

The present invention relates to a device for conveying flat products, in particular printed products, in accordance with the introductory clause of Claim 1.

Such a device is known from CH-PS 637091 and the corresponding US-PS 4333559. In the imbricated formation fed by a feed conveyor to a conveyor device, each pair of products lying one on top of the other lies on a following pair of products in overlapping fashion. The conveyor device has a tail wheel arranged above the feed conveyor. Led around this tail wheel is a traction member on which grippers are provided, arranged one behind the other in the conveying direction. Every gripper has an upper fixed gripping jaw and a lower movable gripping jaw. Each of the grippers as it approaches the imbricated formation from above seizes a pair of products (lying one on top of the other) in the region of their leading edges, by its gripping jaws, and conveys them away. The conveying direction of the discharge conveyor is essentially parallel with the conveying direction of the feed conveyor in the transfer zone.

Also, a device for conveying flat products is known from CH-PS 630583 and the corresponding US-PS 4320894. In the imbricated formation supplied to a conveyor device by means of a feed conveyor, each printed product lies on the next. The feed conveyor transports the products essentially in a horizontal direction, while the conveying direction of the conveyor device is upward. The conveyor device has individually controllable grippers arranged on a traction member. In a transfer zone, these grippers grasp the products supplied by the feed conveyor by their leading edges and lift them from the imbricated formation. In this way the imbricated formation is stripped away. If, in this known device, the conveying speed of the conveyor device is half the speed of the feed conveyor, two products (lying one on top of the other) mesh with each gripper, and are lifted off together. Hence, with this known device, when the incoming imbricated formations are made up of individual products each lying over the next, [either] each individual product is picked up by a gripper and stripped from the imbricated formation, or products are pushed on top of one another in twos, so that each gripper seizes two products, one lying on top of the other, and conveys them away.

A device for conveying flat products which are presented in an imbricated formation in which each product lies over the preceding one is known from GB-PS 966402. At a certain distance from the end of a feed conveyor for the imbricated formation, a section of an endless rail track in which a number of grippers are movably guided extends in a vertical direction. Each gripper possesses a fixed gripping jaw and a pivotably mounted gripping jaw which is held by means of a closing spring in a closed position in which it presses against the fixed gripping jaw. When an actuating arm connected to the pivoting jaw runs on to a control slide, this jaw is tilted to an open position against the force of the spring. The grippers, which are guided in the rail track so as to be freely mobile in the region of the vertical section, run together, owing to the force of gravity, to form a column, in which the open gripping jaw of a given gripper rests against the fixed gripping jaw of the preceding gripper, thus preventing a gap between these grippers. The lowermost gripper in the column is held back by a controllable pin. The positioning of the feed conveyor, rail track and pin in relation to one another is made such that the leading edge of a product dispensed by the feed conveyor precisely enters between the opened jaws of the gripper held back by the pin. This product as it enters the open gripper interrupts a light beam, causing the pin to be momentarily withdrawn. The released gripper is sharply accelerated under its own weight and the weight of the column of grippers. At the same time the actuating arm runs off the slide and the mobile gripping jaw swings into the closed position and holds the product, which is now released from the feed conveyor, between the fixed gripping jaw and itself. In this known device the grippers are stationary during the insertion of the products between the opened gripping jaws, and each incoming product lies over the preceding one in an imbricated formation.

DE-AS 1176675 discloses a device for creating a formation in which each printed product is arranged behind the preceding one, out of an incoming formation in which pairs of printed products, lying one on top of the other, are arranged behind the preceding printed product pair. The incoming printed product pairs are spaced apart from one another. The lower of each pair of superimposed printed products is caught by a suction roll and held fast during one revolution of this roll, while the upper printed product continues on its way. The printed product re-

leased by the suction roll after one revolution is then discharged behind the printed product which has continued on its way. This known device is not suitable for handling printed product pairs fed in an imbricated formation, since each printed product overlaps both products of the ensuing pair, or is overlapped by the ensuing pair. Also, there is no room for discharging the separated products one after another.

