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54 Apparatus for sorting articles.

57 An apparatus for sorting articles supplied in boxes (7) includes a box conveyance system consisting of a main conveyor (1, 2, 8, 20, 21, 24) and at least two sub-conveyors (30a, 30b, 30c, 31a, 31b, 31c) branching off from said main conveyor. The main conveyor is provided with devices (28a, 28b, 28c, 29a, 29b, 29c) for controlled transfer of a box after emptying to a sub-conveyor if there is a need for an empty box.

The apparatus further includes an articles conveyance system, e.g. consisting of a conveyor belt (11, 15, 17), said system extending from the first part (8) of the main conveyor and passing across or leading to the sub-conveyors. The articles conveyance system has a weighing section (15, 16) and following this section a sorting section (17) provided with controllable diverting means (18, 19) in the intersecting points of the system and the sub-conveyors, for passing the articles transferred from a box (7a) on to the system (11, 15, 17) into boxes (7b, 7c, 7d) on the sub-conveyors.

The apparatus may for instance be used for sorting hides from slaughtered animals according to quality, weight and species.

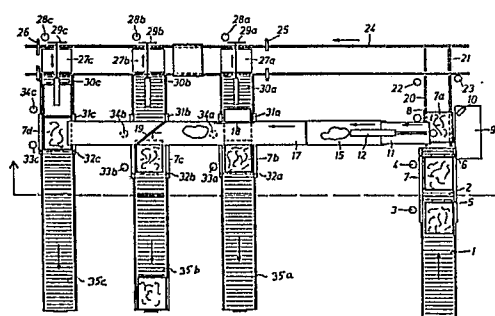


FIG. 1

Description

Apparatus for sorting articles

The invention relates to an apparatus for sorting articles contained in boxes and after sorting fed back into these boxes.

The invention is generally applicable with respect to sorting larger objects contained in boxes, but the invention has particularly been developed with a view to sorting hides and shall therefore be described in the following, particularly in respect of such application.

In cattle slaughterhouses the slaughtered animals are skinned and the hides are put on ice or salted down in order to prolong their durability. The hides are disposed on pallets or in boxes and conveyed to a processing site.

As regards slaughterhouses of a general size, it is most economic to transport the hides to a specialized enterprise capable of receiving and processing hides from a plurality of slaughterhouses. The processing may be carried out more rational in such an enterprise and a more uniform quality of the processed hides is obtained.

The salted hides are conveyed to the enterprise on vehicles and then sorted in various categories, such as hides from cowcalves, bulls and cows, by weight limits and in prime and second quality. Accounts are settled with the slaughterhouse on the basis of weight, category and quality.

The sorted hides are salted in big piles with a view to effect a proper salting so as to preserve them and give them a uniform condition and appearance. When the hides shall be delivered to a tannery, they are removed from the piles and spread flat out atop each other in stacks, thereby allowing for drainage of superfluous liquid, following which the hides are relieved of loose salt and graded according to international sorting rules. The hides are piled up on disposal pallets each carrying about 1500 kg. The stack is provided with a plastic cover and laced up. It may subsequently be loaded on a car for transportation to the tannery for the further processing of the hides to leather.

A substantial part of the conveying work in such an enterprise is effected by means of fork-lift trucks moving the hides carried in boxes or on pallets to and from various sites of processing. The conveyance and the handling of the individual hides in connection with sorting, stacking and performing other operational steps are effected manually that is an extremely hard work, each hide weighing about 30 kg.

It is the object of the invention to provide an apparatus by which part of the heavy manual work is eliminated, e.g. as mentioned above relative to the sorting of hides, and by means of which it is possible to effect a fully automatic or semi-automatic sorting of articles contained in boxes into various classes.

The apparatus according to the invention is characterized in that it includes a box conveyance system consisting of a main conveyor and at least two sub-conveyors branching off from said main conveyor which is provided with devices for con-

trolled transfer of boxes to the sub-conveyors, and an articles conveyance system extending from an area in the vicinity of the first part of the main conveyor and passing across or leading to the sub-conveyors, said articles conveyance system comprising a weighing section and carrying controllable diverting devices on the section following the weighing section in the intersecting points of the articles conveyance system and the sub-conveyors.

A considerable relief of the manual work relative to weighing and sorting articles is obtained by the apparatus according to the invention. After the articles have been removed from the boxes and transferred to the articles conveyance system, the further processing may be effected automatically by passing the articles on the articles conveyance system across the weighing section, conveying them further on to a sorting section on the system and by means of the controllable diverting devices putting them into boxes in accordance with their classification. At the same time the box conveyance function associated with said processings has been taken over by an automatic conveyance system receiving the filled boxes and ensuring that there are continuously boxes available for each category of the sorted articles.

The apparatus according to the invention may process a very large number of articles the day. This mode of sorting articles thus allows for sorting twice the number of articles normally daily received in the enterprise. This implies a shorter time of the processing compared to the hitherto practised manual sorting.

