configured, for example in accordance with relevant control commands which are entered at any time during the production process at the feed conveyor **23** by the operating personnel, for instance via a keyboard or a touch-sensitive display, to display on the display **22** the remaining time period until the next change in the type of the product **P1-P6** to be supplied by the feed conveyor **23** concerned. For instance, the number of remaining loadings of the feed conveyor **23** with the current product **P1-P6** before the next product **P1-P6** of a different type needs to be loaded by the operating personnel, is displayed as a numerical value or graphically. In one variant, the control module **15** displays, for example at the instruction of the operating personnel, on the displays **22** of each of the feed conveyors **23** the entire loading plan **17** or a current segment of the allocated loading plan **17**. The loading plan **17** containing the sequence of different types of products **P3-P1-P4** in time succession is displayed, for example in graphical form, such as illustrated in the example in table **2**, where the different products **P1-P6** are each represented in a different color and include quantity information, and the current point in time or production status is indicated by a marker. In the example in table **2**, the marker shows a production status in which the product **P3** has already been processed and supplied to the conveyor **21** by the feed conveyor **23** concerned, and in which the product **P1** is currently being supplied.

Product and quantity				
P3		P1		P4
4000		2000		1500

----- (marker)

Table 2

In step S63, the operating personnel load the feed conveyors **23** with the
 5 product displayed as the current product on the display **22** in the specified
 orientation. For the purpose of a product change, one or more (handling)
 pallets **P0**, on which are arranged one or more stacks of the product **P1-P6** to
 be supplied, must be moved by the mobile handling devices **3** in good time to
 the feed conveyor **23** concerned, for example under the control of an operating
 10 person or automatically by the handling controller. The handling controller is
 configured, for example, to control the mobile handling device **3** on receiving a
 product handling job in such a way that it automatically obtains from a storage
 location one pallet **P0** (or a plurality of pallets **P0** in succession), on which are
 arranged one or more stacks of the product **P1-P6** to be supplied, and picks
 15 up, lifts and moves said pallet to the feed conveyor **23** concerned, for example
 along predefined paths. The control device **1** and/or the control computer **10**
 receive confirmation both that the product handling job has been carried out
 and that the feed conveyors **23** have been loaded with the products **P1-P6** to
 be supplied.

20 As shown in figure 6, the feed conveyors **23** each have an identifying device
29. The identifying devices **29** enable verification of the allocation of products
P1-P6, which are brought up on one or more pallets **P0** for the purpose of
 loading a feed conveyor **23** concerned, to the feed conveyor **23** concerned.
 25 The intended, correct allocation of a product **P1-P6** of a specific product type
 to one of the feed conveyors **23** is saved in the control computer **10** or in the
 control device **1**. The allocation is typically time-dependent and changes
 during the production process. In the context of the above explanations, the
 loading plans **17**, for example, define the allocation for a production process or
 30 sub-production process.

Verification of the allocation is based on a machine-readable identifier **29*** of
 the product **P1-P6**, for example a product identifier **29*** in the form of a

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barcode or an RFID, which is attached directly to the product **P1-P6**, on the pallet **P0** on which is arranged the product **P1-P6**, or on a stack of the product **P1-P6**. The machine-readable identifier **29*** of the product **P1-P6** is recorded using a mobile reader **4** (hand scanner) or using the identifying device **29** of the feed conveyor **23**, which identifying device is implemented in this case as an identifier reader. In a further variant, the machine-readable identifier of the product **P1-P6** is represented by an image of the product **P1-P6**, which is captured by an image sensor, e.g. a digital camera, wherein the image sensor is in the form of a mobile reader **4** or is part of the identifying device **29**.

10

In the variants in which the identifier of a product **P1-P6** (product identifier) **29*** is recorded by the identifying device **29** which is fixed to the feed conveyor **23** and is in the form of an identifier reader or an image sensor, for the purpose of verifying the allocation, verification data containing the recorded product identifier and a feed-conveyor identification allocated to the feed conveyor **23**, which identification is stored, for example, in the identifying device **29**, is transmitted from the identifying device **29** to the verification module **100** via a communications link.