It is the purpose of the present invention to provide a device for conveying flat products, in particular printed products, which enables products to be individually discharged from an incoming imbricated formation in which each pair of products lying one on top of the other lies on a following pair of products in overlapping fashion i.e. enabling the products to be separated.

This purpose is realized by the features of the characterizing part of Claim 1.

In the transfer area, the leading edges of the products lying one on top of the other in pairs are lifted off one another and a single product is fed to each gripper of the discharge conveyor. Because the conveying direction of the conveyor device cuts across the conveyor plane and extends upwards from the underside of the products, the products lying one on top of the other in pairs can be inserted into the grippers of the conveyor device without being pushed over one another in the conveying direction of the feed conveyor. The products seized in this way are lifted from the incoming imbricated formation, or, in other words, stripped from the imbricated formation.

In a particularly simple preferred embodiment the parting device has a splitter unit which bends down the region of the leading edge of the underlying product of each pair about an axis extending substantially parallel with the conveyor plane and at right angles to the conveying direction of the feed conveyor. In a particularly simple construction the splitter unit has a rotationally driven suction roll which is provided with orifices distributed around its circumference and which is connected, or is capable of being periodically connected, to a partial vacuum source. The underside of the underlying product of each pair

comes into contact with the circumference of the suction roll and is drawn on to the suction roll so that the leading edge of this product separates from the leading edge of the overlying product. Release of the underlying product from the suction roll can be effected by interrupting the connection between the suction roll and the partial vacuum source, or for example by means of a stripper device which lifts this product off the suction roll.

In another preferred embodiment the parting device has a flexing unit which induces a downward undulation in the underlying product of each pair. In this embodiment the leading edges of the products lying one on top of the other are separated in the region in which the grippers seize these products, while the remaining regions may remain in contact with one another. Thus even products with very low inherent stiffness can be individually released and stripped from the imbricated formation.

Reliable one-to-one feeding of products to the grippers of the conveyor device is assured in a simple way by an embodiment of the device according to Claim 9. If the drag link between individual grippers is formed by an elastically retractable and extensible spring element, with the gap between adjacent grippers in the transfer area set to a fixed distance by means of a restraining element, it is possible to compensate phase differences between the pickup of products in the transfer area and the discharge in a discharge area downstream of the transfer area, without varying the conveying speed of the feed conveyor.

The device specified in Claims 1 to 13 can also be used for conveying imbricated formations in which each single product lies over the ensuing product. In this case, all the products are acted on by the parting device and fed to the grippers of the discharge conveyor; or the action of the parting device is switched off, for example by shutting off the connection between the suction roll (or as the case may be the openings in the endless belt) [and] the partial vacuum source. If when the grippers are opened in the transfer area at least one gripping jaw of each gripper rests against a gripping jaw of the adjacent gripper, this ensures that every incoming product is seized by a gripper and conveyed away, as no gaps are left between the gripping jaws in which products might be incorrectly inserted.

Further preferred embodiments are specified in the other dependent claims.

Three embodiments will now be explained in detail, by way of example, with reference to the drawings, which are merely diagrammatic, and show:

- Fig. 1: in elevation, a first embodiment of a device for conveying printed products,
- Fig. 2: a simplified representation on an enlarged scale of a detail of the transfer area in Fig. 1,
- Fig. 3: also in elevation, a second embodiment of the device,
- Fig. 4: a view of the feed conveyor of the device according to Fig. 3 in the direction of Arrow IV in Fig. 3, and
- Figs. 5 and 6: in a section on Line V-V in Fig. 6, and in a top view, respectively, a gripper of the discharge conveyor of the devices according to Figs. 1 to 3, drawn on an enlarged scale.

Fig. 1 shows a transfer area of a device with a feed conveyor 10 and a discharge conveyor 20, in which printed products 12, 14, which are fed by a feed conveyor 10 in an imbricated formation S, are individually seized in the region of their leading edges 16 by grippers 18 of a discharge conveyor 20, and conveyed away. In the incoming imbricated formation S, individual printed products 12, 14 lie one on top of the other in pairs, the upper product of each such pair being designated 12, and the lower product, 14. Every such pair of printed products 12, 14 lying one on top of the other lies (viewed in the conveying direction A of the feed conveyor 10) on the following pair of printed products 12, 14.