As regards hides it will then be possible to introduce a day by day payment system so that, due to the quick flow of work, the slaughterhouse may receive a statement of account already the day after the supply of hides.

It will further be possible to neglect the salting of hides which merely serves to prolong the durability relative to the conveyance and pre-processing in the enterprise prior to the salting step proper. As regards shorter conveyance and processing time it will instead do to put the hides on ice that is considerably less expensive and less polluting.

The apparatus according to the invention is extremely compact in relation to its capacity achieved and does not require any storage space in order to operate. It is capable of supplying sorted articles disposed by one category in a respective box to the following processing sites. The boxes may easily be conveyed by a fork-lift truck to a working place in need of another supply, but the boxes may as well be distributed to the processing sites by means of roller paths or the like.

The apparatus according to the invention is particularly appropriate for sorting hides, pig skins and skins arriving in boxes at the sorting site. Due to the above mentioned advantages consisting in relief of work and short transition time in the hides processing enterprise the apparatus is preferably

used for sorting such articles.

The patent literature discloses various automatic sorting systems for specific objects. US patent No. 4 136 778 deals with a system for sorting laundry articles provided with an identifying tag. The laundry articles are disposed individually on a conveyor belt and conveyed past a detector reading out the tag of the individual pieces. The laundry articles fall down on to a second conveyor belt along which containers are positioned, each having a diverting means. It may be moved automatically into the path of a piece of laundry advanced on the belt so that the article is deflected into a bin in response to the detection of the tag.

EP publication No. 60 013 discloses an apparatus for sorting fruit by weight. The apparatus includes an endless conveyor of interlinked pans tiltable on an axis parallel to the direction of conveyance. A piece of fruit is put into each pan, following which the filled pans pass in sequence across a weighing section. The weight of the individual pieces of fruit is recorded in a computer. The pans are subsequently advanced past a plurality of compartments placed along the endless conveyor, and when a fruit containing pan moves past an associated compartment the computer generates a signal to the mechanism initiating the pan to tilt, thereby causing the fruit to fall down into the compartment.

Said references illustrate apparatuses for automatically sorting objects, but they do not explain how the articles are fed to or from the sorting apparatus or how the apparatus is provided with containers and the like for the sorted articles.

The apparatus according to the present invention makes allowance for either of said working processes and conveyors are provided for the boxes in order to shorten the transition time and facilitate the work of the staff.

The apparatus according to the invention may be used for sorting articles arriving in boxes at the enterprise and which articles after sorting are conveyed further in the same boxes. An operator may stand at the main conveyor with a view to pick up the articles from a box on the conveyor and deposit them on the articles conveyance system. After the operator has informed of the category of the articles to a central unit, the remainder of the working steps may be carried out automatically in the apparatus.

Various embodiments of the apparatus according to the invention are stated below with an explanation referring to said semi-automatic apparatus.

In an embodiment of the apparatus according to the invention the main conveyor includes independently operated sections.

The individual processing steps to be carried out on the main conveyor may thus be made mutually independent, thereby obtaining a shorter transition time for the boxes and more time for picking up the articles from the boxes. An empty box may further be delivered to any of the sub-conveyors without influencing the preceding processing steps, in that the sections may be started and stopped mutually independently. Moreover, the wear is minimized and complex mechanical devices that might be a

consequence of a continuous operation of a main conveyor are avoided.

It is particularly important that a box may be brought to stop opposite the receiving end of the articles conveyance system without imparting arresting to the remaining boxes to be conveyed. Advantageously, a section is provided in this place which may be operated irrespective of other sections of the main conveyor.

On the first part of the main conveyor the apparatus according to the invention may have a slightly downwards sloping section on which the boxes may move freely. When boxes containing unsorted articles are deposited on such a section they will slide downwards by gravity towards the operator's working place until they are stopped by arresting devices and/or an arrested, operated section of the main conveyor. In this manner a minor storage of boxes containing unsorted articles may accumulate in front of the operator. By releasing the arresting devices and/or starting the arrested, operated section a new box may be advanced to the operator.

In the apparatus according to the invention each sub-conveyor may include at least one operated section. In this manner an empty box may be passed on to a collecting field beneath the articles conveyance system for the articles discharged therefrom and then be brought to a standstill by stopping the section. After the box has been filled, the motor of the operated section may be started again for removing the filled box and supplying an empty one.

The first part and/or the last part of each sub-conveyor may have a slightly downwards sloping section on which the boxes may move freely. In this manner it is possible to provide a small storage of boxes in front of the station of collecting the articles, and at the end of the sub-conveyor, respectively, where filled boxes are for instance removed by means of a fork-lift truck. Said sections may function in the same manner as the above described section of the main conveyor on which section the boxes may move freely.

Another embodiment of the apparatus according to the invention is characterized in that photo-detectors or other detectors for recording the presence of a box on a section are arranged at one or more of the driven sections, and in that arresting devices actuatable by the detectors and capable of retaining or releasing a box on the section are arranged at the same section.