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In the variants in which the identifier of a product **P1-P6** (product identifier) **29*** is captured and recorded by a mobile reader or image sensor that is not connected to the feed conveyor **23**, for the purpose of verifying the allocation of the product **P1-P6** to a feed conveyor **23**, an identifier of the feed conveyor **23** concerned is also recorded, wherein the identifying device **29** attached to the feed conveyor **23** for this purpose is in the form of a machine-readable identifier. Then, for the purpose of verifying the allocation, verification data containing the recorded product identifier and the recorded machine-readable identifier of the feed conveyor **23** is transmitted from the mobile reader **4** via a contactless (wireless) or contact-based (wired) communications link **40** to the verification module **100**, for example via a WLAN (Wireless Local Area Network) or via Bluetooth.

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The verification module **100** verifies the allocation of product **P1-P6** to feed conveyor **23** on the basis of the transmitted verification data. Depending on

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the embodiment variant, the verification module is arranged in the control computer **10** or in the control device **1** or as an alternative in the feed conveyors **23**. If, on the basis of the stored allocation of product **P1-P6** to feed conveyor **23**, for example on the basis of the allocated loading plans **17**, the
5 verification module **100** establishes that the product **P1-P6** defined by the received verification data, and the feed conveyor **23** defined by the verification data do not match the stored allocation which is intended for the current point in time or a defined time period after the current point in time, the verification module **100** sends an appropriate error message via the communications link
10 **40** to the mobile reader **4** and/or to the feed conveyor **23**, for example for display on a display of the mobile reader **4** and/or of the feed conveyor **23**, and/or for acoustic output of a warning signal. Incorrect loading of the feed conveyors **23** with unintended products **P1-P6**, in particular at the wrong point in time, can thereby be avoided. Moreover, in one variant in which the product
15 identifier is recorded by the image sensor fixed to the feed conveyor **23**, it is possible to stop and prevent the feed of unintended products **P1-P6** that have been mistakenly loaded on the feed conveyor **23** concerned.

Finally it should be mentioned that although in the description, computer
20 program code has been assigned to specific functional modules and although the execution of steps has been presented in a specific sequence, a person skilled in the art will understand that the computer program code can have a different structure and the sequence of at least some steps can be changed without deviating from the subject matter for which protection is sought.

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EMBODIMENTS IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A computerized control device for controlling a printed product processing system that comprises a collecting system having a conveyor and a plurality of feed conveyors for creating product collections from different types of products supplied by the feed conveyors, the device comprising:

a loading planner for generating and saving one or more loading plans, which define for each of the feed conveyors a time sequence of the products that are to be supplied to the conveyor by the feed conveyor for a defined production process of a plurality of different product collections, each to be created from a plurality of supplied products; and

a control module configured to determine, based on the loading plans, the products to be supplied, which are each to be supplied to the conveyor by one of the feed conveyors for creating the product collections,

wherein the control module is configured to transmit in each case information concerning the determined products to be supplied in question, via a wireless communications channel, to a mobile display device of a mobile handling device for bringing the products to be supplied to the feed conveyor in question, in order to display the products to be supplied to the corresponding feed conveyor.

2. The device as claimed in claim 1, wherein the control module is configured to:

record, during the defined production process, the products supplied by the feed conveyors to the conveyor;

determine, on the basis of the loading plans, an imminent change in the type of the product to be supplied for one of the feed conveyors; and

transmit, via the wireless communications channel to the mobile display device, information concerning the product to be loaded on the feed conveyor for the imminent change.

- 3.** The device as claimed in either one of claims **1** and **2**, wherein the control module is configured to:

determine, during the defined production process on the basis of the loading plans, a time interval until an imminent change in the type of product to be supplied for one of the feed conveyors; and

transmit, via the wireless communications channel, said time interval to the mobile display device.

- 4.** The device as claimed in any one of claims **1** to **3**, wherein the control module is configured to:

display, on a display of the feed conveyor concerned in each case, a graphical depiction and an orientation of the products to be supplied; and

transmit, via the wireless communications channel to the mobile display device, information concerning the products to be supplied for the graphical depiction of the products to be supplied.

5. The device as claimed in any one of claims **1** to **4**, wherein the loading planner is configured to generate the loading plans for the defined production process according to defined optimization rules.
6. The device as claimed in claim **5**, wherein the loading planner is configured to determine the defined optimization rules on the basis of one of a plurality of possible optimization objectives.
7. The device as claimed in any one of claims **1** to **6**, wherein:

the loading planner is configured to generate and save records containing different loading plans for the feed conveyors for different possible production conditions that define at least one of: a configuration of the printed product processing system, the availability of operating personnel of the printed product processing system and an optimization objective; and

the control module is configured to record current production conditions of the printed product processing system for the defined production process, and to select one of the records of the loading plans for the defined production process on the basis of the current production conditions.
8. The device as claimed in any one of claims **1** to **7**, wherein:

the control module is configured to record, during the defined production process, current production conditions which define at least one of: a current configuration of the printed product processing system, the current availability of operating staff of the printed product processing system and a current optimization objective; and

the loading planner is configured to adapt the loading plans, during the defined production process, on the basis of the current production conditions of the printed product processing system.

