

1 DEVICE FOR CUTTING SHEETS OF MATERIAL

2 The present invention concerns a device for cutting sheets of
3 material. It includes a counter for the material to rest on,
4 a blade to cut the material, and a holdfast. The holdfast can
5 be lowered onto the material by a mechanism and raised off it
6 by a spring.

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8 A device for cutting sheets of material with a counter for
9 the material to rest on, a blade to cut the material, and a
10 holdfast that can be lowered onto the material is known for
11 example from European Patent 0 056 874 A1 for example. Such
12 holdfasts are lowered onto the material by a mechanism and
13 raised off it by a spring with the lowering mechanism out of
14 action.

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16 In practice, it is possible with such cutting devices to
17 position the particular cut. The operator lowers the device
18 slowly toward the material, and the proximity of the holdfast
19 to the surface of the material plus the parallelism between
20 the lower forward edge of the of the holdfast and the blade
21 allows ideal orientation of the material in relation to the
22 plane of the cut. It is generally impossible to prevent the
23 operator from shifting the material between the holdfast. To
24 prevent injury to the operator, especially to prevent his
25 finger from getting caught, the pressure applied by the

1 holdfast is decreased while the cut is being positioned. It
2 is of course still possible for the operator to injure
3 himself while the holdfast is being raised, when the
4 mechanism is inactive and the spring that raises the holdfast
5 is broken, allowing it to drop back onto the stack subject to
6 its own weight. Serious injury to the operator in this event
7 cannot be ruled out.

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9 The object of the present invention is to improve the generic
10 device to the extent that the operator cannot be injured when
11 the holdfast-raising spring is broken.

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13 This object is attained in accordance with the present
14 invention in a device of the aforesaid genus by an
15 interceptor that brakes the holdfast when the spring that
16 raises it is broken. "Brake" is to be understood
17 comprehensively in the present context. The braking is
18 intended to ensure that the holdfast comes to rest either
19 immediately or after only a short descent once the spring is
20 broken, effectively preventing the holdfast from striking
21 either the material or the operator's fingers. The holdfast
22 is preferably braked by notching, which is a very simple
23 mechanical procedure for braking it after only a short
24 descent. It is in particular intended for the holdfast to
25 notch indirectly. It is on the other hand conceivable to

1 brake the holdfast directly, hydraulically for example. Such
2 holdfasts are generally lowered hydraulically and the
3 hydraulic system depressurized to allow the holdfast to rise.
4 A broken holdfast-raising spring can be represented by
5 increased pressure in the hydraulics, immediately actuating a
6 valve that hydraulically prevents the holdfast from
7 descending farther.

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9 It is particularly simple from the engineering aspect to
10 brake the holdfast when the spring that raises it is broken
11 if the interceptor accommodates a detente component in the
12 power train that leads to the holdfast, whereby a stationary
13 stop extends into the path of the holdfast when the spring is
14 broken. As long as the spring is intact, the detente
15 component, which accompanies the holdfast, does not come into
16 contact with the stop, whereas a broken spring leads to a
17 variation in the adjustment of the detente component that
18 leads in turn to the stop extending into the component's
19 path. Once the detente component comes into contact with the
20 stop, the holdfast stops descending and is accordingly
21 intercepted in that position.

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23 The detente component in one advantageous embodiment pivots
24 in the power train and between two stops, whereby the
25 holdfast-raising spring engages a stationary component on the

1 device and the detente component while a weaker release
2 spring exerts force on the detente component in opposition to
3 the force exerted by the holdfast-raising spring. As long as
4 the holdfast-raising spring is intact, it will tension the
5 detente component against one stop, whereby the path traveled
6 by the detente component will always be remote from the
7 stationary stop. If the holdfast-raising spring is broken and
8 accordingly fails, the release spring will pivot the detente
9 component against the other stop, and the stationary stop
10 will again extend into the path of the detente component.

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12 The interceptor can be at any position in the power train
13 that terminates in the holdfast. It could basically be
14 immediately next to the holdfast. The holdfast in one
15 preferred embodiment, however, is accommodated in a frame,
16 and the holdfast power train essentially comprises rods that
17 engage each end of the holdfast, angled levers that pivot on
18 the frame and engage the other end of the rods, a rod system
19 that connects the levers, and a mechanism that operates in
20 conjunction with one of the levers, whereby the holdfast-
21 raising spring engages the frame and the detente component,
22 which is mounted in the connecting-rod system. In this event
23 the detente component is associated with the lever-connecting
24 rod that ensures simultaneity of the holdfast and rods.

