

This invention firstly relates to a process for conveying material cut into transverse strips, which is situated on the output field of a device for cutting stacked sheet material, to an input field of the device for the purpose of cutting this material into longitudinal strips, wherein the device comprises a cutting table with a table area which has a field of action above which a cutting knife and the crosshead of a press are situated, with the input field behind it for receiving the material to be cut and with the output field in front of it for receiving the cut material, and a forward feed device associated with the input field is provided for the material to be cut.

In order to make subsequent longitudinal cuts in material cut into transverse strips, it is known that the material can be rotated by 90° on the output field so that the cut transverse strips are then oriented longitudinally, and that the material can then be pushed back over the field of action, i.e. under the cutting knife and the crosshead of the press, on to the input field, in order subsequently to cause the mechanical cutting operation to take place afresh, in which operation, for the purpose of cutting the next section, the forward feed device advances the material situated on the input field into the region of the field of action, where the cuts are made at defined section intervals by means of the cutting knife. Apart from the fact that the stack of cut material, which is usually cuboid in shape, has hitherto been pushed back manually, and a considerable expenditure of force was required for this purpose, an additional hazard exists for the operator in that he always has to work in the region of the cutting knife and the crosshead of the press. Apart from this, the operator has to align the material to be cut from the output field on the input field, so that the alignment operation is of an extremely complicated nature.

A process for cutting stacks of sheet material is known from DE-A-2 911 473 in which the material to be cut is fed to a cutting unit and is positioned, pressed and cut, the feeding operation being effected in such a way that the stack is pressed in outside the cutting unit and is fed in its pressed-in state to the cutting unit, whereupon the cutting operation takes place. A device for carrying out the process has a receiving table on the back of the cutting unit, which receiving table can travel and swivel at least in the direction of the cutting unit and

transversely thereto, wherein a pressing device is associated with the receiving table and can move with the latter. The material to be cut can thus be pressed in in the region of the back of the cutting unit and can move and swivel in relation to the cutting knife.

The object of the present invention is firstly to provide a process which facilitates a production flow when making longitudinal cuts in stacked sheet material subsequent to cutting it transversely.

This object is achieved by means of a process of the type cited initially in that the material which is present in transverse strips and which is to be cut into longitudinal strips is taken from the output field on to a thin-walled plate-like conveying base, and the conveying base is fed together with the material to the input field of the device via at least one table disposed at the side of the device, the table area of which table can be disposed at the same level as that of the cutting table of the device, and is removed there from the conveying base aligned in relation to the input field, wherein the material which is present in transverse strips and which is to be cut into longitudinal strips is rotated from the transverse direction into the longitudinal direction when it is taken on to the conveying base or together with the conveying base or after its removal from the conveying base, before the longitudinal cut.

According to the invention, after the transverse cut the material which is to be cut in its longitudinal direction is taken at the side of the device from the output field to the input field. Material which is placed on the input field can even be cut during the movement of material from the output field to the input field, so that the cutting machine which is incorporated in the process can be operated continuously.

It is deemed to be particularly advantageous if the material which is present in transverse strips is taken, rotated in the longitudinal direction, on to the conveying base. The material to be cut thus assumes its final orientation before a conveying movement of the conveying base from the field of action to the input field, so that essentially it merely has to be ensured that the material has a defined alignment on the input field so that it can be fed to the field of action by means of the forward feed device. In this respect the conveying base is advantageously positioned adjacent to the output field on the table and a first alignment stop

disposed parallel to the cutting plane and a second alignment stop disposed perpendicularly to the first stop are lowered on to the conveying base. The rotated material is aligned at these two alignment stops, and after the stops have moved from their locating positions on the material the conveying base is moved with the material into the region of the input field. The conveying base should advisedly be moved with the material on to the input field towards a lateral stop associated with the latter and a stop should be moved behind the material in the direction of movement of the conveying base, wherein the conveying base is withdrawn below the material in the opposite direction of movement. The stop placed behind the material should execute a movement such that it again clamps the aligned material which is already in the region of the input field between itself and the lateral stop associated with the input field. This stop thus clamps the material before the movement of the conveying base. The material is finally aligned on the input field perpendicular to the latter by means of the forward feed device.