9. The device as claimed in any one of claims 1 to 8, wherein:

the loading planner is configured to generate, for the defined production process, a plurality of records containing different loading plans for the feed conveyors;

the control device comprises a simulator which is configured to simulate the defined production process for the different records of loading plans and to determine in each case a simulated production time period; and

the loading planner is configured to use, for the defined production process, the record of loading plans having the shortest simulated production time period.

10. A computer-implemented method for controlling a printed product processing system that comprises a collecting system having a conveyor and a multiplicity of feed conveyors for creating product collections from different types of products supplied by the feed conveyors, the method comprising:

generating and saving, in a computerized control device, one or more loading plans which define for each of the feed conveyors a time sequence of the products that are to be supplied to the conveyor by the feed conveyor for a defined production process of a plurality of different product collections, each to be created from a plurality of supplied products;

determining, in the computerized control device on the basis of the loading plans, the products to be supplied, which are each to be supplied by one of the feed conveyors to the conveyor for creating the product collections; and

transmitting in each case information concerning the determined products to be supplied, via a wireless communications channel, to a mobile display device of a mobile handling device for bringing the products to be supplied to the feed conveyor in question, in order to display the products to be supplied to the corresponding feed conveyor in question.

11. The method as claimed in claim **10**, further comprising:

recording, during the defined production process, the products supplied by the feed conveyors to the conveyor;

determining, in the computerized control device on the basis of the loading plans, an imminent change in the type of the product to be supplied for one of the feed conveyors; and

transmitting, via the wireless communications channel to the mobile display device, information concerning the product to be loaded on the feed conveyor for the imminent change.

12. The method as claimed in either one of claims **10** and **11**, further comprising:

determining, in the computerized control device during the defined production process on the basis of the loading plans, a time interval until

an imminent change in the type of product to be supplied for one of the feed conveyors; and

transmitting the time interval to the mobile display device via the wireless communications channel.

13. The method as claimed in any one of claims **10** to **12**, further comprising:

displaying, on a display of the feed conveyor concerned, a graphical depiction and an orientation of the products to be supplied; and

transmitting, via the wireless communications channel to the mobile display device, information concerning the products to be supplied, for the graphical depiction of the products to be supplied.

14. The method as claimed in any one of claims **10** to **13**, further comprising:

selecting one of a plurality of possible optimization objectives;

determining, in the computerized control device, defined optimization rules on the basis of the one of a plurality of possible optimization objectives; and

generating the loading plans, in the computerized control device for the defined production, according to the determined defined optimization rules.

15. The method as claimed in any one of claims **10** to **14**, further comprising:

generating and saving, in the computerized control device, records containing different loading plans for the feed conveyors for different possible production conditions, which define at least one of: a configuration of the printed product processing system, the availability of operating personnel of the printed product processing system and an optimization objective;

recording, in the computerized control device, current production conditions of the printed product processing system for the defined production process; and

selecting, in the computerized control device, one of the records of the loading plans for the defined production process on the basis of the current production conditions.

16. The method as claimed in any one of claims **10** to **15**, further comprising:

recording, in the computerized control device during the defined production process, current production conditions of the printed product processing system which define at least one of: a current configuration of the printed product processing system, the current availability of operating staff of the printed product processing system and a current optimization objective; and

adapting, in the computerized control device during the defined production process, the loading plans on the basis of the current production conditions of the printed product processing system.

17. The method as claimed in any one of claims **10** to **16**, further comprising:

generating, in the computerized control device for the defined production process, records containing different loading plans for the feed conveyors;

simulating the defined production process for the different records of loading plans;

determining in each case a simulated production time period; and

using, for the defined production process, the record containing loading plans having the shortest simulated production time period.

18. A computer program product comprising a tangible computer-readable storage medium containing stored computer code, the code being configured to control one or more processors of a control device for controlling a printed product processing system that comprises a collecting system having a conveyor and a multiplicity of feed conveyors for creating product collections from products supplied by the feed conveyors, such that the processors execute a method as claimed in any one of claims **10** to **17**.

