

The invention relates to a stack table receiver of a stack lifting apparatus, to a stack lifting apparatus, to a stack feeder, to a process for receiving and for raising and lowering a stack table which can be aligned laterally, and to the use thereof.

DE-OS 19 10 160 discloses a stack feeder for paper sheets in sheet-fed printing machines, in the case of which stack feeder a stack table is advanced upwards to a separating device by raising chains. The stack table can be displaced laterally. Guided pivot levers which are carried along by the raising chains and are coupled together via a shaft can be taken from said specification for the purpose of carrying along the stack table. In order to receive the next ready prestacked feed stack, the coupled pivot levers slide downwards along guide strips after they have been disengaged from the raising chains. The coupled pivot levers strike against the stack table edge, by means of rollers mounted on them, and tilt away upwards with a pivot movement. The coupled pivot levers pass the level of the table top and fall back into their initial position again with a pivot movement. They slide further downwards to stops beneath the feed table, in order to be seized and raised again by the raising chains.

In the case of the disclosed coupled pivot-lever system, the operation of passing level with the stack table can be extremely adversely affected by the coupling and the levers striking against the stack table again and again in the manner of a resilient ball. In the case of fast-conveying machines, this may result, during stack changing, in an undesired lack of reliability as regards the operations of receiving and conveying stacks.

In order to be able to swing back again under its own weight, the levers, which swing away upwards, additionally require a low-level centre of gravity of the lever beneath the stack table in the carry-along position of the latter. In the case of such a feed stack, the chain guidance of the pivot point has to extend downwards to a large extent in order to receive stack tables. In

this arrangement, stack tables of lower heights cannot be received without additional outlay. Additional outlay is necessary even if the floor of the printing shop is lowered. For reasonably satisfactory reliability of the pivoting-back operation, the pivot point of the lever additionally needs to be spaced apart laterally from the stack table edge to some extent, and thus lateral space loss [sic].

US-A-3,998,448 presents an apparatus for moving a sheet stack vertically by means of hooks provided for receiving a pallet. Additional actuating means have to be provided in order to actuate the said hooks.

The object of the invention is to provide apparatuses and a process for receiving and carrying along stack tables in a secure and reliable manner, with optimum utilization of space.

This object is achieved by a stack table receiver according to the features of Claim 1.

In order to receive the new stack table, the downwardly guided carrier hooks in the region of the stack table are pivoted out laterally by said table and assume their initial position again beneath the table position in order to carry along the stack table by way of the hook fingers as they move upwards. The pivotable carrier hooks permit a pivot point above the bearing position of the stack table in the carry-along position of the latter, as a result of which it is possible, in a simple and reliable manner, to receive even low stack tables and to receive stack tables when the floor of the printing shop has been lowered.

The pivot point may be provided very close to the stack table edge, as a result of which the lateral space is utilized to the optimum extent. In addition, the carrier hooks permit simple lateral alignment of the stack table.

The configuration with an energy storage device according to Claim 3 makes it possible for the stack table to be carried along reliably even with relatively small lightweight carrier hooks. A particularly simple,

cost-effective configuration is one with the features of Claim 4.

The features of Claim 5 describe a process for achieving the object.

5 The claimed apparatuses and process have proven to be particularly advantageous when used in laterally adjustable paper-sheet feeders in prestacking operation, in the case of which, on the one hand, a reliable, quick stack change is desired, with the optimum utilization of
10 space, even in the case of low-level stack tables and, on the other hand, the carrying-along of the stack tables is to permit the lateral displaceability of the stack tables received, even in the event of use for multiple printing runs.

15 A preferred embodiment of the invention is represented by way of example in Figures 1 to 6, in which:

Fig. 1 shows a side view of an inventive paper-stack feeder of a sheet-fed offset printing machine
20 before the paper stack is introduced

Fig. 2 shows, in detail form, a front view of the paper-stack feeder with a paper stack which has been received and a schematically represented device for lateral alignment,

25 Fig. 3 shows a detail view of a carrier hook according to the invention,

Fig. 4 shows a front view upon pushing in of the stack table, without making contact with the floor,

Fig. 5 shows a front view with a carrier hook in the
30 lowermost position and with the stack table introduced on a lowered printing-shop floor, and

Figs. 6

a,b,c show a front view of the operation in which a stack table which has already been introduced is
35 received.