The feed conveyor 10 comprises a belt conveyor 22 with revolving driven endless belts 24 (of which only one is visible in Fig. 1) whose live side 26 establishes a conveyor plane 28 for the imbricated formation S. The endless belts 24 are led around return pulleys 30, of which only the one which is at the end of the live section of the belt conveyor 22 is shown. The return pulley 30 is actively connected with a shaft 34 by a chain drive 32 shown in chain-dotted lines, this shaft being driven by a drive

motor (not shown) via a chain drive 32' shown by chain-dotted lines. The direction of rotation of the return pulley 30 is given by the arrow B.

Located downstream of the belt conveyor 22 is a rotatably mounted suction roll 36. A guide plate 35 is provided between the belt conveyor 22 and the suction roll 36 in the extension of the conveyor plane 28. The suction roll 36 comprises a hollow cylinder 40, which is actively connected with the drive shaft 34 by means of a further chain drive 38, and in which radial orifices 42 are provided in three axially extending bands 41 pitched at 120° intervals. The suction roll 36 has an airtight closure at its end walls, and the hollow interior of the suction roll 36 can be connected to a partial vacuum source, in a known manner. The circumference of the suction roll 36 is equal to three times the distance C between two printed product pairs in the incoming imbricated formation S, so that the radial orifices 42 of a band 41 come into contact with the underside of the underlying printed product 14 in the region of its leading edge 16, and lay this printed product 14 on the surface of the suction roll 36, with the edge 16 - which, viewed in the direction of Arrow B, runs ahead of the orifices 42 - sticking up from the suction roll 36. The suction roll 36 parts the leading edges 16 of two printed products lying one on top of the other 12, 14 in a direction at right angles to the conveyor plane 28 and guides each of them individually to a gripper 18. The printed products 12 and 14 which are at the top in Fig. 1 are held by grippers 18 and are being stripped from the imbricated formation S in the conveying direction D of the discharge conveyor 20.

The conveying direction D of the discharge conveyor 20 extends upwards, and lies in a plane which is essentially at right angles to the conveyor plane 28.

The discharge conveyor 20 has an orbiting guide 44 which is formed by rails 46 and by a guide plate 50 in the region of two cam disks 48, of which only one is visible. Guide bodies 52 of the grippers 18 are slidably mounted in the guides 44. The grippers 18 will be described in detail later. The guide bodies 52 are interconnected by drag links formed by spring elements 54 which are initially tensioned in a series of undulations by the guide bodies 52. The gap E between adjacent guide

bodies 52 can be varied, owing to the elasticity of the spring elements 54. As can be clearly seen in Fig. 1, this gap E is at a maximum in the region in which catches 56 on the guide bodies 52 are in engagement with the cam disks 48, while it is at a minimum in the region which follows after the cam disks 48, viewed in the conveying direction D.

The cam disks 48 are actively coupled with the shaft 34 via a chain drive 58, and are also driven in the direction of Arrow B. Consequently the cam disks 48 are synchronized with the suction roll 36 and the belt conveyor 22, and the phase between the cam disks 48 and the drive shaft 34 can be adjusted by means of a phase adjuster 60.

The cam disks 48 have a sawtooth profile at their periphery, with steep flanks 62 preceding, when viewed in the direction of Arrow B. These steep flanks 62 propel the catches 56, while the trailing, gently-sloping flanks 64 retard the catches 56 so that each steep flank 62 propels only a single gripper 18 and the gap E between adjacent grippers 18 is increased to a maximum in the region of the cam disk 48.

