

The invention relates to a sheet feeder according to the preamble of the patent claim.

It is known, in the feeder of a sheet-processing machine, in particular a printing machine, to scan the upper edge, facing the machine, of a sheet pile located in the feeder by means of a detector device and, using appropriate signals of said detector device, to control a drive in such a way that the said upper edge maintains a specific level (see DE 34 11 886 A1). Depending on the design of such a detector device, it may be necessary in this case for a specific horizontal distance between said detector device and a scanned portion of said upper edge not to be exceeded. However, this may be the case if the sheet pile does not bear sufficiently precisely against front stops which are customary in such feeders, that is to say the sheet pile is disposed, for example, at an angle to the processing direction or has a front face which is curved in this direction. However, such irregularities can also result in the fact that sheets which have been removed from the sheet pile by means of a sheet separating device and have been placed on the path in the direction of the sheet-processing machine in a processing direction are not picked up satisfactorily by so-called cycle rollers which are customary in such feeders. The said irregularities can thus lead to interferences in the operation of a sheet-processing machine.

An insufficiently precise contact of the type described can result, in particular, in sheet feeders having a non-stop device, specifically due to the fact that a residual sheet pile which is already located in the sheet feeder and has been processed for the most part is combined with a main sheet pile, which is initially completely independent of said residual sheet pile and is newly introduced into the sheet feeder, to form a total pile. Such a sheet feeder is known, for example, from the publication DE 26 37 086 B1.

In this case, a residual sheet pile rests temporarily on bearing bars which are oriented in the processing direction and are borne by at least two crossmembers,

arranged transversely relative to said bearing bars and borne by a lifting device, and are drawn counter to the processing direction to combine the residual sheet pile with a main pile which is placed from below against the bearing bars. Provided to secure the position of the residual sheet pile during such a drawing operation is a pile stop which can be placed against the residual sheet pile. This pile stop can be fixed in a position once set and thus provides a support for a residual sheet pile against the latter being displaced counter to the processing direction.

A possibly insufficient pile alignment at the said front stops due to the conditions mentioned at the beginning is not eliminated by a sheet feeder of such a design.

A device is known from the publication DE 29 39 267 A1, by means of which an upper region of a first pile side face of a sheet pile arranged in a sheet feeder can be aligned at a stop assigned to said pile side face. In this case, a displacement member is provided, which works against said stop and acts on the second pile side face located opposite the first. The said pile side faces, however, are those which are not brushed over by components of the sheet feeder, even in the case of a sheet feeder fitted with a non-stop device, specifically pile side faces facing in directions transversely relative to the processing direction. However, only a lateral pile alignment is thus possible in a sheet feeder fitted with a non-stop device.

The invention is based on the object of designing a sheet feeder of the generic type in such a way that interferences in the operation of a sheet-processing machine are avoided, insofar as these interferences are caused by the fact that a sheet pile in the feeder of such a machine does not bear sufficiently precisely against front stops which are customary in such feeders. This object is achieved by a device specified in the patent claim.

A sheet feeder according to the invention

furthermore proves to be advantageous insofar as only relatively low requirements are still placed on the prestacking of sheet piles, and an interference-free operation in the sense mentioned is also guaranteed  
5 without manual aligning work by an operator.

The invention is explained in greater detail below with reference to drawings of an exemplary embodiment. In these drawings,

10 Figure 1 shows a section, passing perpendicular to a stop rail, through a non-stop device, and its assignment to a pile arrangement in a sheet feeder,

Figure 2 shows a section along the line II in Figure 1,

15 Figure 3 shows a frame, separated from a displacement device for a rake formed by grate bars,

Figure 4 shows a section along the line IV in Figure 3,

Figure 5 shows a view in the direction of the arrow V in Figure 3,

Figure 6 shows a section along the line VI in Figure 3,

20 Figure 7 shows the rake, separated from the displacement device,

Figure 8 shows a section along the line VIII in Figure 7,

25 Figure 9 shows a partial view in the direction of the arrow IX in Figure 7,

Figure 10 shows a section along the line X in Figure 7,

Figure 11 shows a cross-slide, separated from the displacement device,

30 Figure 12 shows a view in the direction of the arrow XII in Figure 11,

Figure 13 shows a view in the direction of the arrow XIII in Figure 11,

Figure 14 shows a partial view in the direction of the arrow XIV in Figure 13,

35 Figure 15 shows a crossmember arrangement, separated from the displacement device,

Figure 16 shows a section along the line XVI in Figure 15,

Figure 17 shows a view in the direction of the arrow XVII

in Figure 16,  
Figure 18 shows a view in the direction of the arrow  
XVIII in Figure 1.