According to this embodiment it is not alone possible to detect the presence of a box on a section and its passing past a specific point, but it is also possible to stop a box in a specific position by means of the arresting device, and wear on boxes and conveyors may be eliminated by stopping the operated section as soon as the box occupies its position.

The structure of the main and the sub-conveyors may include a combination of mutually independently operated sections, inoperated sections, detectors and arresting devices, thereby obtaining not only mutually independent working operations, controlled transfers between the sections and buffer

capacity before the working operations but also a well defined positioning of the boxes, e.g. at the discharge and at the filling sites.

In the apparatus according to the invention a controlled transfer of empty boxes is effected from the main conveyor to the sub-conveyors so that there always are new boxes available for the sorted articles, irrespective of the amount of the various classes in which the articles are delivered to the enterprise.

Still another embodiment is characterized in that one or more detectors are disposed on each sub-conveyor for recording the presence of empty boxes and/or boxes whilst being filled, and in that a mechanism for transferring an empty box to a sub-conveyor is provided on each of the transitions between the main conveyor and a sub-conveyor, said mechanism being controlled by the signal generated by the detectors of the same sub-conveyor.

A further embodiment of the apparatus according to the invention is characterized in that the sub-conveyors extend substantially perpendicularly from the main conveyor, and in that a carrier device adapted to pull a box from the main conveyor on to the sub-conveyor is positioned at each of the transitions between the main conveyor and a sub-conveyor. This design allows for depositing the sub-conveyors close to each other, thereby shortening the conveyance path of the empty boxes and the individual articles.

The main conveyor may be provided with detectors for boxes, where the sub-conveyors extend from the main conveyor. The boxes may in this manner be diverted to a sub-conveyor when detected, but it may as well pass a sub-conveyor and continue to a subsequent sub-conveyor if there is no need for the box at the first sub-conveyor.

The boxes may be diverted to a sub-conveyor in various ways. An embodiment consists in that lifting devices for lifting the boxes clear of the main conveyor are located at each of the points at which the sub-conveyor extends from the main conveyor, said lifting devices allowing the box to slide or roll on to a sub-conveyor. Preferably said lifting devices cooperate with the above described carrier devices and detectors. By the use of such lifting devices the boxes may be transferred to the sub-conveyors without rotating more or less arbitrarily and a uniform transfer will paticularly be obtained wen using the above carrier system.

By using the lifting devices it is not necessary to arrest the main conveyor when a box is to be transferred to a sub-conveyor, but even though it is preferred to arrest the main conveyor, the arresting will only be very short until the lifting device has lifted the box clear of the conveyor.

Yet another embodiment is characterized in that the main conveyor is L-shaped and that the conveyance system for the articles to be sorted extends from an area in the vicinity of the first part while the sub-conveyors extend from the second part.

This latter embodiment provides for obtaining an extremely compact apparatus, in particular if the

conveyor, as described above, extends substantially perpendicularly from the main conveyor. The conveyance system for the articles will then extend in parallel with the second part of the L. According to this embodiment the boxes will further be turned 90° in relation to the direction of advancement of the main conveyor, where the branches collide. In many structures a further 90° turning of the box will occur during the transfer of the sub-conveyor, meaning that the boxes are rotated 180° from the moment that they have been supplied to the main conveyor and till they have been discharged from the sub-conveyors, so that the boxes in this embodiment may be removed for instance by a fork-lift truck from a sub-conveyor just like they had been supplied to the main conveyor.

In order to facilitate the operator's work as to the transferring of articles from a box to the articles conveyance system catching and lifting devices may be provided at the start of the system. The transfer may as well be effected without the assistance of an operator, in particular in case of more uniform and handy articles than e.g. hides. The operator may be replaced by a manipulator having a video camera and a pattern recognition program or he may be replaced by other devices known per se, capable of removing the articles from the box and depositing them in sequence on the conveyance system.

The articles conveyance system consists preferably in a conveyor belt which may include e.g. a first section on to which the articles are transferred, a weighing section and a final sorting section with the diverting devices.

An embodiment applicable e.g. for hides consists in that a catching and lifting device is provided above the first section of the conveyor belt, said catching device having an automatic jaw adapted to lock about part of a article thrust into the jaw and including mechanical means for moving the article caught by the jaw on to the first section of the belt.

Thus, when sorting hides the operator only has to lift a corner of the hide and thrust it into the jaw, following which the apparatus takes care of the remaining work, i.e. lifting the heavy hide on to the conveyor belt.

The sorting of the articles by various classes may be oarried out according to various criterions. The apparatus according to the invention may in this respect be more or less automatized. Some of the criterions essential to the sorting may be stored in other computers connected to the calculator unit of the apparatus of the invention.

Other parameters may be available such as codes read out by special apparatuses and/or by an operator. It could for example be codes on an automtically readable bar code label or simply a number to be keyed manually by an operator on the calculator unit.