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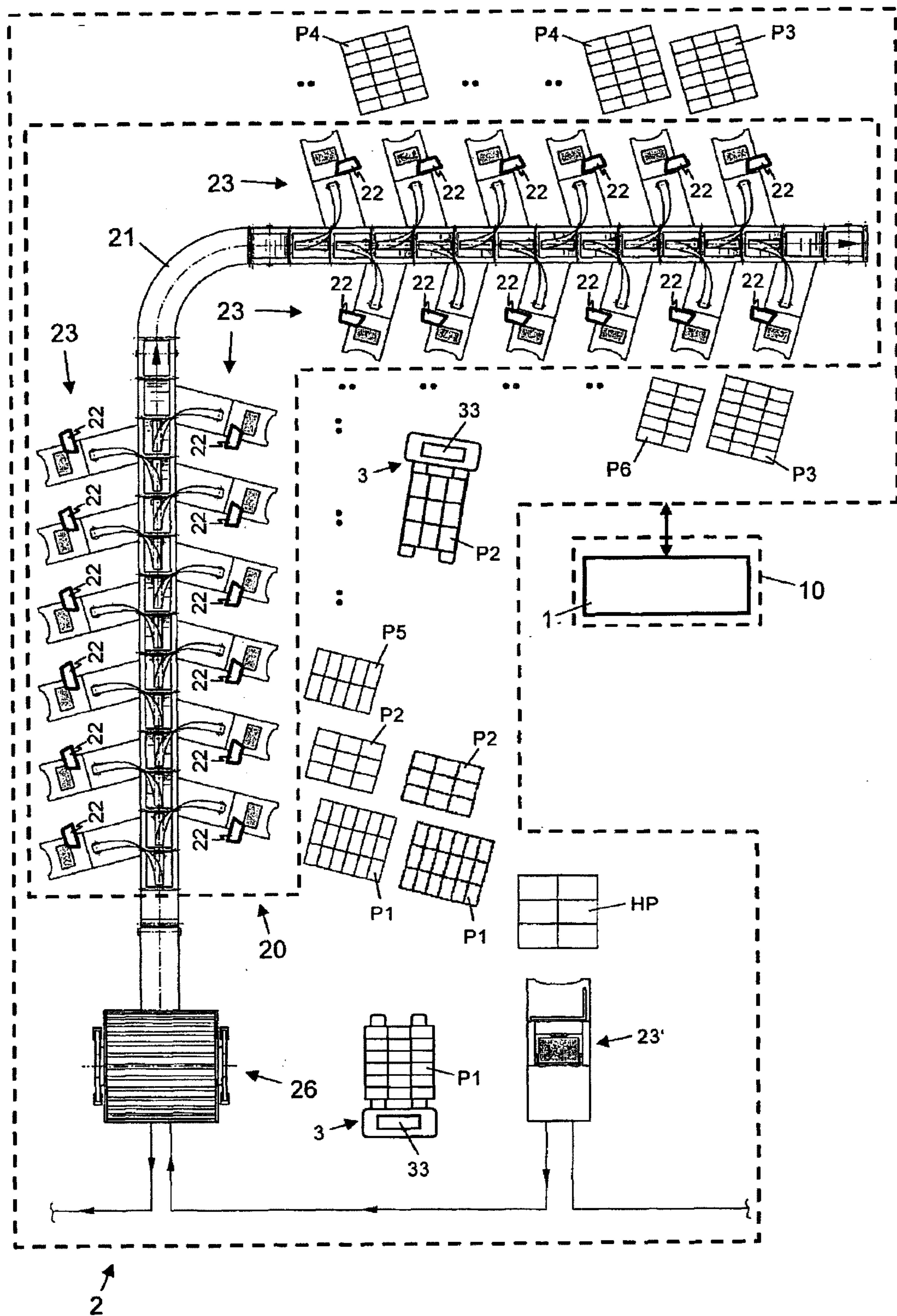


