Conveyor system with conveyor carriage running on rails

The invention relates to a conveyor system according to the preamble of claim 1.

A conveyor system of the above mentioned type is known from DE 33 09 377 A. In such a conveyor system a lifting device for the driving wheel is provided with a swivel arm, which at one end thereof is swivel-mounted to the running gear at an axis disposed transversely to the rail plane, and which at the other end thereof is provided with a guide-follower that cooperates with a guideway connected with the driving unit. The guideway defines a basic position, in which the driving wheel is pre-stressed against the rail, a labile lift-off position, from which the driving wheel automatically returns to the basic position in the absence of the holding force of a person, and a stable lift-off position, in which the driving wheel is designed to remain even in the absence of the influence by a person. It is disadvantageous that this lifting device is relatively complicated and particularly requires a relatively large amount of space. Moreover, the stable lift-off position is only apparently stable, since there is no locking device and since a biasing spring also automatically returns the swivel arm to the basic position in the absence of the holding force of a person. Furthermore, the handling of the lifting device is quite difficult because it is externally accessible only at the bottom side of the conveyor carriage by means of a tool.

The aim of the invention is to improve a conveyor system of the kind described hereinabove.

This aim is achieved according to the invention by means of the characterising features of claim 1. The lifting device is distinguished through an extraordinarily simple, room-saving and safe construction based on a flexible coupling member that is wound up on a shaft. The handle disposed externally from the running gear permits a simple handling at all times and without the use of additional tools.

Advantageous embodiments of the conveyor system are described in claims 2 to 4.

It is particularly advantageous if the lifting device according to claim 2 is designed in such a way that it is lockable in the stable lift-off position of the driving wheel, so that the lifting device needs not be actuated for a lengthy period of time, for example until a displacement process of the conveyor carriage has been completed. However, the locking should not occur in every case but only in a second phase of the adjustment, that is, in the locking position of the lifting device, while in a first, labile phase, i.e. in the lift-off position, the lifting device should have to be constantly held manually in order to ensure that upon release of the lifting device the automatic engaging of the driving device on to the rail is guaranteed. Claim 3 describes an advantageous solution of the locking device of the lifting device.

Particularly advantageous is a further embodiment of the conveyor system according to claim 4, which prevents the driving wheel from lifting off unintentionally from the rail.

An embodiment of the conveyor carriage will hereinafter be described with reference to the drawings, wherein:

Figure 1 shows the running gear of a conveyor carriage hanging in a rail, in section along I-I of Figure 2;

Figure 2 shows the conveyor system of Figure 1, in section along II-II of Figure 1;

Figure 3 shows the conveyor system of Figure 1 with the driving wheel lifted off; and

Figure 4 shows the mounting of a lifting shaft, in section along IV-IV of Figure 2.

The parts of the conveyor system represented in detail in the figures show the running gear 2 of a conveyor carriage 4 in a rail 6. The conveyor carriage includes running wheels 8 and a driving wheel 12 driven by a driving unit 10, which driving wheel in the instant case includes a friction wheel 12a and a gear wheel 12b. The conveyor carriage 4 runs in a rail 6 that prevents the conveyor carriage from lifting off transversely to the rail plane. For example, the rail includes a rail base 14 and lateral rail parts 16 that engage running wheels 8 in a C-shape, so that the conveyor carriage 4 cannot be removed perpendicularly from the rails.

The driving unit 10 is swivel-mounted on frame 22 of running gear 2 around an axis 20 that is parallel to axis 18 of the driving wheel 12. A biasing spring 24 pre-stresses driving wheel 12 against the rail base 14, so that either friction

wheel 12a is engaged with a friction surface 26 of the rail base 14 or, like in the example shown, gear wheel 12b is engaged with a tooth rack 28 at the rail base 14.

The conveyor carriage 4 is provided with an externally manually actuated device 30 for lifting the driving wheel 12, 12a or 12b, respectively, from rail 6. This lifting device 30 includes a shaft 32 disposed parallel to the drive axis, which shaft is rotatably and axially movably mounted in running gear 2. The shaft is provided with a handle 34 that permits swivelling of shaft 32 as well as axial movement of shaft 32, as will be described in more detail hereinbelow. Shaft 32 is provided with a locking cam 36 that in its basic position S0 according to Figure 1 abuts against an abutment 38 of the driving unit 10, so as to prevent swivelling of the latter. Furthermore, shaft 32 is connected with driving unit 10 by means of a coupling member 40, said coupling member 40 consisting of a flexible element, such as a rope, belt or ribbon, one end 42 of which is attached to the driving unit 10 and the other end 43 of which is attached to shaft 32. Upon swivelling of shaft 32, coupling member 40 is wound up on the shaft, while at the same time locking cam 36 is disengaged from abutment 38 and coupling member 40 is wound up on shaft 32. Thereby, driving unit 10 is swivelled against the force of biasing spring 24 until driving wheel 12 is disengaged from rail 16.