Each gripper 18 possesses two fingers 66 (of which only one is visible in Fig. 1), mounted on the guide body 52, which, in the transfer area, project towards the belt conveyor 22; and one gripper jaw 68. The gripper jaw 68, which is trailing when viewed in the conveying direction D, is fixed to the guide body 52, whereas the preceding fingers 66 are mounted on the guide body 52 so as to pivot about an axis 70 extending at right angles to the conveying direction D. Each of the fingers 66 is urged by a spring 72 towards a closed position in which the tips 66' of both fingers 66 come into contact with the tips 68' of the gripper jaw 68 or with a print shop product 12, 14. Together with an operating member 74 each finger 66 forms a double-armed lever which is capable of pivoting about the axis 70. Two control slides 76, of which only one is visible, are fixed to the guide plate 50, extending into the region of the rail 46 which, viewed in the conveying direction D, immediately follows this guide plate 50. When the operating members 74 run on to the control slides 76 the fingers 66 are tilted into an open position against the force of the springs 72; in a region which then follows, in which the leading edges 16 of the printed products 12 and 14 are inserted between the now-open fingers 66 and gripper jaws 68, they are held open; and in a

region which then follows, in which the gap between the control slides 76 and the guide bodies 52 widens, the fingers 66 are tilted back to the closed position under the action of the springs 72.

As already stated, the gap E between two adjacent grippers 18 is at a maximum in the region of the cam disk 48. As a result of the braking effect due to friction between the control slides 76 and the operating members 74, the gripper 18 which has been released by the steep flank 62 of the cam disk 48 is retarded until the following gripper 18 collides with the retarded gripper 18 and pushes it forward. Consequently the gap E between adjacent grippers 18 is at a minimum in the region of the control slides 76 which, viewed in the direction of Arrow D, comes after the cam disks 48. Smooth running is afforded by the spring elements 54, whose initial tension is set for an average gap E.

It should be noted that when there is a minimum gap E between adjacent grippers 18 and the fingers 66 are in the open position, every pair of leading tiltable fingers 66 lies flat against the fixed trailing gripper jaw 68 of the gripper 18 which precedes (viewed in the conveying direction D), so that no empty space is left between the fingers 66 and gripper jaws 68 of adjacent grippers 18. It is not necessary for the fingers 66 to lie flat against the gripper jaws 68 over their whole length; it is sufficient for a tip 66' to rest on the adjacent gripper jaw 68, or vice versa. What matters is that any gap between these gripper jaws 66, 678 should be closed or covered up in the region of the tips 66', 68.

Fig. 2 affords a simplified view of a part of the device shown in Fig. 1, on an enlarged scale. The reference numbers and letters in this Figure conform to those in Fig. 1, and are given only where necessary for elucidation of the Figure. The suction roll 36 is shown rotated through an angle of approx. 60° in the direction of Arrow B from the position shown in Fig. 1. The leading edge 16 of an underlying printed product 14 of printed products 12, 14 lying one on top of the other in the imbricated formation S fed by the belt conveyor 22 lies on the suction roll 36. The leading edge 16 of the underlying printed product 14 of the printed product pair lying on top of this printed product pair is situated in the region of the open fingers 66 and the gripper jaw 68 of a gripper

18, while the upper printed product 12 is resting on the tip 68' of the gripper jaw 68 of the preceding gripper 18 and the fingers 66 are moving back from the open position to the closed position. The grippers 18 which precede these grippers 18 in the conveying direction D have each picked up either an overlying or an underlying printed product 12 or 14 respectively, stripping them from the imbricated formation S.