Fig. 1

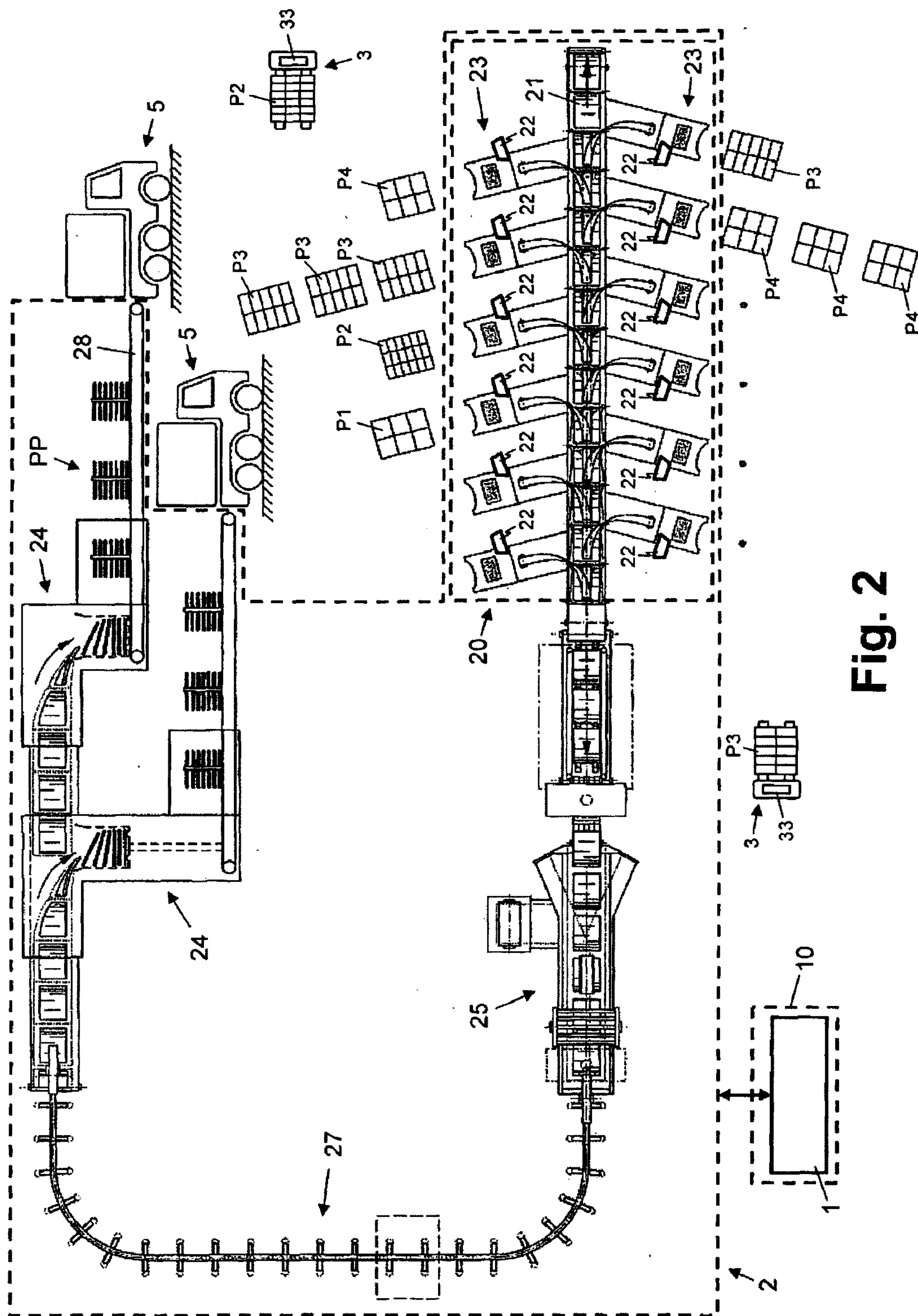