Furthermore, some parameters may be determined in the apparatus according to the invention. It could for instance be the weight of the individual articles, their colour, size or other quality properties to be used in the sorting of the objects.

The size of an article and possible defects of the article may for instance be defined automatically by

means of a video camera with a picture processing program. The same parameters may also be determined visually by an operator who may key the result on a keyboard in communication with a calculator unit controlling the sorting. An operator may also read the actual category. When sorting hides he is for instance able to see whether a hide originates from a cow, a cowcalf or a bull and then transfer the result to the calculator unit.

On the basis of one or more of said criterions the unit determines the class to which the individual articles belong, and before the article shall be advanced past the box containing articles of this class, the unit actuates the corresponding diverting device so that the article conveyed on the belt strikes the device and is deflected sidewise over the edge of the belt, following which it drops down into the box determined for articles of that class.

Still another embodiment of the apparatus according to the invention is particularly fitted for articles that are difficult to classify automatically, such as hides. It consists in that the apparatus includes a keyboard for manually keying the data of an article which is being transferred to or has been transferred to the first section of the conveyor belt, and a calculator unit connected to the keyboard and the weighing unit of the weighing section and intended to control the diverting devices sidewise over and away from the conveyor belt in dependence on the calculations made by the unit.

The box conveyance system is preferably controlled on the basis of the available or obtained data of the articles to be sorted. The obtained data of weight may for instance be used to control the filling degree of the boxes, a box being removed from the collecting site on the sub-conveyor as soon as the total weight of articles supplied to the box by the belt exceeds a threshold value. If desired, it will also be possible to fill the boxes with a predetermined number of articles.

A further embodiment of the apparatus according to the invention is thus characterized in that the calculator unit is arranged to generate a release signal to the arresting device and/or motor of the sub-conveyors in a section of the sub-conveyor subjacent of the conveyor belt, in dependence on the data received from the weighing unit of the weighing section.

The apparatus according to the invention will now be described in more detail by way of examples with reference to the accompanying drawings, in which

Fig. 1 illustrates the apparatus, viewed from the top, for sorting hides delivered by the slaughterhouse in boxes,

Fig. 2 is a cross-section of the apparatus in side elevation, along the line A-A in Fig. 1, and

Fig. 3 is a second embodiment of the apparatus according to the invention, viewed from the top.

The apparatus in Fig. 1 includes a slightly sloping roller path 1 provided with freely rotatable rollers and on which a fork-lift truck may dispose the boxes with hides received from the slaughterhouse. A driven roller path 2 provided along its sides with two photo detectors 3 and 4 to record the presence and

position of boxes on the path 2 is disposed in alignment of path 1. Said detectors, and the detectors recited in the following, supply information about the state of the system to a PLC-control unit. Along the sides of roller path 2 there are, moreover, provided two arresting devices 5 and 6 in the form of pivotal arms which by means of a pneumatic drive cylinder can enter the path and retain a box 7 thereon. The box is of the type whose bottom is shaped as a pallet with apertures for the fork of a fork-lift truck. The arresting devices may engage said apertures and retain the box.

The activation and deactivation of the arresting device is controlled by the PLC-unit in dependence on the signals generated by the detectors and the time control. The motor of roller path 2 and other devices for operating sections of conveyors described in the following are likewise controlled by the PLC-unit in accordance with a predetermined program.

A driven chain conveyor 8 is located in extension of roller path 2. On one side of the conveyor there is provided a platform 9 for the operator and a terminal 10 on which the operator may key the category of the hides he picks up one by one from box 7a located in front of him on chain conveyor 8.

An inclined, continuously working conveyor belt 11 with transversely positioned carrier ribs (Fig. 2) is provided on the other side of conveyor 8. A device for hauling up the hides from the box is located above the belt. The device includes a drive cylinder 12 with a piston rod the free end of which carries an automatic jaw. When the operator inserts a corner of a hide into the jaw, the jaw closes automatically and the drive cylinder is activated, thereby picking up the hide from box 7a and depositing it on belt 11. In the top position the jaw opens automatically, thereby causing the hide to fall down on the conveyor belt. Then, the jaw is returned to its starting position where the jaw is again within operator's reach.

In this manner the hides may one by one be transferred to a conveyor belt 15 disposed beneath belt 11. Conveyor belt 15 is suspended in a weighing arrangement 16 measuring the weight of the hides in unison with their being passed in sequence along the belt. The measured weight is transferred to a calculator unit together with the information keyed by the operator about category and hide supplier.

The calculator refers automatically each hide to a class defined in the unit in the form of weight intervals and high category. In extension of belt 15 a continuously moving sorter belt 17 is positioned, along which two diverting plates 18, 19 are disposed that may be pushed in over belt 17 by a small cylinder and thus lead the hides conveyed on the belt to drop sidewise over the edge and fall down into the boxes 7b, 7c located beneath the belt. At the end of the belt a box 7d is likewise located into which hides not diverted by plates 18 and 19 are supplied by the belt.