Figure 1 shows a stack feeder 1, for example that of a sheet-fed rotary offset printing machine. Located between two side walls 2, of which only one is represented in Figure 1, is the stack region 36 into which the

charged feed stack 13 is pushed. The paper sheets are fed, for example, with the aid of a suction conveying device 4, from the feed stack 13 to conveying means on the feed table 3. The feed stack 13 is advanced vertically upwards, for paper-sheet removal, by raising and lowering chains 5 which are driven via a drive unit 6 and guided around chain wheels 7.

In the inner walls of the two side walls 2, in the stack region 36, in each case one guide strip 8 is fastened such that it is aligned parallel to the stack conveying direction. On each guide strip 8, a guide carriage 9 is mounted such that it can be displaced by means of rollers 10 engaging in grooves in guide strips 8, two pivotably downwardly directed carrier hooks 11 are located on said guide carriage 9. In order to receive the carrier hooks 11, as can be seen from Figs. 2 to 6, there is fastened on the guide carriage 9, oriented towards the feed stack, a bearing block 14 comprising a crossmember part 31 and two bearing walls 30 fastened on both sides, as is represented in Fig. 3. Between the two bearing walls 30, that part of the bearing block 14 of the carrier hooks 11 which is oriented from the crossmember part 31 to the feed stack is mounted rotatably by means of a pivot pin 12. The curvature of the carrier hook 11 is configured such that the carrier finger 32 and the opening region 33 of the hook are oriented towards the centre of the stack feeder 2 and thus towards the feed stack 13 when the latter has been introduced. Between the bearing walls 30, beneath the crossmember 31, there is enough clearance 26 for the pivot movements of the pivot hook 11. Provided beneath the pivot pin 12, between the crossmember 31 and the pivot hook 11, is a compression spring 27, which is supported on the spring bearings 28, 29 on the pivot hook 11 and on the crossmember 31.

Between the side walls 2, provision is made, for the feed stack 13, in the known manner for abutment strips 18 with abutment edge 20 for the leading edge of the feed stack 13 and side edge 18 for lateral abutment parallel to the stack conveying direction. As is rep-

resented in Figure 2, the lateral abutment edges 19 can be adjusted laterally. For this purpose, the lateral abutment edges are each provided with guide blocks 24 and 25 which are mounted displaceably on a shaft 23 oriented transversely with respect to the sheet conveying direction and fastened in the side walls 2. The threaded spindles 21 and 22 engage, by means of their thread, into threaded bores in the guide pistons [sic] 24, 25, the threaded spindles being mounted rotatably in an axially fixed manner in a side wall 2. By rotation of the threaded spindles 21, 22, for example by means of a handwheel, the side stops can be adjusted in their position.

A feed stack 13 provided for processing is pushed into the stack region 36 of the stack feeder 1, with the result that the leading edge of the feed stack 13 butts against the front abutment edges 20. With the aid of the threaded spindles 21, 22, the lateral abutment rails 19 are brought into abutment with the side edges of the feed stack 13. By means of these, the feed stack 13 may, moreover, be displaced into a desired lateral operating position. With the aid of the raising and lowering chain 5, on which the guide carriage 9 is fastened, the guide carriages 9 are lowered, as can be seen in Figure 6a. Once the hook fingers 32 reach the level of the feed table, their front region comes into contact with said table and, since the hook curvature has a favourable tangent, at the point of contact, which is oriented upwards towards the centre of the stack, the hook fingers are pivoted back laterally in the direction of the guide strip 8 counter to the spring force of the spring 27 in the direction of the guide strip 8, as is represented in Figure 6b. If the hook fingers 32 are beneath the stack table, they are moved back into their initial position by the spring force of the spring 27. The guide carriages 9 may then, as is represented in Fig. 6c, be raised by the raising chains 5. In this arrangement, they engage behind the retaining bolts 15 fastened on the stack table and thus carry along the feed stack 13 upwards in the