In Figure 1, a stacking space of the sheet feeder  
5 is represented only diagrammatically by the representation of a residual sheet pile 1 and of a main sheet pile 2 by means of dot-dashed lines in one phase of the combination, in which the residual sheet pile 1 is seated with its lowest sheet on horizontally arranged grate bars  
10 3 of a displacement device denoted in total by 4, and the main sheet pile 2 is placed with its uppermost sheet from below against the grate bars 3 which, in this case, are located in the position drawn in dot-dashed lines and displaced in the longitudinal direction of the grate bars  
15 3 relative to that drawn in uninterrupted lines. The free ends of the grate bars 3, protruding beyond the first side face, facing the machine, of the pile arrangement are supported in a known manner by means of an auxiliary crossmember 5 which can be seen in cross-section in  
20 Figure 1.

The main pile 2 is seated with its lowest sheet on a pile bearing plate 6. In a sheet feeder of a printing machine, a sheet pile seated on such a pile bearing plate is raised during running-on by means of a  
25 known lifting mechanism to the same extent as the height of the sheet pile decreases until it finally becomes a residual sheet pile. The residual sheet pile 1 is thus seated with its lowest sheet, before it is combined with the main pile 2, firstly likewise on a pile bearing plate denoted by 6 in Figure 1 until said pile bearing plate is removed, after the residual sheet pile 1 has been supported from below by means of the grate bars 3, in a known manner by lowering by means of the said lifting mechanisms. This pile bearing plate 6 is provided with  
30 mutually parallel grooves 7 on its horizontally aligned upper side. A group of the mutually parallel grate bars 3 is combined to form a rake 8. In this case, the cross-sections of the grate bars 3 and of the grooves 7 are matched to one another in such a way that the grate bars

3 can be inserted into the grooves 7 in their longitudinal direction in such a way that the residual sheet pile 1 is supported from below by the grate bars 3 in one phase of the combination.

5           To displace the grate bars 3 in their longitudinal direction, guide rails 9 are provided for this purpose in the displacement device 4, on which guide rails the rake 8 is displaceably mounted.

10           Following on from the phase of the combination illustrated in Figure 1 with a view to the mutual position of the residual sheet pile 1, main sheet pile 2 and grate bars 3 enclosed between them, in a final phase of the combination, is the pulling-out of the grate bars 3 from the illustrated pile arrangement in a removal  
15           direction pointing towards the right in Figure 1. In order to prevent sheets located in the vicinity of the grate bars 3 likewise being displaced in the removal direction during this process, a horizontal stop rail 10  
20           is provided, which extends transversely relative to the longitudinal direction of the grate bars 3 and is arranged so as to be displaceable in the longitudinal direction of the grate bars 3, with openings 11 which can be seen in Figures 4 and 5 for the passage of the grate bars 3 through said stop rail 10. An aligning face 47,  
25           provided on said stop rail 10, is disposed directly opposite a second side face 1.2 or 2.2 located opposite the first side face 1.1 or 2.1 of the residual sheet pile 1 or of the main sheet pile 2.

30           As can be seen from Figure 2, a side part of a frame 12 is formed in each case by a guide rail 9 and an end-side limb of a frame 12 is formed by the stop rail 10.

35           The frame 12 illustrated in Figure 3 separated from the displacement device 4 and in a position corresponding to the position in Figure 2 is furthermore reinforced by means of a first cross-strut 13 at a front end located on the left in Figure 3 and by means of a second cross-strut 14 at a rear end of the guide rail 9 located on the right in Figure 3.

As can be seen from Figure 6, a respective guide rail 9 is composed of an upper guide rod 15 and of a lower guide rod 16. Of these, the respective upper guide rod 15 serves as a straight guide for the rake 8 which is illustrated in Figure 7 separated from the displacement device 4 and in a position corresponding to the position in Figure 2. This rake 8 is formed from a bridge 17 in which the grate bars 3, as can be seen most clearly in Figure 8, are attached at one of their ends. The bridge 17 extends transversely relative to the longitudinal direction of the grate bars 3 and has bridge bearings in the form of straight-guide profiles 18 which engage around a respective upper guide rod 15 of one of the guide rails 9. For one of the straight-guide profiles 18, its connection to a respective upper guide rod 15 is represented in Figure 9, the upper and the lower guide rod 15 and 16 being illustrated in each case by dot-dashed lines. The guide rails 9 and the grate bars 3 extend parallel to one another, so that the rake 8 is mounted so as to be displaceable in the longitudinal direction of the grate bars 3 relative to the frame 12.