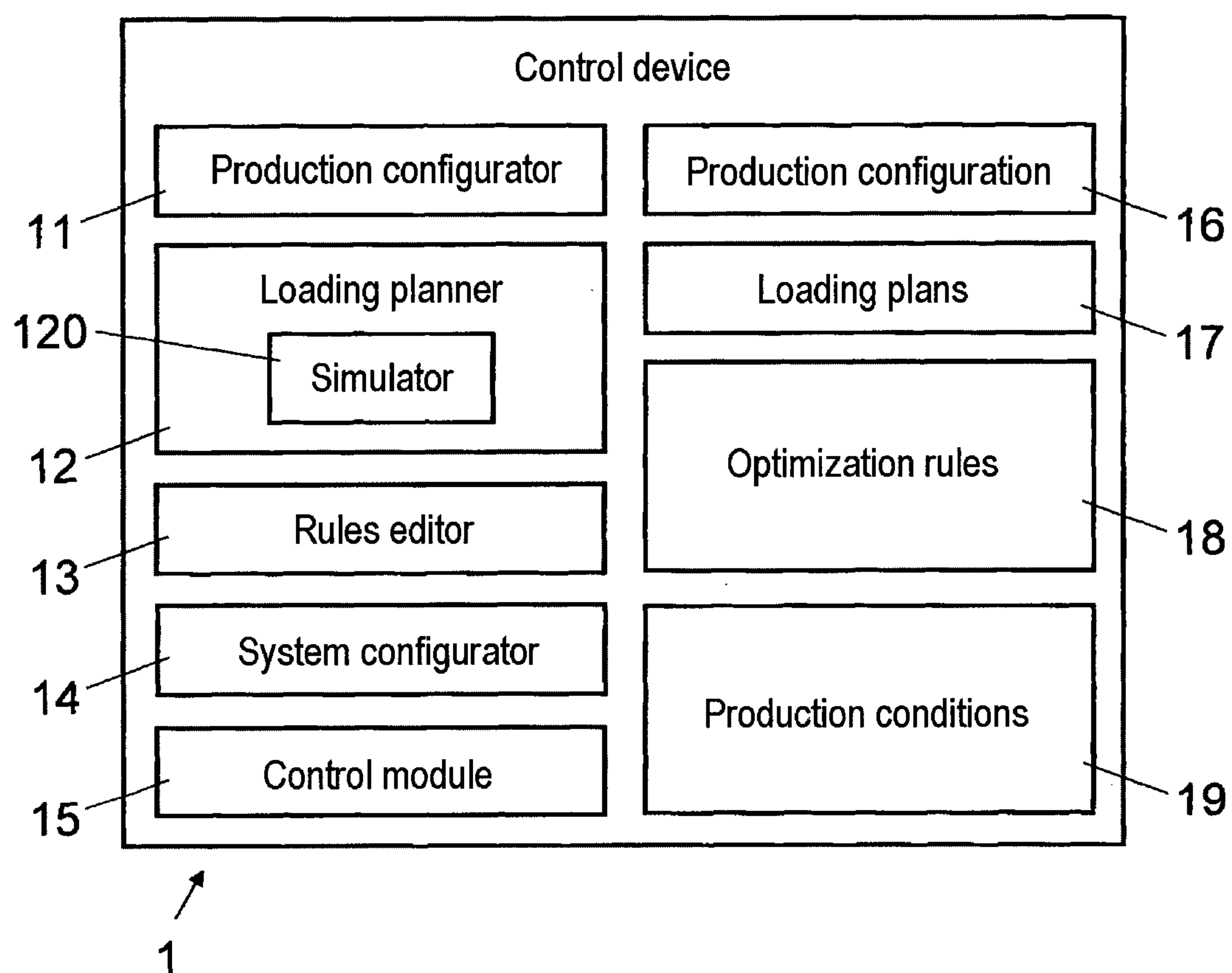