According to one particular embodiment of the invention, provision is made for the surface of the conveying base not to be completely occupied by material, and for the movement of the conveying base to be effected by means of suction- and/or gripper devices or the like which act on the unoccupied regions of the conveying base.

The table disposed at the side of the cutting table may be of one-piece or multi-part construction. If a multi-part construction is employed, provision is made for the table areas of the table parts to be raiseable and/or lowerable in relation to their level with respect to the table area of the cutting table. This may be desirable in particular, for example, when auxiliary units for the management of the cutting operation are disposed at the side of the field of action, which units make it necessary to transport the conveying base above the auxiliary unit or units. In a situation where the width of the auxiliary unit or units is small, the gap formed between the table parts which are disposed at the side of the auxiliary units can be bridged perfectly by the conveying base with the material situated thereon. If the gap is larger, however, the surface of the respective auxiliary unit itself is constructed as a table area and the table areas of the adjacent table parts are brought to its level.

This invention also relates to a device for cutting stacked sheet material, with a cutting table with a table area which has a field of action above which a cutting knife and a crosshead of a press are located, with an input field behind the field of action for receiving the material to be cut and with an output field in front of the field of action for receiving the cut material, and with a forward feed device, which is associated with the input field, for the material to be cut. In a device of this type it is proposed according to the invention that an additional table is disposed at the side of the cutting table, the table area of which additional table can be positioned at the same level as the table area of the cutting table, wherein one end of the table is disposed adjacent to the output field and the other end of the table is disposed adjacent to the input field, and a thin-walled, plate-like conveying base is provided for conveying the material from the output field to the input field. When the table areas of the cutting table and the additional table are positioned at the same level, material which has been cut transversely can be guided past the actual cutting machine at the side and fed to the input field of the cutting table without it being necessary to move the material over the field of action, i.e. under cutting knife and the crosshead of the press. The additional table advantageously comprises a first table part at the side of the output field and a second table part at the side of the input field, wherein the table parts are arranged so that they can be positioned in a plane and adjacent to each other and to the cutting table. A region of one table part can be constructed as a raisable and lowerable lateral placement device associated with the field of action, wherein its upper surface forms a plane with the table area of the remaining region of this table part in a lowered position. In order to align the material, the first table part is advisably provided with an alignment stop which is disposed perpendicularly to the cutting plane, and an additional alignment stop disposed parallel to the cutting plane. If the alignment stops are situated in the direction of movement of the material when it is conveyed from the output field to the input field, they should be removable from the region of the material, and in particular should be raiseable, lowerable or horizontally displaceable. In addition, the second table part can be provided with an alignment stop parallel to the cutting plane for the material to be cut. Finally, the cutting table is provided with a lateral stop disposed perpendicularly to the cutting plane for the final alignment of the material on the input field of the cutting table.

Additional features of the invention are illustrated in the description of the Figures and in the subsidiary claims, wherein it should be noted that all individual features and all combinations of individual features are an essential part of the invention.

Figures 1 to 10 illustrate a possible process according to the invention with reference to a conceivable variant of a device, without being restricted thereto.

Figure 1 is a plan view of a considerably simplified device. A cutting table 1 comprises a horizontal table surface 2 which is composed of an input field 3, a field of action 4 disposed in front of the input field, and an output field 5 disposed further in front of the input field. The table area 2 is rectangular. A cutting knife is mounted in a frame 6 extending above the field of action 4, the cutting plane of which cutting knife runs perpendicularly to the plane of the page through line 7. In addition, a crosshead of a press is mounted in the frame 6 on the side of the cutting knife facing the input field 1. A forward feed bracket 8, which can travel in the longitudinal direction of the table area 2, adjoins the input field 3 on the side of the latter remote from the frame 6. The contact face 9 of the forward feed bracket for the material to be cut is disposed parallel to the cutting plane 7.