By activating plates 18, 19 or by deactivating both plates in accordance with the classification the hides are guided automatically down into the individual boxes. In the illustrated apparatus cowhides may for instance be led to one box, while hides from bull and cowcalf are passed to two other boxes, dependent

on the button key by the operator on the keyboard whilst the hide is being suspended.

In extension of chain conveyor 8 there are provided two supplementary chain conveyors 20, 21 capable of removing box 7a after the operator has removed the hides therefrom and given a signal to that effect. Two photo-detectors 22, 23 are connected to the PLC-unit arranged to control the motor of conveyors 20, 21. Dectector 22 records that a box has been put on conveyor 20. Dectector 23 records that a box is received on conveyor 21. If this is not the case, a box from conveyor 20 passes further on to conveyor 21. If not, the motor is stopped at 20 until 21 is idle.

A lifting/lowering arrangement operable by a drive cylinder is located beneath conveyor 21. By means of this arrangement it is possible to lower conveyor 21 so that a box carried thereon will instead be supported by a transverse chain conveyor 24 adapted to send on the box.

Two arresting devices 25 for advanced boxes are provided along the sides of conveyor 24. The devices are designed in the same manner as devices 5, 6.

Three sliding plates 27a, 27b, 27c which may be lifted and lowered by means of a drive cylinder arrangement are disposed between the two chains of the conveyor. A photo-detector 28a, 28b, 28c which by means of the PLC-unit can stop conveyor 24, when the front edge of a box enters the detecting field, is positioned opposite each plate. After the belt has stopped the corresponding sliding plate 27a, 27b, 27c is raised to its upper position in which the box gets clear of the chains.

A carrier device consisting of a drive cylinder and a carrier plate 29a, 29b, 29c secured to the piston rod of the drive cylinder is located opposite each of plates 27a, 27b, 27c. Upon activation of the drive cylinder a box lifted clear of the chains may be pulled on to a roller path 30a, 30b, 30c perpendicular to conveyor 24 opposite slide plates 27a, 27b, 27c. The roller paths have freely rotatable rollers and are slightly sloping down towards three roller paths 31a, 31b, 31c provided with driven rollers. Three arresting devices 32a, 32b, 32c of a similar structure as devices 5, 6 can stop advanced boxes in a correct position on the roller path, thereby allowing the hides diverted from belt 17 to fall down into their respective boxes.

Photo-detectors 33a, 33b, 33c record the presence of boxes and may over the PLC-unit stop or start the motors for the driven roller paths 31a, 31b, 31c. Three other photo-detectors 34a, 34b, 34c record if there is an empty spare box ready for being advanced to receive hides from belt 17. Said detectors control through the PLC-unit whether there are boxes to be advanced past stop 25 and, in the affirmative, it decides which sliding plate and carrier device are to be activated.

The calculator unit records how many kilos of hides are dropped into each box, and when a predetermined weight limit has been exceeded the unit generates a signal to the PLC-unit, thereby releasing the arresting device 32a, 32b, 32c corresponding to the actual box, and starting the motor

associated with roller path 31a, 31b, 31c. The box is then transferred to a slightly sloping roller path 35a, 35b, 35c with freely rotatable rollers. The box rolls by gravity downwards to abut on a fix stop located at the end of the roller path where it is picked up by a fork-lift truck or the like for the further processing of the sorted hides in the factory.

By means of the driven roller path an empty box is transferred to the place of the removed box and is positioned correctly to receive hides by abutting on the arresting device which is closed as soon as the filled box has passed.

The apparatus supplies itself with boxes for carrying away the sorted hides, the weight limit for filled boxes being preferably adjusted so that the apparatus reuses all supplied boxes containing unsorted hides.

If it is required to supplement with empty boxes, such boxes may be placed at the first part of conveyor 24. Possible excess boxes may be removed at the remote end of conveyor 24 after the arresting device 26 has been opened.

The embodiment illustrated in Fig. 3 is designed in a similar manner as the apparatus shown in Figs 1 and 2, but it allows for sorting hides into six different classes in dependence of weight, category and/or other criterions.

The apparatus has two lines for the supply, classification and sorting of hides. Conveyor belt 40a, 40b is controlled so that diversion from both belts to the same box cannot be effected concurrently.

The further processing of the hides sorted in the apparatuses according to Figs 1 to 3 may be carried out in immediate connectdion with the apparatus or in other places in the enterprise receiving boxes containing sorted hides.

The hides are preferably examined for cutting damages, then salted and stacked into smooth layers on pallets on the same day. This may be effected in that the hides are picked up one by one from the boxes by means of a jaw arrangement and subjected to an estimate by an operator taking notes of cutting damages and other processing defects of the hide. Reports about defects may be forwarded to the hides supplier so that the work in the slaughter-house may rapidly be adjusted in case an unusually high number of defects occurs.

After the estimate the high is spread smoothly out on a pallet and salted by means of a machine dispersing a uniform layer of salt across the hide. The hides are placed on the pallet one by one and salted until attaining a pile of hides. The further processing may be effected in a known manner as described in the preamble.