The mode of operation of the device shown in Figs. 1 and 2 is as follows: The suction roll 36, rotating in the direction of Arrow B, is synchronized with respect to the imbricated formation S fed by the belt conveyor 22 so that the leading edge 16 of the underlying printed product 14 in each pair comes into contact, in the direction of Arrow A, a short way ahead of a band area 41 of orifices 42, as shown in Fig. 2. Since the interior of the suction roll 36 is connected to a partial vacuum source, further rotation of the suction roll 36 causes the underside of the underlying printed product 14 to be drawn on to the suction roll 36 in the region of the orifices 42. As rotation continues in the direction of Arrow B, as shown in Fig. 1, this causes the leading edge of the underlying printed product 14 to separate from the leading edge 16 of the overlying printed product 12. The leading edge 16 of the overlying printed product 12 is inserted directly into an opened gripper 18, while the suction roll 36 prevents the leading edge 16 of the underlying printed product 14 from entering the same gripper 18. As soon as the leading edge 16 of the upper printed product 12 crosses the path of the tip 68' of the fingers 68, detachment of the lower printed product 14 from the suction roll 36 causes its leading end 16 likewise to become inserted into an open gripper 18, as shown in Fig. 2. The inherent stiffness or springiness of the printed products 12, 14 ensures, first, that the overlying printed product 12 moves into the opened gripper 18 essentially in the conveying direction A, and, second, that the lower printed product 14 released from the suction roll 36 detaches itself from this roll and springs up into the region of the opened gripper 18; cf. Fig. 2. Detachment of the underlying printed product 14 from the suction roll 36 is effected by a momentary interruption of the connection between the interior of the suction roll 36 and the partial vacuum source. However, it will be seen that the suction roll 36 may also remain permanently in communication with the partial vacuum source if the underlying printed product 14 is detached from the suction

roll 36 for example by means of a wiper (not shown in the drawing). As soon as the leading edges 16 of the printed products 12, 14 have passed sufficiently far beyond the tips 66', 68' of the fingers 66 and gripper jaws 68 respectively, they are gripped by the fingers and conveyed away in the direction of Arrow D. Here it should be noticed that the printed products 12, 14 are grasped by the grippers 18 along a line and the leading edges 16 are able to move freely between the fingers 66 and gripper jaw 68.

The discharge conveyor 20 depicted in Fig. 3 corresponds to the discharge conveyor 20 described above and depicted in Fig. 1. Hence it will not be described again. The feed conveyor 10 shown in Figs. 3 and 4 has a belt conveyor 22 with four endless belts 24 extending parallel with one another. Each endless belt 24 is guided around a return pulley 30 at the end of its live section, two return pulleys 30 of two adjacent endless belts 24 being mounted, fixed in rotation, on each of the two shafts 78. The shafts 78 are mounted in bearing plates 80 at both ends and are driven in a similar manner to that illustrated in Fig. 1. The live sides 26 of these endless belts 24 define the conveyor plane 28 for the printed products 12 and 14 fed in imbricated formation S. A further belt conveyor 82 is provided at the centre between the endless belts 24 arranged in pairs on either side (viewed in the conveying direction A). This has a perforated endless belt 84 which is guided around further return pulleys 86, of which only the one at the end of the live section of the conveyor is shown. The return pulley 86 is likewise mounted in bearing plates 80, and is capable of being driven in the direction of Arrow B, synchronously with the return pulleys 30. The live strand 90 of the belt conveyor 82 is located in the conveyor plane 28 at the start of the live section [of the belt conveyor 82] and slopes downwards therefrom, viewed in the direction of Arrow A. The two return pulleys 30 and 86 are vertically offset at the end of the live section by approximately half their diameter. The live strand 90 of the belt conveyor 82 runs over a channel-shaped suction trough 92 which is connected to a partial vacuum source by means of a conduit 94.

The device shown in Figs. 3 and 4 operates as follows: At the start of the live section of the belt conveyor 22, pairs of printed products 12 and 14 lying one on top of the other lie on other pairs in the imbricated

formation S. When these printed products 12 and 14 run on to the live strand 90 of the downward-sloping belt conveyor 82, the underside of the underlying printed product 14 is sucked on to the perforated endless belt 84 by the partial vacuum in the suction trough 92. In the course of further travel in the direction of Arrow A the underlying printed product 14 flexes while the overlying printed product 12 remains straight owing to its inherent stiffness. The downward undulation thus formed in the underlying printed product 14 extends essentially in the direction of Arrow A. The leading edges 16 of the two printed products 12 and 14 lie flat on one another in the lateral marginal regions (lateral with respect to the conveying direction A), while in the centre, in the region of the belt conveyor 82, they are parted in the direction perpendicular to the conveyor plane 28. The parted leading edges 16 of the two printed products 12 and 14 are separately inserted into open grippers 18 of the discharge conveyor 20, seized in the region of their leading edges 16, and separately withdrawn from the imbricated formation S.