A narrow side 12 of a table part 11 is disposed adjacent to the side 10 of the output field 5, wherein this side only partially overlaps the side 10. The table part 11 has a rectangular table surface 13, and its longitudinal side 14 parallel to the cutting plane 7 is disposed at a slight distance from the frame 6, so that the table part 11 is seated directly against the cutting table 1 over most of the length of the side 10 of the output field 5. The table area 13 of the table part 11 normally forms a plane with the table area 2 of the cutting table 1, the table part 11 being raisable, however.

A second table part 15, which also has a rectangular table surface 16, is disposed adjacent to the input field 3. The longitudinal edge of the table part 15 is directly adjacent to the input field 3. The two table parts 11 and 15 are spaced apart from each other corresponding to the width of the frame 6, the space between the table parts 11 and 15 accommodating a housing 18 in which a lateral placement device is mounted which can travel in the longitudinal direction of the frame 6 in the immediate vicinity of the cutting plane 7 in the

space between the cutting knife and the crosshead of the press. The housing 18 is of flat construction at the top and thus virtually constitutes an additional table part with a table surface 19. The table areas 13 and 16 of the table parts 11 and 15 can be raised to the level of the table surface 19.

A stop 20, which is oriented perpendicularly to the table surface 13, which can be lowered on to the table surface 13, and which extends parallel to the cutting plane 7, is disposed on the side of the table part 11 facing the housing 18. An additional stop 21 is situated perpendicular to the first stop above the table part 11. An additional frame 22 can travel in the longitudinal direction of the table part 11, and thus in the direction of the cutting plane 7. This additional frame is disposed transversely to the table part 11 and is provided with a plurality of suction elements 23 over its length. A further frame 24 can travel in the longitudinal direction of the table part 15, and thus perpendicularly to the cutting plane 7, above this table part and above the housing 18 as far as the table part 11. The frame 24 extends across the table part 15 and also has various suction elements 25 over its length. A clamping device 26 can travel across the table part 15 from the side of this table part remote from the input field 3 to the forward feed bracket 8. As seen in the longitudinal direction of the table part 15, the clamping device 26 has two clamping elements 27 disposed spaced apart from each other. The cutting table 1 is provided with a lateral stop 28 in the region of its input field 3 on its side remote from the table part 15.

The process according to the invention for conveying the material will next be described. An untrimmed stack of material in sheet form is first placed on the table area 2 in the region of the input field 3 with the forward feed bracket 8 moved back, and is aligned at the lateral stop 28. In this respect the untrimmed stack can be taken from a vibrating table over the table part 15 to the cutting table 1 via a gripper system. The forward feed bracket 8 is then brought into contact with the stack and the latter is advanced into the field of action 4. Sectional cuts are then made successively, in which the stack is cut into a plurality of transverse strips. These transverse strips are denoted by reference numeral 32 in the illustration of Figure 1. The table area 13 of the table part 11 is positioned at the same level as the table area 2 of the cutting table 1. A thin-walled plate-like conveying base 29, which projects beyond the longitudinal side 14 of the table part 11 by a certain distance, is placed

on the table part 11. The longitudinal sides 30 of the conveying base 29 are parallel to the longitudinal side 14 of the table part 11, and the transverse sides 31 of the conveying base 29 are aligned parallel to the narrow side 12 of the table part 11. The stop 20 is lowered on to the conveying base 29 at the height of the longitudinal side 14 of the table part 11. The stop 21, which abuts the stop 20 and which is positioned perpendicularly thereto, is also lowered on to the conveying base. The frame 22 is positioned above the half of the table part 11 remote from the output field 5, and its suction elements 23 are lowered on to the surface of the conveying base 29.