It will be of course be understood that the present invention has been described above purely by way of example, and modifications of detail can be made within the scope of the invention.

Claims

1. An apparatus for sorting articles accommodated in boxes and which after the sorting

are fed back into these boxes, characterized in that it includes a box conveyance system consisting of a main conveyor (1, 2, 8, 20, 21, 24) and at least two sub-conveyors (30a, 30b, 30c, 31a, 31b, 31c) branching off from said main conveyor which is provided with devices (25, 27a, 27b, 27c, 28a, 28b, 28c, 29a, 29b, 29c) for controlled transfer of boxes to the sub-conveyors, and an articles conveyance system (11, 15, 17) extending from an area the vicinity of the first part (8) of the main conveyor and passing across or leading to the sub-conveyors, said articles conveyance system comprising a weighing section (15) and carrying controllable diverting devices (18, 19) on the section following the weighing section in the intersecting points of the articles conveyance system and the sub-conveyors.

2. An apparatus as claimed in claim 1, characterized in that the main conveyor includes mutually independently operated sections (2, 8, 20, 21, 24).

3. An apparatus as claimed in claims 1 and 2, characterized in that the first part of the main conveyor has a slightly downwards sloping section (1) on which the boxes may move freely.

4. An apparatus as claimed in claims 1 to 3, characterized in that each sub-conveyor has at least one driven section (31a, 31b, 31c).

5. An apparatus as claimed in claims 1 to 4, characterized in that the first part of and/or the last part of each sub-conveyor has/have a slightly downwards sloping section (30a, 30b, 30c and/or 35a, 35b, 35c) on which the boxes may move freely.

6. An apparatus as claimed in claims 2 to 4, characterized in that photo-detectors (3, 4, 33a, 33b, 33c) or other detectors for recording the presence of a box on a section are arranged at one or more of the driven sections (2, 31a, 31b, 31c), and in that arresting devices (5, 6, 32a, 32b, 32c) actuable by the detectors and capable of retaining or releasing a box on the section are provided at the same section.

7. An apparatus as claimed in claims 1 to 6, characterized in that one or more detectors (33a, 33b, 33c, 34a, 34b, 34c) are disposed on each sub-conveyor for recording the presence of empty boxes and/or boxes whilst being filled, and in that a mechanism (27a, 27b, 27c, 29a, 29b, 29c) for transferring an empty box to a sub-conveyor is provided on each of the transitions between the main conveyor and a sub-conveyor, said mechanism being controlled by the signal generated by the detectors of the same sub-conveyor.

8. An apparatus as claimed in claims 1 to 8, characterized in that the sub-conveyors extend substantially perpendicularly from the main conveyor, and in that a carrier device (29a, 29b, 29c) adapted to pull a box from the main conveyor on to the sub-conveyor is positioned at each of the transitions between the main conveyor and a sub-conveyor.

9. An apparatus as claimed in claims 1 to 8,

characterized by detectors (28a, 28b, 28c) for boxes on the main conveyor, where the sub-conveyors extend from the main conveyor.

10. An apparatus as claimed in claims 1 to 9, characterized in that lifting devices (27a, 27b, 27c) for lifting the boxes clear of the main conveyor are located at each of the points at which the sub-conveyors extend from the main conveyor, said lifting devices cooperating preferably with the carrier devices (29a, 29b, 29c) and the detectors (33a, 33b, 33c, 34a, 34b, 34c) as defined in claims 7 and 8.

11. An apparatus as claimed in claims 1 to 10, characterized in that the main conveyor is L-shaped and that the conveyance system for the articles to be sorted extends from an area in the vicinity of the first part while the sub-conveyors extend from the second part.

12. An apparatus as claimed in claims 1 to 11, characterized in that the articles conveyance system consists in a conveyor belt (11, 15, 17) and preferably includes a first section (11), onto which the articles are transferred, a weighing section (15) and a final sorting section (17) with the diverting devices.

13. An apparatus as claimed in claim 12, characterized in that a catching and lifting device (12) is provided above the first section (11) of the articles conveyor belt, said catching device having an automatic jaw for locking about part of an article thrust into the jaw and including mechanical means for moving the article gripped by the jaw on to the first section of the conveyor belt.

14. An apparatus as claimed in claim 12 or 13, characterized in that it includes a keyboard (10) for manually keying the data of an article which is being transferred to or has been transferred to the first section of the conveyor belt (11), and a calculator unit connected to the keyboard and the weighing unit (16) of the weighing section and intended to control the diverting devices (18, 19) across and away from the conveyor belt in dependence on the calculations performed by the unit.

15. An apparatus as claimed in claim 14, characterized in that the calculator unit is arranged to generate a release signal to the arresting device (32a, 32b, 32c) and/or motors of the sub-conveyors in a section (31a, 31b, 31c) of the sub-conveyors subjacent of the conveyor belt, in dependence on the data received from the weighing unit (16) of the weighing section.

