Abstract: Diverting device (1) for a conveyor system, comprising a housing (2), a diverter wheel (7) rotatably supported in the housing in a bearing means, a diverter arm (10), and a toothed wheel (8) connected to the diverter wheel (7), where the toothed wheel (8) is adapted to be driven by a conveyor chain in a conveyor track. The advantage of the invention is that an object can be moved from one conveyor track to another conveyor track in an easy and cost-effective way. A method for diverting objects which are conveyed along a conveying track is also disclosed.
Diverting device for a conveyor system and a method for diverting objects which are conveyed along a conveying track.

TECHNICAL FIELD

The present invention relates to a diverting device for a conveyor system.

BACKGROUND ART

Conveying devices, such as those which are used for moving objects between different stations in a factory, usually comprise a conveying track in the form of a belt or a chain. The conveying tracks can be recessed in a trench with vertical side surfaces. Alternatively, they can be located on the horizontal upper surfaces of the trench or arranged in some other way. The objects to be conveyed are arranged slidably in relation to the conveying tracks, either directly or via bearing means, which are also known as pallets.

A pallet is conveyed along the conveying device, which comprises different work stations. In some cases, every work station will perform one operation on the transported object. In those cases, the work flow is designed such that every pallet will stop at every work station. In other cases, for example when different products or different versions of the same product are produced in the same product flow, all pallets do not have to stop at all the work stations.

If the conveying device is of a conventional type, in which all work stations are positioned after each other and the operations on the objects are performed synchronous, every pallet will stop at each work station. If no operation is to be performed on an object at a specific work station, the object will have to wait at that work station until the operation on the previous object at that work station is ready, until the object can continue. All pallets are in this case released at the same time and moves at the
same time. One advantage of such a system is that it is easy to predict the performance of the system. One disadvantage of such a system is that it is not very flexible. If the operation time at a work station is long, all objects will have to wait that time, even if there is no operation performed on all objects. Thus, such systems are mostly used for a single product or when the differences in the products are small.

In other systems, the operations on the objects are performed asynchronous, i.e. the pallet stops at a work station where an operation is to be performed, and is released when the operation is ready. In such systems, a relatively large buffer is required between each work station in order to compensate for the different through-flow times of the products and for the different operation times at a work station.

Another way of compensating for different operation times at a work station is to use two or more work stations that perform the same task. They are often positioned close to each other, and the object is stopped at the work station that is free. In this way, the through-flow time of the system can be balanced in order to avoid bottlenecks in the system.

Normally, the operator setting up the system will try to coordinate the work so that every pallet spends the same length of time at each work station. Sometimes, it is difficult to coordinate the operation time at each work station. One solution, apart from using a buffer, is to locate some work stations along different sub-conveyors located on the side of the main conveyor. Such a solution will require extra space and extra parts, such as a drive motor and means to divert objects to the sub-conveyor. This solution will work in some cases, but in other cases, especially when the product flow is altered after production has started, it may not be possible to rebuild the conveying system with such a solution. There is thus room for improvements.
DISCLOSURE OF INVENTION

An object of the invention is therefore to provide a diverting device for a conveyor system.

A further object of the invention is to provide a conveyor system comprising a diverter device. Another object of the invention is to provide a method for diverting objects which are conveyed along a conveying track from one conveyor track to another conveyor track.

The solution to the problem according to the invention is described in the characterizing part of claim 1. Claim 9 contain an advantageous conveyor system and claim 11 contain an advantageous method for diverting objects. The other claims contain advantageous embodiments and further developments of the diverter device.

In a diverting device for a conveying system, comprising a housing, a diverter wheel rotatable supported in the housing in a bearing means, a diverter arm, and a toothed wheel connected to the diverter wheel, the object of the invention is achieved in that the toothed wheel is adapted to be driven by a conveyor chain in a conveying track.

By this first embodiment of the diverter device according to the invention, a passive diverter device that is driven by the conveyor system is provided. This is advantageous in that the diverter device can be mounted to a new or to an existing conveyor system without the need of using a dedicated drive means for the diverter device.

