

DEVICE FOR CUTTING SHEETS OF MATERIAL

The present invention concerns a device for cutting sheets of material in stacks. The device comprises a board for the material to rest on, a blade for cutting the material, a holdfast that lowers onto the material, and a motorized saddle for advancing the material toward the blade. It is also provided with an electronic display for displaying the position of the saddle in a field and an electronic corrector for correcting the saddle's position. The corrector comprises a positioning component, a rotation-pulse generator, and a processor. The pulse generator can be manually controlled by means of a switch, the pulse generator controls the processor, and the processor controls the mechanism that drives the saddle. When the switch is in one state, the pulse generator is activated and a different direction-related deflection of the positioning component results in a different direction-related speed on the part of the saddle. When the switch is in the other state, the pulse generator is deactivated.

A device of this genus is known in practice. It includes a component called an electronic-control handwheel that corrects the position of the material-advance saddle. The extent of the advance must be corrected whenever manual or automatic operation of the drive mechanism does not position the saddle precisely enough. Automatic operation

usually requires less correction than does manual operation, which is controlled directly by the operator.

The purpose of the saddle in devices of this genus is to advance the material being cut. When, for whatever reason, the saddle advances the material too far and accordingly beyond the cutting position, there is no way of withdrawing the material as the saddle retracts, and it has to be done by the operator, by holding it against the saddle as the latter retracts or by pushing it back against the retracted saddle.

One drawback of the known electronic-control handwheel is that the operator never knows how rapidly the saddle is moving forward or backward. Although he has manual control of the positioning component, it is connected to the saddle-drive mechanism electronically by way of the rotation-pulse generator with its switch, and not mechanically. The operator actuates the switch by manipulating the positioning component or handwheel, and the processor detects the positioning component's starting position. The resulting change in the direction of the positioning component and accordingly in that of the pulse generator represents a reference for the particular speed the saddle is moving at in either direction. If the operator turns the positioning component one notch, the pulse generator will generate a single increment. That increment is detected by a counter.

The result is read out by the processor's software and exploited to drive the saddle in accordance with the direction the pulse generator is rotating in at a speed represented by the parameter +1. This parameter corresponds to a very slow advance on the part of the saddle toward the blade. If the positioning component is rotated farther, with two increments for example being generated and detected by the counter, the saddle will be advancing at a speed of +2, preferably twice as rapidly. If the deflection toward the positioning component is in the opposite direction, as represented by the parameter -3 for example, the saddle will be moving at thrice the speed +1 but in the opposite direction, away from the blade. The operator can accordingly in the event of a wide deflection on the part of the positioning component coarsely establish the desired saddle position at a relatively high speed and, by decreasing the increment, arrive at the intended dimension in the 1/10 or 1/100 mm range at low speed. When the switch is not on, of course, meaning that the positioning component has not been depressed, the counter will be at zero, and the zero state of the pulse generator will be independent of the positioning component's state. This mechanical uncoupling of the positioning component from the saddle-drive mechanism makes it difficult for the operator to adjust the desired position of the saddle.

The object of the present invention is to make it easier for the operator of the device to establish the correction position of the saddle in spite of the electronic uncoupling of the positioning component from the saddle-drive mechanism.

This object is attained in accordance with the present invention in a device of the aforesaid genus in that the speed the saddle is moving at is visually displayed directly or indirectly and directionally related in the display field while the position of the saddle is being corrected. The operator will accordingly be able to tell from the display field how rapidly and in what direction the saddle is moving. Since the position of the saddle will also be superimposed on the field, the operator will easily be able to estimate whether he can carry out the correction at a relatively high speed due to a relatively wide difference between the desired and the actual position of the saddle or whether he can do so only at a relatively low speed because the difference between the desired and actual position is slight. When the switch has been switched into its initial position and is accordingly closed, the display field will always include a graphical representation of the directionally related speed of the saddle in relation to its zero speed. The operator will always know, due to this relative level, what directionally related saddle speed he

should adjust the positioning component for. It will be practical for the speed of the saddle to be displayed on a dial with zero speed at the top and the speeds of the advancing saddle to the right of a zero point and the speeds of the retracting saddle to its left. It is unnecessary to display the speeds directly. It will be sufficient for the operator to be informed that he has established speed 1, 2, 3, etc. Along with the additional information "Saddle moving toward blade" or "Saddle moving away from blade".

When the device in one particular embodiment of the present invention is being operated automatically, in a mode, that is, wherein the dimension is being automatically approached, any external corrections can be undertaken only at relatively decreased speeds. In this case it will be preferable to design the software such that during automatic operation it will not convert wide differences in speed, those that extend beyond three steps in either direction, that is, but no more than three steps out of for example eight of those possible during manual operation.

One embodiment of the present invention will now be specified by way of example and without restricting it in any way with reference to the accompanying drawing, wherein

Figure 1 is a schematic illustration from the operator's point of view of a device for cutting sheets of material in stacks,

Figure 2 illustrates how the corrector employed in the device works,

Figure 3 is a detail illustrating the display field from the device illustrated in Figure 1 during manual operation, and

Figure 4 is an illustration similar to Figure 4 but representing automatic operation.

Figure 1 illustrates as viewed by the operator the basic structure of a device 1 for cutting unillustrated sheets of material in stacks. Device 1 includes a stand 2 with a guillotine 3 at the top and a board 4 with a surface 4a perpendicular to the plane of the sheets. A blade 5 travels up and down in guillotine 3 along with a holdfast. The holdfast is behind blade 5 and is not visible. Blade 5 and guillotine 3 can be moved in planes parallel to the plane of the sheets. A saddle 6 toward the rear 29 of board 4 advances the material being cut. The side of saddle 6 that faces the operator parallels the cutting plane of blade 5. Saddle 6 can be moved forward toward and backward away from the plane of projection in the vicinity of the rear 29 of board 4. Next to the front 7 of board 4 are two light-barrier grids 8 that protect the range traveled by the blade from interference. Above blade 5 and on the operator's side of guillotine 3 is a panel 9 with input and control buttons 10, a display field 11, and an electronic-control handwheel 12.