In Figs. 5 and 6 a gripper 18 of the discharge conveyor 20 is depicted on an enlarged scale, as a section on the line V-V in Fig. 6 and as a top view, respectively. The guide body 52 comprises two body parts 98 and 100 screwed together by means of a screw 96. On the part 98, two parallel fingers 66 are mounted so as to be capable of pivoting about a rocker shaft 102. The gripper jaw 68, which is in the form of a blade, is fixed to the part 98 by means of further screws 104. In the region of the heads of these screws 104, a damper 106, for example a rubber strip, is arranged, to prevent hard knocks from the adjacent gripper with minimum gap E; cf. Fig. 1. Unbroken lines represent the fingers 66 in the closed position, while chain-dotted lines indicate these fingers in the open position in which they lie flat against the gripper jaw 68, also shown in chain-dotted outline, of the adjacent gripper 18. The operating members 74 of the fingers 66 are bent slightly back when viewed in the conveying direction D, to enable the operating members 74 to run smoothly on to the control slides 76 each cooperating with a finger 66 (see also Fig. 1), and to prevent jamming between the control slides 76 and the operating members 74 on closure of the fingers 66.

The springs 72 bear on the operating members 74 at one end and on the body part 98 at the other end. Cf. Fig. 1. A catch 56 is fastened by means

of bolts 108 to each of the end faces of the body part 100. The bolts 108 have heads 110 at both ends. The opposing flanks 112 of parallel angle sections 114 of the rail 46 slide in the gap between the body part 98 and the bolt heads 110.

The spring element 54 is formed by sections of a toothed belt 116 arranged between adjacent grippers 18. The body part 100 has a saddle-shaped recess into which the toothed belt 116 is drawn to form an arc by a rider 120 fastened to the body part 100 with screws 118. With minimum gap E between adjacent grippers 18 (cf. Fig. 1), the sections of the toothed belt 116 are sharply deformed into meanders, whereas they are practically straight when the gap E is at a maximum. Owing to the elasticity of the toothed belt 116 it tends to repel when the gap E between adjacent grippers is minimum, and to attract when it is extended.

It is also feasible for the drag link connection between the grippers 18 to keep these grippers 18 at a fixed distance E from one another, but in this case there could be no phase shifts in operation between the takeup by the discharge conveyor 20 and the discharge timing. If the drag link is formed by a spring element 54 (toothed belt 116), as shown in Figs. 1, 3 and 5, the gaps E between the grippers 18 can be increased in the section immediately following the transfer area (viewed in the conveying direction D), thus allowing any difference in phase in the takeup and discharge timing of the discharge conveyor 20 to be compensated.

It will also be observed that the device can be used for conveying imbricated formations S in which a single product lies on the ensuing one. In this case, for example, it is possible to omit the connection between the suction roll 36 (Fig. 1) or suction trough 92 (Fig. 3) and the partial vacuum source. The products will then be individually and directly inserted, in the conveying direction A, into the open grippers 18.

It should be noted that with both embodiments as per Figs. 1 to 4 the printed products 12 and 14 lying one on top of the other are not slid over one another with respect to the conveying direction A.

The grippers 18 may also be mounted on a traction element e.g. of a

ball joint link chain, cf. e.g. CH-PS 630583 and the corresponding US-PS 4320894. The bodies of the grippers 18 on which the fingers 66 and gripper jaw 68 are mounted are then attached to extension arms of the ball joint link chain. In embodiments in which the grippers 18 are slidably mounted in a guide 44, the guide bodies 52 form the gripper bodies.