The lifting device 30 is provided with locking device 44, which locks the lifting device in the basic position S0 shown in Figure 1, in order to prevent unintentional swivelling of shaft 32. For this purpose, shaft 32 is provided with a step 46, so that by means of a biasing spring 48 shaft 32 is brought into contact through step 46 against a wall 50 that is located on the side remote from handle 34.

In wall 50 there is included a bore 52 that includes two diametrically opposite radial recesses 54, into each of which a radial ledge 56 of shaft 32 engages and thereby secures the shaft against swivelling. Shaft 32 can be displaced in axial direction 58 by means of handle 34 until the shaft is in contact with the outer part of wall 50 by means of a securing ring 60, whereby radial ledges 56 are disengaged from radial recesses 54 and the shaft can be swivelled, as can be deduced from Figure 1. Position S0 is the basic position in which driving wheel 12 is engaged with rail base 14. Upon swivelling by about 30° into the first position S1, locking cam 36 is released. Upon further swivelling by 90° into position S2, gear wheel 12b is disengaged from tooth rack 28, so that the conveyor carriage can be moved along rail 6. In this position, handle 34 has to be held in place manually, otherwise biasing spring 24 would move back driving unit 10 into the basic position. Only upon further swivelling of the handle 34 by 180° from the basic position S0 into position S3 can the lifting device 30 be locked, by engaging radial ledges 56 into radial recesses 54. Such a locking is, however, only advisable where the rail takes a horizontal course. In case of oblique or even vertical course of the rail the locking should not be used, in order to ensure that in the event of unintentional release of handle 34 the gear wheel 12b immediately engages into tooth rack 28, thus preventing an undesired departure of the conveyor carriage.

LIST OF REFERENCE NUMERALS

S0	basic position
S1	releasing position of locking cam
S2	lift-off position of driving wheel
S3	locking position
2	running gear
4	conveyor carriage
6	rail
8	running wheel
10	driving unit
12	driving wheel
12a	friction wheel
12b	gear wheel
14	rail base
16	rail part
18	axis of 12
20	axis of 10
22	frame
24	biasing spring
26	friction surface
28	tooth rack
30	device
32	shaft
34	handle
36	locking cam
38	abutment
40	coupling member
42	end of 40
43	end of 40
44	locking device
46	step
48	biasing spring

50	wall
52	bore
54	radial recess
56	radial ledge
58	axial direction
60	securing ring

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CLAIMS

1. Conveyor system with conveyor carriage running on rails, each conveyor carriage (4) having a running gear (2) with running wheels (8) that are guided in rail parts (16) so as to prevent the conveyor carriage (4) from lifting off transversely to the plane of the rails, the running gear (2) containing a driving unit (10) that is pre-stressed against the rail (6) and swivel-mounted about an axis (20), which axis is parallel to but disposed at a distance from the axis (18) of a driving wheel (12), the driving unit further containing a lifting device (30) carried on the running gear (2) for lifting off the driving wheel (12) from the rail (6), a movable part (32) being movable between a basic position (S0) in which the driving wheel (12) is pre-stressed against the rail (6), a labile lift-off position (S2) and a stable lift-off position (S3), characterised in that the lifting device (30) includes as a moving part a shaft (32) that is rotatably mounted to the running gear (2) of the conveyor carriage (4) and that is provided with a handle (34) accessible on the outside of the running gear (2), the shaft (32) being connected with the driving unit (10) by means of a flexible coupling member (40) that is woundable up onto the shaft (32).

2. Conveyor system according to claim 1, characterised in that the lifting device (30) is lockable in the stable lift-off position.

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3. Conveyor system according to claim 2, characterised in that the shaft (32) in its basic position (S0) is prestressed by means of a spring (48) with a step (46) against an abutment (50) of the running gear (2), the shaft (32) further being guided in a bore (52) and being provided with at least one radial ledge (56) that engages in a radial recess (54) in the wall of the bore (52), the bore (52) including a further radial recess (54) corresponding to the locking position (S3), into which the radial ledge (56) engages after swivelling outside of the bore (52).

4. Conveyor system according to one of claims 1 to 3, characterised in that the shaft (32) is provided with a locking cam (36), which in the basic position (S0) of the shaft (32) abuts against an abutment (38) of the driving unit (10), so as to prevent it from swivelling.