In the exemplary embodiment illustrated, a self-acting displacement of the rake 8 relative to the frame 12 is provided. For this purpose, band cylinders 19 are inserted between the first and the second cross-strut 13 and 14 of the frame 12, which band cylinders are oriented parallel to the guide rails 9 and whose bands, as indicated by dot-dashed lines in Figure 10, are connected to the bridge 17 of the rake 8. In Figure 7, corresponding diagrammatically illustrated connection means, represented by dot-dashed lines, for connecting the bands of the band cylinder 19 to the bridge 17 are denoted by 20.

The frame 12, in turn, is mounted so as to be displaceable in the longitudinal direction of the grate bars 3 and transversely relative to the longitudinal direction of the grate bars 3 in the horizontal plane. In the present exemplary embodiment, the displacement device 4 is fitted with a cross-slide 21 for this purpose.

The cross-slide 21 illustrated in Figure 11 separated from the displacement device 4 and in a position corresponding to the position in Figure 2 extends transversely relative to the grate bars 3 from a guide rail 9 on a first longitudinal side of the frame 12 to the opposite guide rail on a second longitudinal side of the frame 12 and has straight-guide profiles 22 corresponding to the straight-guide profiles 18 provided on the rake 8 (Figures 9, 10). These straight-guide profiles 22 engage around a respective lower guide rod 16 of a respective guide rail 9. The frame 12 is thus displaceable relative to the cross-slide 21 and the rake 8 is displaceable relative to the frame 12, in each case in the longitudinal direction of the grate bars 3, the cross-slide 21, in turn, being fitted with further straight-guide profiles 23 which are oriented transversely relative to the grate bars 3 (see Figures 12, 13) and which will be described in detail below.

To press the aligning face 47 formed on the frame 12 in the exemplary embodiment against the second side face 1.2 or 2.2, self-acting adjusting means are provided in the form of a piston-cylinder arrangement which has a first cylinder 26 and a second cylinder 27 and acts between the cross-slide 21 on the one hand and the frame 12 on the other hand. The first cylinder 26 is flanged onto a guide head 28 which is guided by means of a slide path 29 which is oriented in the longitudinal direction of the grate bars 3 and is attached to the cross-slide 21, whereas the piston rod of this first cylinder 26 is linked to a strap 30 attached to the cross-slide 21 (see Figures 11, 13, 14). The second slide 27 is linked by its one end to the guide head 28, whereas the end of the piston rod of the second cylinder 27, facing away from said end, is connected in an articulated manner to a further strap 31 which, in turn, is attached to the frame 12.

To adjust desired height positions of the stop rail 10, a positioning device is provided in the form of a lifting device which bears the displacement device 4

and, at the same time, serves for lowering and lifting the rake 8. This lifting device has a horizontal cross-member arrangement 24 aligned transversely relative to the grate bars 3.

5            Provided on the crossmember arrangement 24, illustrated in Figure 15 separated from the lifting device and in a position corresponding to the position in Figure 2, are straight-guide paths 25 which extend horizontally in the exemplary embodiment, are oriented  
10 transversely relative to the grate bars 3, and are in engagement with the straight-guide profiles 23 provided on the cross-slide 21 and mentioned above.

          In the exemplary embodiment, a self-acting displacement of the cross-slide 21 relative to the  
15 crossmember arrangement 24 is furthermore provided. For this purpose, a linear adjustment drive 33 is attached to the crossmember arrangement 24, and a connecting rod of the linear adjustment drive 33 is linked to a further strap 34 which is attached to the cross-slide 21.

20            In Figures 15, 16 and 17, one end of the cross-member arrangement 24, which can be seen in its entirety in Figure 18, of the positioning device is illustrated in each case. This crossmember arrangement 24 is connected, in a manner which is not illustrated in detail, to a  
25 lifting drive 36 by a traction means 35 attached thereto, such as, for example, a chain or a toothed belt (see Figures 1 and 18), and is vertically displaceable along a lifting structure 32. For this purpose, a respective end of the crossmember arrangement 24 is guided on  
30 vertically extending guide paths 37 provided on a lifting structure 32.