In an advantageous development of the invention, the toothed wheel of the diverter device is adapted to be driven by a receiving conveyor track. The advantage of this is that the objects will be pulled from the feeding conveyor track instead of being pushed into the receiving conveyor track.

In another advantageous development of the invention, the diverter arm of the diverter device is provided with a first position in which the outer side
of the diverter arm is lined up with a guide rail of the conveyor track, and a second position in which the diverter arm extends into a conveyor track. The advantage of this is that the objects to be diverted can be moved into the diverter device in an easy way. Advantageously, the diverter arm extends into a feeding conveyor track in the second position.

In an advantageous further development of the invention, the toothed wheel of the diverter device is directly connected to the diverter wheel. This allows for an easy and robust drive of the diverter wheel.

In an advantageous further development of the invention, the toothed wheel of the diverter device is connected to the diverter wheel with a gear mechanism having a gear ratio differing from 1. This is advantageous in that the speed of the diverter wheel can be selected depending e.g. on the size of the diverter wheel.

In an advantageous further development of the invention, the housing of the diverter device is adapted to be mounted between a feeding conveyor track and a receiving conveyor track in an existing conveyor system. This is advantageous in that a diverter device can be retrofitted to a conveyor system in an easy way.

In a conveyor system, comprising a feeding conveyor track, a receiving conveyor track and an inventive diverter device, the object of the invention is achieved in that the toothed wheel is driven by a conveyor chain of one of the conveyor tracks. In this way, a conveyor system is achieved in which an object can be moved from one conveyor track to another conveyor track in an easy way. In this way, a flexible conveyor system in which an object does not have to pass all work stations is provided.

With a method for diverting objects which are conveyed along a conveying track comprising a conveyor chain and guide rails, said objects being conveyed on pallets, comprising the steps of; detecting if a pallet is to be diverted using a sensor, sending a signal to a diverter arm in order to
move the diverter arm into the conveyor track if the pallet is to be diverted, the object of the invention is achieved in that a pallet is moved from the feeding conveyor track to the receiving conveyor track using a diverter wheel driven by a conveyor chain of a conveyor track. This is advantageous in that an object can be moved from one conveyor track to another conveyor track with a diverter device that do not require an own driving means.

BRIEF DESCRIPTION OF DRAWINGS

The invention will be described in greater detail in the following, with reference to the embodiments that are shown in the attached drawings, in which

Fig. 1 shows a first embodiment of a diverting device according to the invention, and

Fig. 2 shows the diverting device according to the invention in a split view.

MODES FOR CARRYING OUT THE INVENTION

The embodiments of the invention with further developments described in the following are to be regarded only as examples and are in no way to limit the scope of the protection provided by the patent claims.

Fig. 1 shows a first embodiment of a diverting device for a conveyor system according to the invention, and Fig. 2 shows the diverter device in a split view. The diverting device 1 comprises a housing 2 that is attached to the conveyor tracks of both sides of the conveyor system, i.e. to the feeding conveyor track 3 and to the receiving conveyor track 4. The feeding conveyor track 3 comprises a feeding conveyor chain 16 and the receiving conveyor track 4 comprises a receiving conveyor chain 17. The conveyor tracks further comprises guide rails 6 to guide the pallets. The conveyor system is adapted to convey pallets 5 in a known manner. A
conveyor track of this type is well-known to the skilled person and is not described further.

The housing 2 of the diverting device comprises a diverter wheel 7. The diverter wheel 7 is in this embodiment positioned somewhat unsymmetrical in the housing, closer to the receiving conveyor track 4 than to the feeding conveyor track 3. The diverter wheel is supported in the housing in a rotatable way, e.g. with roller bearings of some kind. The diverter wheel 7 is further provided with a toothed wheel 8. The toothed wheel may resemble a drive wheel of the conveyor track and is adapted to interact with the receiving conveyor track 4. In this way, the teeth of the wheel grip into the receiving conveyor chain 17 which will cause the toothed wheel and thus the diverter wheel to rotate when the conveyor chain moves along the receiving conveyor track. The diverter wheel 5 will thus be driven by the receiving conveyor chain 17 of the receiving conveyor track 4.