Claims

1. Device for conveying flat products, in particular printed products, with a feed conveyor (10) establishing a conveyor plane (28) for the products (12, 14) which are fed in an imbricated formation (S) in which each pair of products lying one on top of the other (12, 14) lies on a following pair of products (12, 14) in overlapping fashion to a transfer area and with a conveyor device (20) possessing individually controllable grippers (18), arranged one behind the other in the conveying direction (D), for seizing the incoming products (12, 14), in the transfer area, in the region of their leading edges (16), characterized in that the conveying direction (D) of the conveyor device (20) cuts across the conveyor plane (28) and extends upwards from the underside of the products (12, 14), the grippers (18) are coupled to one another by means of drag links (54) permitting variation in the intervening gap (E), a drive arrangement (48), synchronized with the feed conveyor (10), located near the transfer area, and ahead of the transfer area when viewed in the conveying direction (D), acts on the grippers (18), means (76) are provided in the transfer area for setting the gap (E) between the grippers (18) to a specific distance, and a parting device (36; 82) in the transfer area lifts the projecting edges (16) of the products (12, 14) superimposed in pairs, off one another, to feed these products (12, 14) to two successive grippers (18) spaced apart by the set distance.
2. Device according to Claim 1, characterized in that the feed conveyor (10) is constructed as a belt conveyor (22).
3. Device according to Claim 1 or 2, characterized in that the parting device has a splitter unit (38) which bends down the region of the leading edge (16) of the underlying product (14) of each pair about an axis extending substantially parallel with the conveyor plane (28) and at right angles to the conveying direction (A) of the feed conveyor (10).
4. Device according to Claim 3, characterized in that the splitter unit has a rotationally driven suction roll (36) which is provided with orifices (42) distributed around its circumference and which is connected, or is capable of being periodically connected, to a partial vacuum source, and which comes into contact with the underside of the underlying product



(14) of each pair.

5. Device according to Claim 4, characterized in that the orifices (42) are arranged within at least one band area (41) extending essentially in the axial direction of the suction roll (36).

6. Device according to Claim 1 or 2, characterized in that the parting device has a flexing unit (82) which induces a downward undulation in the underlying product (14) of each pair.

7. Device according to Claims 2 and 6, characterized in that the belt conveyor (22) possesses at least two propellable endless belts (24), arranged parallel with one another and laterally spaced apart from one another, between which the flexing unit (82) is arranged.

8. Device according to Claim 7, characterized in that the flexing unit possesses at least one additional belt conveyor (82) which, viewed in the conveying direction (A) of the feed conveyor (10), slopes down and away from the conveyor plane (28) established by the live side (26) of the endless belts (24), the endless belt (84) of the additional belt conveyor (82) being provided with openings which, over the live sector (90), can be connected to a partial vacuum source.

9. Device according to one of Claims 1 to 8, characterized in that the conveyor device (20) has an enclosed guide (44) for the grippers (18) and the drag link between the individual grippers (18) is formed by an elastically retractable and extensible spring element (54).

10. Device according to one of Claims 1 to 9, characterized in that the means (76) for setting the gap (E) between the grippers (18) possess a restraining element (76), acting on the grippers (18), for setting the gap (E) to a minimum.

11. Device according to Claim 10, characterized in that each gripper (18) has gripping jaws (66, 68) between which the individual product (12, 14) is picked up, such that when the grippers (18) are open in the transfer area a jaw (66, 68) of one gripper (18) is in contact with a jaw (68, 66) of the adjacent gripper (18), in order to close or cover any gap between these gripping jaws (66, 68) at their tips (66', 68').



12. Device according to Claim 11, characterized in that each gripper (18) has a guide body (52) to which one gripping jaw (68), preferably the follower, is fixed, and the other gripping jaw is formed by preferably two fingers (66) mounted so as to be capable of pivoting about an axis (70) essentially at right angles to the conveying direction (D) of the discharge conveyor (20) so that when the fingers (66) are in the closed position they come into contact preferably only by their tips (66', 68') with the gripping jaw (68), or with the seized product (12, 14).

13. Device according to Claim 12, characterized in that the pivoting fingers (66) are kept in the closed position by a closure spring (72) and are capable of being moved to an open position by means of opening-slides (76) preferably formed on the restraining element (76) and capable of being caused to act on operating members (74) of these fingers (66).