16. An apparatus as claimed in claims 1 to 15, characterized in that it is intended for the sorting of hides.

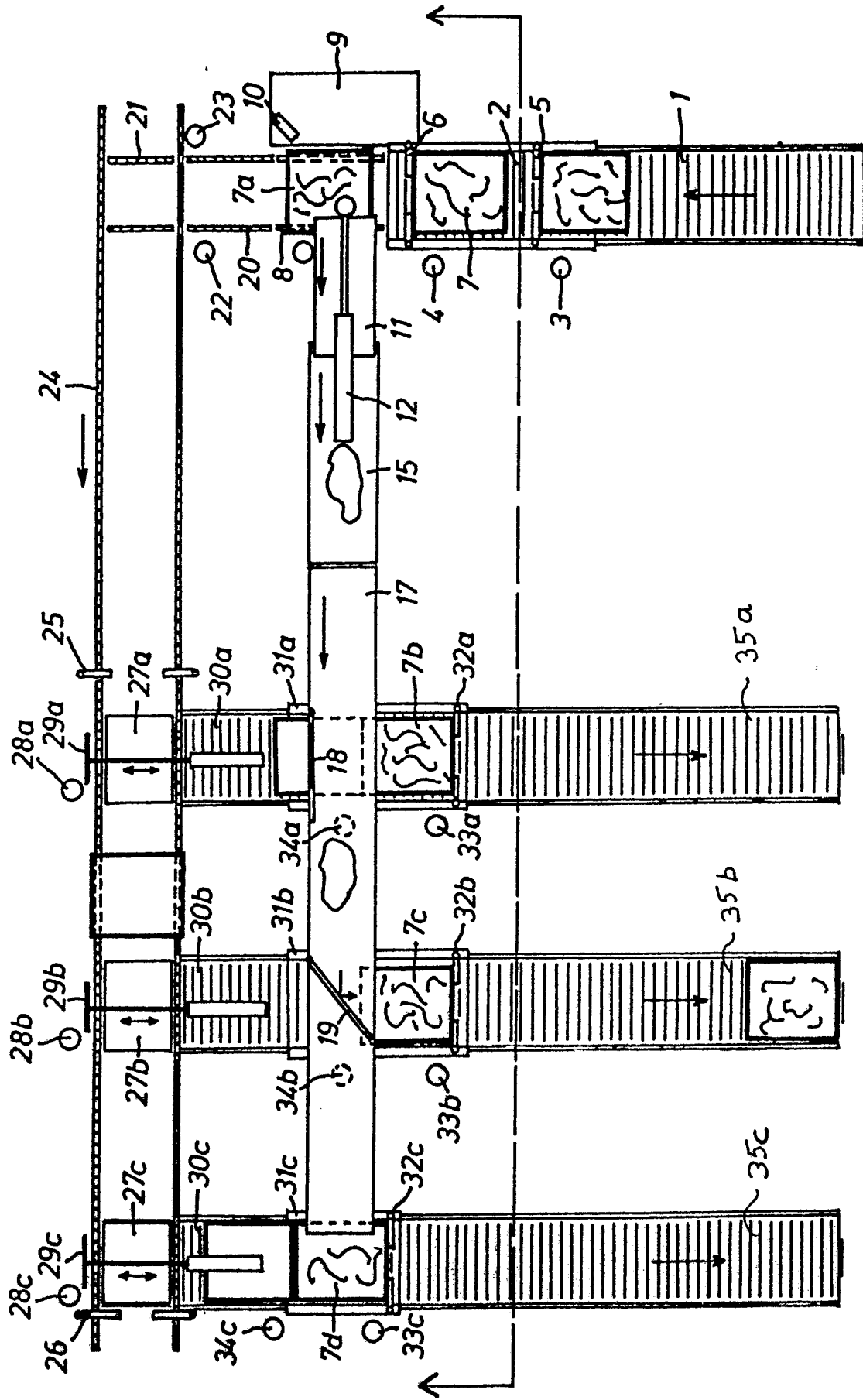


FIG. 1

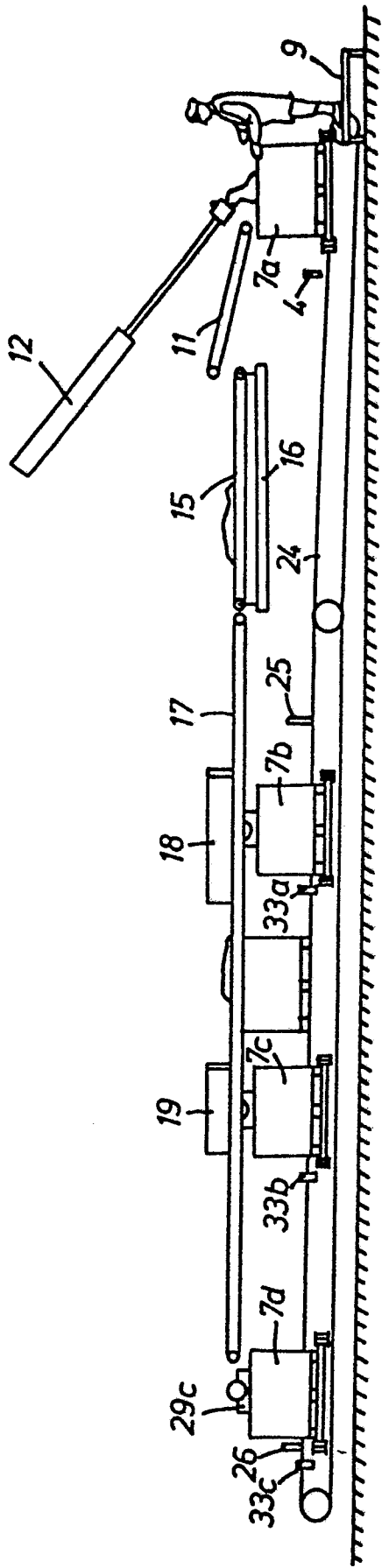


FIG. 2

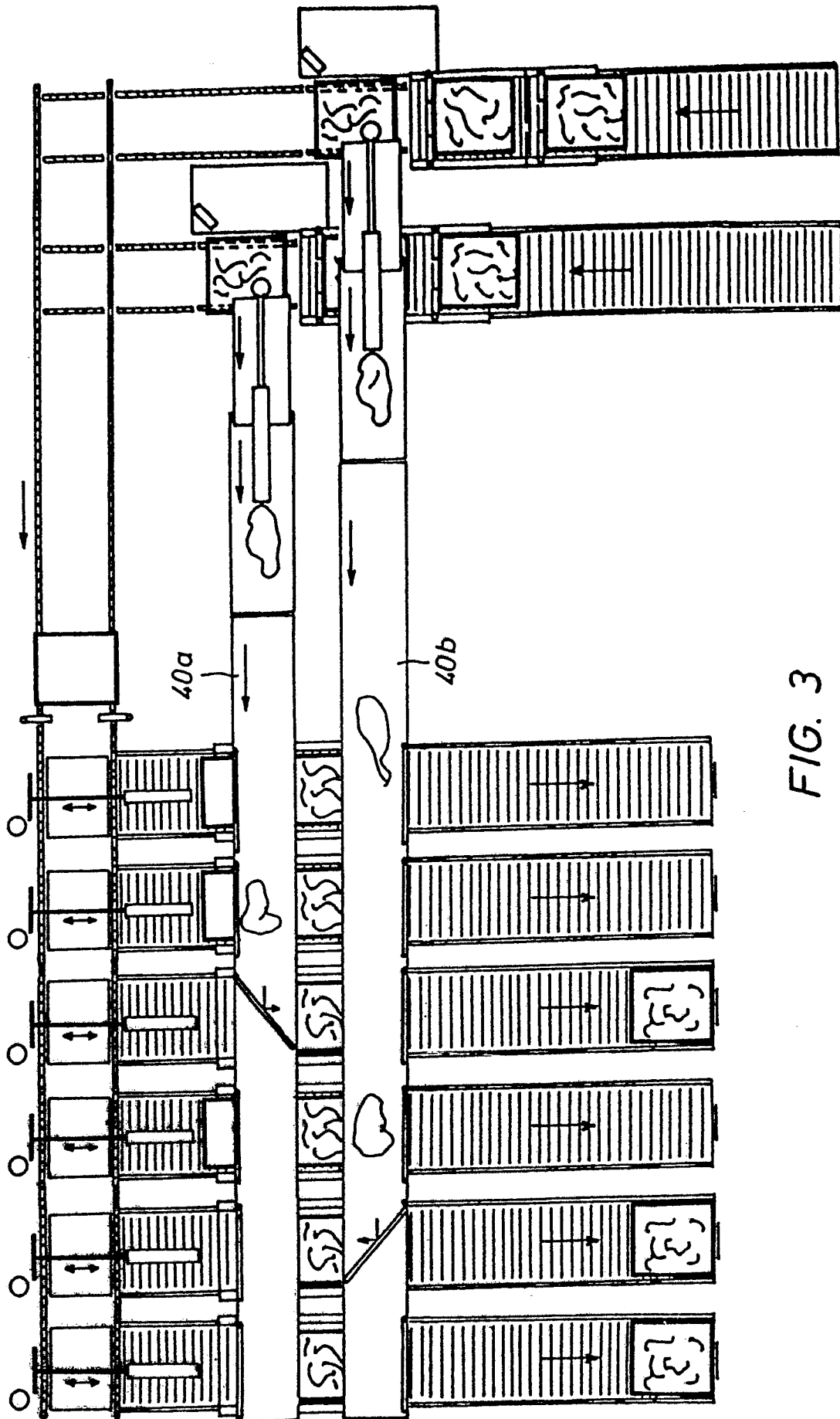


FIG. 3