The transverse strips 32 produced by cutting are successively pushed over the table areas 2 and 13, which form a plane, on to the thin-walled conveying base 29, and in the course of this procedure are simultaneously rotated by 90°, so that they are situated perpendicular to the cutting plane 7, as can be seen in relation to the table part 11. In this respect, the transverse strips 32 can be taken manually or also by means of a rotary gripper from the output field 4 of the cutting table 1 on to the table part 11. The individual transverse strips 32 are successively aligned at the stops 20 and 21. Whilst the conveying base 29 is being loaded it can be moved in the longitudinal direction of the table part 11 under the stops 20 and 21, which are only resting loosely, by means of the suction elements 23, in order to facilitate the feeding of the individual transverse strips 32 on to the conveying base 29.

Figure 1 shows a loaded conveying base 29, on which seven transverse strips 32 are positioned and are aligned at the stops 20 and 21. The associated stop 21 is then moved away from the output field 6 [sic] together with the frame 22, and thus with the suction elements 23, until the transverse side 31 of the conveying base 29 which is associated with the input field 5 is aligned with the longitudinal edge 17 of the table part 15. The table parts 11 and 15 are then raised to the level of the table surface 19 of the housing 18. Figure 2 shows the lowered state and Figure 3 shows the raised state in the direction of view A of Figure 1. The stop 20 has previously been moved horizontally out of the region of the conveying base 29, and the suction elements 23 associated with the frame 22 have previously been raised. As can be seen from the illustration of Figure 2, simultaneously with this raising movement the frame 24 with the suction elements 25 which is disposed in the region of the second table part 15 is moved towards the first table part 11 and the suction elements

25 are lowered there on to the region 33 of the conveying base 29 projecting above the table part 11. As can be seen from the illustration of Figure 4, which relates to the same direction of view, following this the conveying base with the material 34 situated on it is pulled completely on to the table part 15, after which the table part 15 is lowered to its initial level again and the suction elements 25 are disengaged from the conveying base 29. On the side of the conveying base 29 remote from the input field 3 the clamping elements 27 of the clamping device 26 grip the conveying base and push it on to the input field 3 of the cutting table 1 until the frontmost transverse strip 32 is seated against the lateral stop 28. A stop 35 disposed parallel to the lateral stop 28 is then lowered exactly behind the material 34 which has been pushed over. These conditions are shown in part in the illustration of Figure 5, which represents the situation in the direction of view B of Figure 1. After the stop 35 has been lowered on to the conveying base 29 the clamping device 26 travels towards the table part 15 again, whereupon the conveying base 29 is withdrawn from underneath the material 34 formed from the individual transverse strips 32. These conditions are illustrated in Figures 6 and 7, which relate to the same direction of view. Figure 7 also clearly shows that after reaching its initial position the first table part, together with the conveying base 29, is again raised to the level of the table surface 19 of the housing 18. The clamping strips 27 are subsequently removed from the conveying base 29. Figures 8 to 10 show the additional process steps, again in the direction of view A, for transporting the conveying base 29 into its initial position. In Figure 8 the suction elements 25 are again lowered on to the conveying base 29, and the latter is then displaced towards the first table part in its initial position. The frame 24 with the suction elements 25 is moved back into its initial position, and the two table parts 11 and 15 are then lowered to the level of the cutting table 1 and the stop 20 is moved out again. This is followed by the renewed loading of the conveying base 29 with transverse strips 32. During the movement of the conveying base back to the first table part 1 as described above, and after raising the stop 35, the contact face 9 of the forward feed bracket 8 is brought into contact with the rear face 36 of the material 34 which is now due to be cut, and the material is advanced according to the desired thickness of the blocks to be produced after the cut.