In one embodiment, the toothed wheel may be fixedly attached to the diverter wheel, so that the have the same rotational axis. They will then be supported by the same bearing means. By positioning the diverter wheel and the toothed wheel somewhat unsymmetrical, the toothed wheel can interact with the receiving conveyor chain 17 of the receiving conveyor track 4 without interfering with the feeding conveyor chain 16 of the feeding conveyor track 3. This simplifies the design of the diverter device.

In another embodiment, the toothed wheel may also be suspended individually in a separate bearing means in the housing. In this case, the diverter wheel and the toothed wheel are connected through a gear mechanism of some kind. The gear mechanism may comprise e.g. gear wheels or drive belts. The gear mechanism may have a gear ratio differing from 1 to 1, in order to optimise the rotational speed of the diverter wheel. The speed of the diverter wheel may be set depending on the size of the diverter wheel and/or the surface of the diverter wheel.
The diverter wheel is provided with a flat upper surface 9. The friction of the surface is preferably such that the slide plate of the pallet can glide easily on the surface but still be transported from the feeding conveyor track to the receiving conveyor track by the diverter wheel. Since the pallet will make a 180° turn from the feeding conveyor track to the receiving conveyor track, and the diameter of the diverter wheel is smaller than the distance between the conveyor tracks, the pallet will glide on part of the diverter wheel and be transported by part of the diverter wheel.

The diverter device is provided with a diverter arm 10. The diverter arm has a first position, in which the outer side 11 of the diverter arm is lined up with the inner guide rail of the feeding conveyor track. In this position, the pallets can pass the diverting device and the conveyor system functions as if the diverter device was not present. In the second position of the diverter arm, the diverter arm extends into the feeding conveyor track. The inner side 12 of the diverter arm is formed with a curvature so that the pallet, when it reaches the diverter arm, is gently introduced into the diverter device. When the pallet is in the diverter device and the slide plate of the pallet leaves the conveyor chain of the feeding conveyor track, the diverter wheel takes over the transportation of the pallet and moves the pallet to the receiving conveyor track, where the pallet is in turn driven by the conveyor chain of the receiving conveyor track. The diverter arm is powered in a suitable way, e.g. by pressurised air or electricity. Preferably, if the conveyor system comprises compressed air, the diverter arm is powered by compressed air.

The diverter device comprises an inner guide rail 13 with a radius that is adapted to the distance between the inner guide rails of the feeding conveyor track 3 and the receiving conveyor track 4. The diverter device further comprises an outer guide rail 14 with a radius that is adapted to the distance between the outer guide rails of the feeding conveyor track 3 and the receiving conveyor track 4. The curvature of the inner side of the
The diverter arm and the outer guide rail are substantially the same. The distance between the inner guide rail and the outer guide rail is substantially the same as the distance between the guide rails in a conveyor track. This will allow a pallet to be conveyed in the diverting device without the risk of jamming.

The advantage of driving the diverter wheel with the receiving conveyor track is that the pallets will not pile up in the diverting device if there is a problem with the feeding conveyor track. In some systems, the feeding conveyor track and the receiving conveyor track are not driven by the same motors. This means that the feeding conveyor chain and the receiving conveyor chain are not attached to each other. If a failure in the feeding conveyor track occurs in such a system, only the feeding conveyor track will stop or slow down. In this case, no new pallets will reach the diverter device. The diverter device and the receiving conveyor track will continue to transport the pallets available.

If, on the other hand, the diverter wheel is driven by the feeding conveyor track and a failure in the receiving conveyor track occurs, only the receiving conveyor track will stop or slow down. The feeding conveyor track and the diverter wheel will in this scenario continue to feed pallets to the receiving conveyor track in a normal pace. The pallets will in this case pile up at the receiving conveyor track, which may lead to damage of the objects transported by the pallets or even damage to the pallets themselves. Thus, it is of advantage to drive the diverter wheel with the receiving conveyor track 4.