Fig. 2

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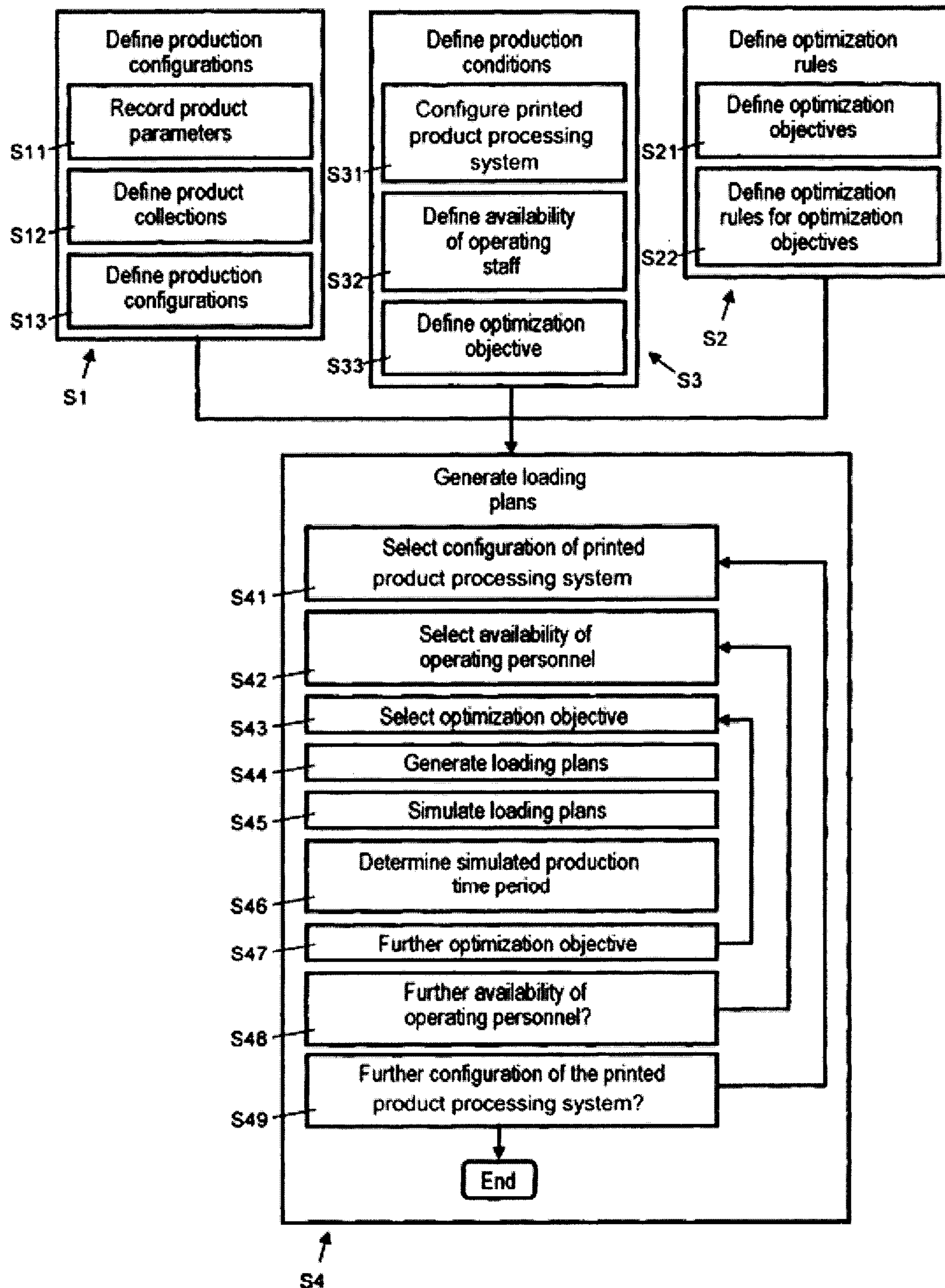
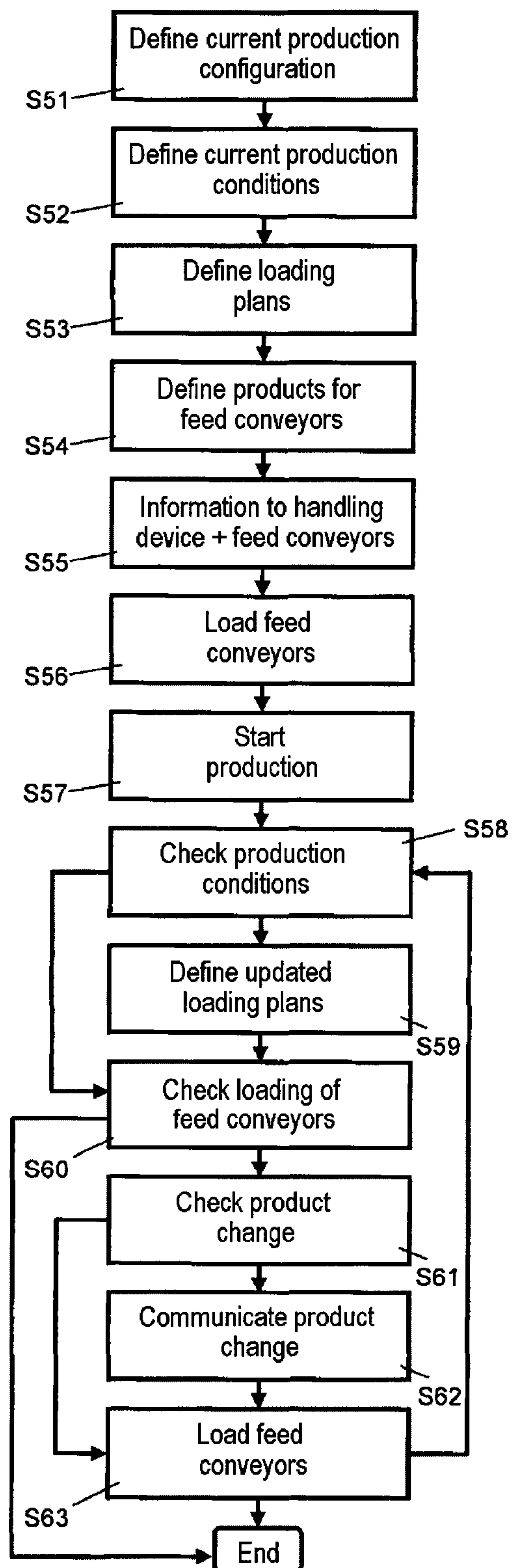