          In the exemplary embodiment, the guide paths 37 are designed as rectangular profile bars whose cross-sections can be seen in Figure 15 in dot-dashed lines.

35            A respective end of the crossmember arrangement 24 is provided with running rollers 38 and 39 which roll off on the guide paths 37 and are arranged in such a way that they fix the crossmember arrangement 24 transversely relative to the longitudinal direction of the guide

paths 37.

5 The lifting structure is designed as a self-supporting construction and, as can be seen most clearly in Figure 1, is set up outside the pile space which is represented diagrammatically in Figure 1 by the dot-dashed illustration of the residual pile 1 and the main  
10 pile 2. This lifting structure 32 is composed of a first column 40, a second column 41 and a yoke 42/ connecting the upper ends of these columns 40 and 41, and thus forms a two-legged gantry (see Figure 18). In this case, a respective column 40 or 41 is formed by means of a hollow profile.

15 The traction means 35 provided for lifting and lowering the crossmember arrangement 24 are illustrated in the exemplary embodiment by toothed belts. Deflection wheels 43, toothed corresponding to the toothed belts, are mounted on the yoke 42 and are wrapped around by a respective toothed belt. In this case, a first strand of a respective toothed belt bears the crossmember arrangement  
20 ment 24, and a second strand bears in each case a counter-weight 44 which is inserted in the hollow profile of a respective column 40 or 41.

List of reference numerals

|    |    |                                     |
|----|----|-------------------------------------|
|    | 1  | Residual sheet pile                 |
|    | 2  | Main sheet pile                     |
|    | 3  | Grate bar                           |
| 5  | 4  | Displacement device                 |
|    | 5  | Auxiliary crossmember               |
|    | 6  | Pile bearing plate                  |
|    | 7  | Groove                              |
|    | 8  | Rake                                |
| 10 | 9  | Guide rail                          |
|    | 10 | Stop rail                           |
|    | 11 | Opening in the stop rail 10         |
|    | 12 | Frame                               |
|    | 13 | First cross-strut                   |
| 15 | 14 | Second cross-strut                  |
|    | 15 | Upper guide rod of the guide rail 9 |
|    | 16 | Lower guide rod of the guide rail 9 |
|    | 17 | Bridge                              |
|    | 18 | Straight-guide profile              |
| 20 | 19 | Band cylinder                       |
|    | 20 | Connection means                    |
|    | 21 | Cross-slide                         |
|    | 22 | Straight-guide profile              |
|    | 23 | Straight-guide profile              |
| 25 | 24 | Crossmember arrangement             |
|    | 25 | Straight-guide path                 |
|    | 26 | First cylinder                      |
|    | 27 | Second cylinder                     |
|    | 28 | Guide head                          |
| 30 | 29 | Slide path                          |
|    | 30 | Strap                               |
|    | 31 | Strap                               |
|    | 32 | Lifting structure                   |
|    | 33 | Linear adjustment drive             |
| 35 | 34 | Strap                               |
|    | 35 | Traction means                      |
|    | 36 | Lifting drive                       |
|    | 37 | Guide path                          |

- 38 Running roller
- 39 Running roller
- 40 First column
- 41 Second column
- 5 42 Yoke
- 43 Deflection wheel
- 44 Counter-weight
- 46 Front stop
- 47 Aligning face

Patent Claim

Sheet feeder having a non-stop device for the continuous loading of a sheet-processing machine in a processing direction,

- 5     -     a front stop (46) being provided for a first side face (1.1; 2.1), facing the machine, of a sheet pile (1, 2) located in the sheet feeder,
  - the non-stop device having a rake (8) which is horizontally displaceable in and counter to the  
10     processing direction, has mutually parallel grate bars (3) and temporarily bears a residual sheet pile (1) located in the sheet feeder before it is combined with a main sheet pile (2), located below said residual sheet pile, to form a total pile,
  - 15     -     the non-stop device having a horizontal stop rail (10) which, in one phase of the combination, is placed against a respective second side face (1.2; 2.2), facing away from the front stop (46), of the residual sheet pile (1) and of the main sheet pile  
20     (2) in the region of the grate bars (3), and
  - the rake (8) and the stop rail (10) being supported by a lifting device,
- characterized by aligning means having an aligning face (47) which can be placed against the sheet pile (1, 2)  
25     under the effect of an aligning force, produced by self-acting adjusting means (26, 27), in the direction of the front stop (46), the aligning face (47) being formed on the stop rail (10).