The advantage of a diverter device is that pallets can be moved from a feeding conveyor track to a receiving conveyor track in an easy and quick way. This can be advantageous in systems where all pallets do not have to pass all work stations. The pallets with objects that do not have to pass a specific work station can thus be fed to another work station without having to wait. A sensor 15 is in this case added to the feeding conveyor
track in order to detect when an object is to be diverted. The sensor may be of any suitable type, such as an inductive sensor, an RFID or an optical sensor. When the sensor detects a pallet that is to be diverted, a signal is sent to the means controlling the diverter arm in order to move the diverter arm into the feeding conveyor track which will convey the pallet to the receiving conveyor track. The diverter arm may close after a pallet has passed, or it may be open until a pallet that is not to be diverted is detected by the sensor.

The diverter device is in one embodiment designed as a complete diverter module. The diverter module comprises in this embodiment a diverter device and conveyor tracks of a predefined length. The length of the conveyor tracks are advantageously such that the diverter module has the same length as regular conveyor track parts. In this way, a modular system is created, in which regular track parts can be replaced with a diverter module. This allows an easy and cost-effective retrofitting of a diverter device to an existing conveyor system. The invention is not to be regarded as being limited to the embodiments described above, a number of additional variants and modifications being possible within the scope of the subsequent patent claims.
REFERENCE SIGNS

1: Diverting device
2: Housing
3: Feeding conveyor track
4: Receiving conveyor track
5: Pallet
6: Guide rail
7: Diverter wheel
8: Toothed wheel
9: Upper surface
10: Diverter arm
11: Outer side
12: Inner side
13: Inner guide rail
14: Outer guide rail
15: Sensor
16: Feeding conveyor chain
17: Receiving conveyor chain
CLAIMS

1. Diverting device (1) for a conveyer system, comprising a housing (2), a diverter wheel (7) rotatable supported in the housing in a bearing means, a diverter arm (10), and a toothed wheel (8) connected to the diverter wheel (7), characterized in that the toothed wheel (8) is adapted to be driven by a conveyer chain (16, 17) in a conveyer track (3, 4).

2. Device according to claim 1, characterized in that the toothed wheel (8) is adapted to be driven by a receiving conveyer chain (17).

3. Device according to claim 1 or 2, characterized in that the diverter arm (10) is provided with a first position in which the outer side (11) of the diverter arm is lined up with a guide rail (6) of the conveyer track (3), and a second position in which the diverter arm extends into a conveyer track (3).

4. Device according to claim 3, characterized in that the diverter arm (10) extends into a feeding conveyer track in the second position.

5. Device according to any of the preceding claims, characterized in that the toothed wheel (8) is directly connected to the diverter wheel (7).

6. Device according to any one of claims 1 to 4, characterized in that the toothed wheel (8) is connected to the diverter wheel (7) with a gear mechanism having a gear ratio differing from 1.
7. Device according to any one of the preceding claims, characterized in that the diverter arm (10) is powered by compressed air.

8. Device according to any one of the preceding claims, characterized in that the housing (2) is adapted to be mounted between a feeding conveyor track (3) and a receiving conveyor track (4) in an existing conveyor system.

9. Conveyor system, comprising a feeding conveyor track (3), a receiving conveyor track (4) and a diverter device according to any of claims 1 to 8, characterized in that the toothed wheel (8) is driven by a conveyor chain (16, 17) of one of the conveyor tracks (3, 4).

10. Conveyor system according to claim 9, characterized in that the toothed wheel (8) is driven by the receiving conveyor chain (17).

11. Method for diverting objects which are conveyed along a conveying track comprising a conveyor chain and guide rails, said objects being conveyed on pallets, comprising the steps of; detecting if a pallet is to be diverted using a sensor, sending a signal to a diverter arm in order to move the diverter arm into the conveyor track if the pallet is to be diverted, moving the pallet from the feeding conveyor track to the receiving conveyor track using a diverter wheel driven by a conveyor chain of a conveyor track.

12. Method according to claim 11, characterized in that the diverter wheel is driven by the conveyor chain of the receiving conveyor track.
A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: B66G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE, DK, FI, NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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Further documents are listed in the continuation of Box C.  See patent family annex.

Date of the actual completion of the international search: 11 June 2008
Date of mailing of the international search report: 1-06-2008

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International patent classification (IPC)

B65G 47/52 (2006.01)
B65Q 47/76 (2006.01)
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Cited literature, if any, will be enclosed in paper form.
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