CLAIMS

1. A process for conveying material cut into transverse strips, which is situated on the output field of a device for cutting stacked sheet material, to an input field of the device for the purpose of cutting this material into longitudinal strips, wherein the device comprises a cutting table with a table area which has a field of action above which a cutting knife and the crosshead of a press are situated, with the input field behind it for receiving the material to be cut and with the output field in front of it for receiving the cut material, and a forward feed device associated with the input field is provided for the material to be cut, characterised in that the material (34) which is present in transverse strips (32) and which is to be cut into longitudinal strips is taken from the output field (5) on to a thin-walled plate-like conveying base (29), and the conveying base (29) is fed together with the material (34) to the input field (3) of the device via at least one table (11, 15) disposed at the side of the device, the table area (13, 16) of which table can be disposed at the same level as that of the cutting table (1) of the device, and is removed there from the conveying base (29) aligned in relation to the input field (3), wherein the material (34) which is present in transverse strips and which is to be cut into longitudinal strips is rotated from the transverse direction into the longitudinal direction, when it is taken on to the conveying base (29) or together with the conveying base (29) or after its removal from the conveying base (29), before the longitudinal cut.
2. A process according to claim 1, characterised in that the material (34) which is present in transverse strips is taken, rotated in the longitudinal direction, on to the conveying base (29).
3. A process according to claim 1 or 2, characterised in that the conveying base (29) is positioned adjacent to the output field (5)' on the table (11, 15) and a first alignment stop (20) disposed parallel to the cutting plane (7) and a second alignment stop (21) disposed perpendicularly to the first stop are lowered on to the conveying base (29), and the material (34) is aligned at the stops (20, 21), and after the stops (20, 21) have



moved from their locating positions on the material (34) the conveying base (29) is moved with the material (34) into the region of the input field (3).

4. A process according to claim 3, characterised in that the conveying base (29) is moved with the material (34) on to the input field (3) towards a lateral stop (28) associated with the latter and a stop (35) is moved behind the material (34) in the direction of movement of the conveying base (29), and the conveying base (29) is withdrawn below the material (34) in the opposite direction of movement.
5. A process according to any one of claims 1 to 4, characterised in that the surface of the conveying base (29) is not completely occupied by material (34), and the movement of the conveying base (29) is effected by means of suction- (23, 25) and/or gripper devices (27) which act on the unoccupied regions of the conveying base (29).
6. A process according to any one of claims 1 to 5, characterised in that the table (11, 18, 15) is of multi-part construction and the table areas (13, 16) of the table parts (11, 15) can be raised and/or lowered in relation to their level with respect to the table area (2) of the cutting table (1).
7. A device for cutting stacked sheet material, with a cutting table with a table area which has a field of action above which a cutting knife and a crosshead of a press are located, with an input field behind the field of action for receiving the material to be cut and with an output field in front of the field of action for receiving the cut material, and with a forward feed device, which is associated with the input field, for the material to be cut, characterised in that an additional table (11, 15) is disposed at the side of the cutting table (1), the table area (13, 16) of which additional table can be positioned at the same level as the table area (2) of the cutting table (1), wherein one end of the table (11, 15) is disposed adjacent to the output field (5) and the other end of the table (11, 15) is disposed adjacent to the input field (3), and a thin-walled, plate-like conveying base (29) is provided for conveying the material (34) from the output field (5) to the input field (3).



8. A device according to claim 7, characterised in that the table (11, 15) comprises a first table part (11) at the side of the output field (5) and a second table part (15) at the side of the input field (3), wherein the table parts (11, 15) are arranged so that they can be positioned in a plane and adjacent to each other and to the cutting table (1).
9. A device according to claim 7 or 8, characterised in that a region (18) of one table part (11, 18, 15) is constructed as a raisable and lowerable lateral placement device associated with the field of action (4), wherein its upper surface forms a plane with the table area (19) of the remaining region (18) of this table part (11, 18, 15) when the table parts (11, 15) are lowered.
10. A device according to any one of claims 7 to 9, characterised in that the first table part (11) has an alignment stop (21), which is disposed perpendicularly to the cutting plane (7), for the material (34) to be cut.
11. A device according to any one of claims 7 to 10, characterised in that the first table part (11) has an alignment stop (20) for the material (34) to be cut, which alignment stop is disposed parallel to the cutting plane (7).
12. A device according to claim 11, characterised in that the alignment stop (20) is raiseable and lowerable.