On the front of board 4 finally are two cutting-process triggering buttons 13 and at the bottom of the device 1 a pedal 14 for indicating a cutting process.

Figure 2 is a schematic representation of how the corrector in the device in accordance with the present invention works. Control panel 9 is illustrated at the upper right and the circled area is represented in greater detail to its left. The detail shows display field 11 and electronic-control handwheel 12, a switch 20 in the form of a detector behind the field, and an incremental rotation-pulse generator 21 that operates in conjunction with the switch. Handwheel 12 is employed to fine-adjust saddle 6 in tenths and hundredths of millimeters. Switch 20 is employed to detect the starting position of handwheel 12. The double-headed arrow associated with switch 20 indicates the direction mechanically traveled by switch 20 when opening and closing. Incremental pulse generator 21 releases a reference signal on the basis of the direction the handwheel is moving in. The dot-and-dash line represents the possibility of visually indicating the manual generator position in display field 11 while handwheel 12 is being turned, whereby the actual position of saddle 6 can also be indicated by an actual-value display 30, particularly the value 111.111 cm. Electronic switch 20 and incremental pulse generator 21 communicate with a processor 23. The essential components of

processor 23 are a CPU card 24, a counter-pulse card 25, and a board-motor control management system with an ideal-value output terminal 26. A motor 25 accommodated in board 4 is controlled by the signal leaving terminal 26 and drives by way of a transmission 32 a spindle 27 associated with saddle 6. The distance traveled by saddle 6 is represented by the double-headed arrow. The position of spindle 27 and hence the actual value of saddle 6 is detected by a detector 28 that communicates with both counter-pulse card 25 and ideal-value output terminal 26. The result is monitoring of the position of the pulse generator 21 associated with saddle 6 accompanied by detection of the saddle's actual and ideal values.

As hereintofore specified, the operator is, due to the uncoupling of electronic-control handwheel 12 from the motorized mechanism 31 that drives saddle 6, directly unaware of the relation between a rotating knob 15 and the saddle's established speed. The state of activated pulse generator 21 is accordingly displayed in field 11, but only of course when knob 15 has been depressed against the force of a spring to activate switch 20. In this event the point 16 that represents the saddle's reference-speed parameter on the dial 18 illustrated in Figure 3 will coincide with a rectangular mark 17. When the depressed knob 15 is rotated various notches to the left from this setting until for example point

16 is at the illustrated value of 4.5, saddle 6 will retract in the direction indicated by an arrow 19 on dial 18 at a specified speed, 4 cm/sec for example. If the operator deflects knob 15 until point 16 arrives at setting 8, saddle 6 will be accordingly accelerated. If the depressed knob 15 is rotated to the right until point 16 passes mark 17, saddle 6 will advance, move toward the blade, that is, at the speed represented by the particular setting. Since display 30 is also displaying the actual position of saddle 6, the operator will know how far it is from where it should be and can accordingly easily estimate whether he can accelerate or decelerate it. If the operator for example releases knob 15 while it is in the position illustrated in Figure 3, at the setting of 4.5, and the pulse generator 21 accordingly as well, the switch will be turned off and the pulse generator's counter will return to zero. Processor 23 will detect the situation and discontinue the forward motion of saddle 6. If knob 15 is later depressed while it is in this state, dial 18 will display point 16 as a reference parameter for the saddle's forward speed coincident with mark 17. Only once knob 15 is rotated will point 16 move left or right in the direction of the particular increment generated and detected by the counter.

As will be evident from Figure 4, when the device is operating automatically, numerals 4 through 8 will not be

displayed on dial 18. Processor 23 is programmed such that, when knob 15 has been deflected to the maximum illustrated in Figure 2, the only possible speeds will be plus or minus three units. The saddle will accordingly move slowly toward or away from the blade. The purpose is to prevent wide and rapid deviations from the automatically established saddle position.



1. Device for cutting sheets of material in stacks and comprising a board for the material to rest on, a blade for cutting the material, a holdfast that lowers onto the material, and a motorized saddle for advancing the material toward the blade, also provided with an electronic display for displaying the position of the saddle in a field and an electronic corrector for correcting the saddle's position, whereby the corrector comprises a positioning component, a rotation-pulse generator, and a processor, the pulse generator can be manually controlled by means of a switch, the pulse generator controls the processor, and the processor controls the mechanism that drives the saddle and whereby, when the switch is in one state, the pulse generator is activated and a different direction-related deflection of the positioning component results in a different direction-related speed on the part of the saddle and, when the switch is in the other state, the pulse generator is deactivated, characterized in that the speed the saddle is moving at is visually displayed directly or indirectly and directionally related in the display field while the position of the saddle is being corrected.

2. Device as in Claim 1, characterized in that the speeds that the saddle (6) is moving at are numerically displayed in the display field (11).



3. Device as in Claim 1 or 2, characterized in that the speeds the saddle (6) is moving at are displaced on a dial (18).

4. Device as in one of Claims 1 through 3, characterized in that the rotation-pulse generator can be set to establish several speeds, up to eight for example in each direction.

5. Device as in one of Claims 1 through 4, characterized in that, the rotation-pulse generator can establish only fewer speeds, up to three in each direction for example, when the device is operating automatically.