Fig. 4

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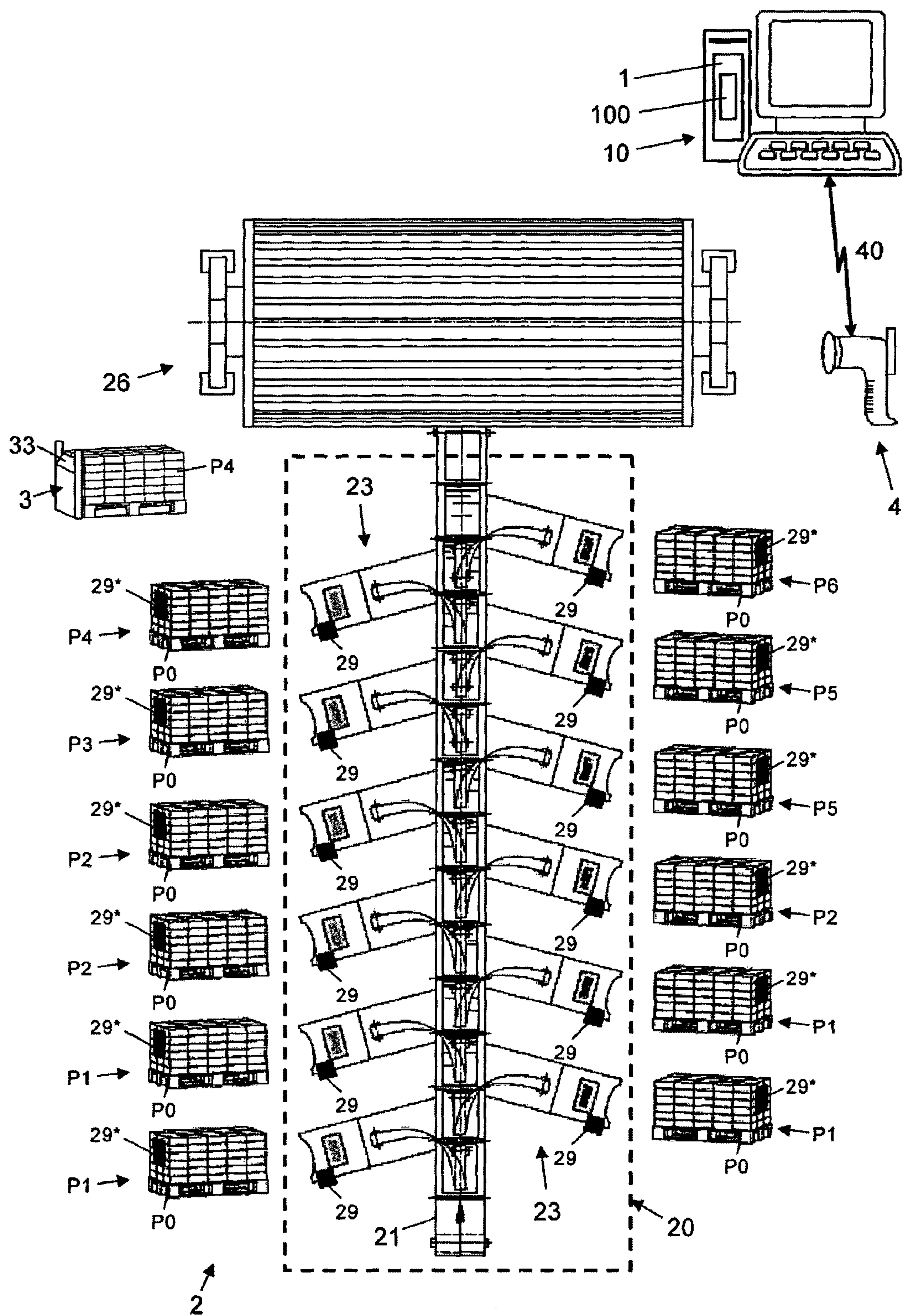


Fig. 6