direction of the suckers 4. Such a stack lifting apparatus permits simple prestacking. When the guide carriage 9 has been moved upwards, empty stack tables can be drawn out of the stack-table-retaining carrier hooks 11 in a simple manner by hand. Thereafter, the guide carriages 9 are lowered to the new feed stack 13, which has already been pushed into the adjusted abutment strips 18, in order to receive said stack directly for conveying purposes. In this arrangement, hooks 11 also permit desired lateral changes in position after the feed stack 13 has been received, as can be seen in Fig. 2.

A new feed stack 13 can also be pushed in, for example by hand, without the stack rollers 17 coming into contact with the floor 35, as can be seen in Fig. 4. Fig. 5 shows the stack being received with the printing-shop floor 35 lowered beneath a normal level 34 of a floor. By the favourable guidance and suspension of the hook 11 with its pivot point 12 in the vicinity of the stack edge and the alignment of the pivot arm from the pivot point 12 to the receiving point on the hook finger 32, virtually parallel to the conveying direction and extending downwards to a relatively large extent, it is possible to utilise virtually the entire space between the pivot points 12 for the permissible format width, and low-level stack tables can be received without any difficulty.

LIST OF DESIGNATIONS

	1	Stack feeder
	2	Side wall
	3	Feed table
5	4	Suction conveying device
	5	Raising and lowering chain
	6	Drive unit
	7	Chain wheel
	8	Guide strip
10	9	Guide carriage
	10	Guide rollers
	11	Carrier hook
	12	Pivot pin
	13	Feed stacks
15	14	Bearing block
	15	Retaining bolt
	16	Stack table
	17	Stack rollers
	18	Abutment strip
20	19	Lateral abutment rail
	20	Front abutment rail
	21	Spindle
	22	Spindle
	23	Shaft
25	24	Guide block
	25	Guide block
	26	Clearance
	27	Spring
	28	Spring bearing
30	29	Spring bearing
	30	Bearing wall
	31	Crossmember
	32	Hook finger
	33	Hook opening
35	34	Normal floor level
	35	Lowered printing-shop level
	36	Stack region
	37	Guide groove



Patent Claims

1. Stack table receiver of a stack lifting apparatus, having vertically guided, pivotably arranged receiving means for the stack table, which each exhibit
5 a pivot point which is arranged outside the stack table, the receiving means being carrier hooks (11) which are aligned with respect to the stack table (16), the carrier hooks (11) each exhibiting a hook opening (33), provided
10 beneath the pivot point, and a hook finger (32) reaching into the lifting range of the stack table (16), the carrier hooks (11) being hinged in a pivotable manner on carriages (9), guide strips (8) being provided for
15 guiding the carriages (9), and each carriage (9) being arranged in driving connection with a raising and lowering chain (5).

2. Stack table receiver according to Claim 1, characterized in that each carriage (9) exhibits in each case two carrier hooks (11).

3. Stack table receiver according to one of the
20 preceding Claims 1 or 2, characterized in that the carrier hook (11) is in operating connection with an energy storage device (27).

4. Stack table receiver according to Claim 3, characterized in that the energy storage device is a
25 compression spring (27), and in that one spring bearing (28) of the compression spring (27) is provided on the carrier hook (11) and another spring bearing (29) is provided on the carriage (9).

5. Process for receiving and for raising and
30 lowering a stack table (16) which can be aligned laterally, in which carrier hooks (11), each exhibiting a hook opening (33) and a hook finger (32), are guided, to receive a stack, on chains (5) from the top to beneath the stack table (16), in which process they are deflected
35 laterally from their position at the level of the stack table (16) by the latter and take up their original position again beneath the stack table, whereupon the carrier hooks are raised again by the chains (5), these automatically grasping and raising the stack table (16).



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6. Use of the apparatus according to Claim 1 or of the process according to Claim 5 in a laterally adjustable paper-sheet feeder in prestacking operation.