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1 The detente component in one particularly simple embodiment
2 is angled and pivots at its vertex on the connecting-rod
3 system, whereby the holdfast-raising spring engages one arm
4 of the detente component and the free end of the other arm
5 can operate in conjunction with the stationary stop. If the
6 arms of the detente component are at a right angle, the
7 holdfast-raising spring will be able to intervene very
8 powerfully, and the other arm will be exposed essentially
9 only to compressive forces when the holdfast-raising spring
10 is broken, leading to impact against the stationary stop. It
11 is practical for the release spring to be a leg spring
12 accommodated in the connecting-rod system with one leg
13 resting against the connecting-rod system and the other
14 against the detente component between the component's pivot
15 and the holdfast-raising spring's point of intervention. The
16 detente component's two stops can for example be pins
17 extending remote from the pivot through a slot in the
18 component that extends along the direction it pivots in.

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20 The stationary stop in one particular embodiment has a
21 sliding detente that allows engagement of the detente
22 component in accordance with the interception position of the
23 holdfast. The background here is that the connecting-rod
24 system mounted in the two angled levers moves along the arc
25 of a circle in accordance with the position of the holdfast,

1 with the consequence that the detente lever will complete a
2 similar motion as long as the holdfast-raising spring is
3 intact. To ensure rapid braking of the holdfast no matter
4 what position it is in when the holdfast-raising spring is
5 broken, the sliding detente, with its large number of notches
6 for the detente component, is at almost the same distance
7 from any position of the detente lever.

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9 Further characteristics of the present invention will be
10 evident from the subsidiary claims, the description of the
11 figures, and the figures themselves. All characteristic and
12 combinations thereof are essential to the invention.

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14 One embodiment of the present invention will now be specified
15 without limiting its scope in any way with reference to the
16 accompanying drawing, wherein

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18 Figure 1 is a schematic representation of a device for
19 cutting sheets of material,

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21 Figure 2 is a larger-scale illustration of the detail x in
22 Figure 1, and

23
24 Figure 3 is a section along the line A-A in Figure 2.

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1 Figure 1 represents the basic design of a device for cutting
2 sheets of material along a plane perpendicular to the
3 direction the material is being advanced in and parallel to
4 the direction traveled by the holdfast and blade. Only the
5 essential parts of the device are illustrated.

6
7 As will be evident from Figure 1, a counter 12 with a
8 horizontal top 13 that supports the sheets 2 of material is
9 accommodated in a frame 1. A holdfast 11 ascends and descends
10 in the direction indicated by double-headed arrow Z in two
11 parallel and perpendicular tracks 14. Figure 1 illustrates
12 holdfast 11 in its uppermost position. The distance
13 separating the upper surface of sheets 2 from the lower edge
14 15 of holdfast 11 will be evident.

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16 Two parallel rods 3 engage the sides of holdfast 11. Rods 3
17 pivot on angled levers 4. Levers 4 pivot in turn in frame 1.
18 The other end of each angled lever 4 pivots on a connecting-
19 rod system 5, which accordingly mechanically couples rods 3,
20 creating a ganged track for holdfast 11. One angled lever 4
21 has a third arm 4a that functions as an actuating arm. The
22 free end of arm 4a extends into the positioning path of the
23 piston 10a. Piston 10a operates in conjunction with a
24 hydraulic cylinder 10. Cylinder 10 is accommodated in frame
25 1. As piston 10a travels out, the activating arm 4a, which

1 rests against it, of the angled lever 4 next to cylinder 10
2 will pivot along with the rigidly integrated lever 4. The
3 lever will accordingly not only draw its associated rod 3
4 down but transmit its motion to the other angled lever 4 by
5 way of connecting-rod system 5. Rod system 5 will then draw
6 its associated rod 3 down. The synchronized motion of both
7 rods 3 will draw holdfast 11 down, in order to position the
8 cut for example. Holdfast 11 is raised by depressurizing
9 cylinder 10, whereupon a holdfast-raising spring 6 that
10 engages both frame 1 and, indirectly, connecting-rod system 5
11 will apply force to the connecting-rod system, pivoting
12 angled lever 4 against the direction the force is applied in
13 when the hydraulics are in action. Holdfast-raising spring 6
14 is a spiral tension spring.

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16 The design of the interceptor in accordance with the present
17 invention will be evident from Figures 2 and 3 in particular.
18 Connecting-rod system 5 comprises two parallel rods 5a and
19 5b. Rods 5a and 5b pivot, accommodating between them not only
20 the free arms of angled levers 4 but also an angled detente
21 component 8. A bolt 16 extends snugly through concentric
22 bores in rods 5a and 5b and loosely through a bore at the
23 vertex of angled detente component 8. Another bolt 17,
24 remote from bolt 16, extends snugly through rods 5a and 5b
25 and loosely through a slot 18 that is concentric with secured

1 bolt 16 in the essentially perpendicular arm 8a of angled
2 detente component 8. The end 6a of holdfast-raising spring 6
3 is suspended in a hole in the vicinity of the free end, which
4 faces away in bolt 16, of arm 8a. Another bolt 19 (Fig. 1)
5 extends snugly through concentric bores in rods 5a and 5b on
6 the side facing holdfast-raising spring 6. Bolt 19 also
7 extends through a leg spring 7. One leg 7a of leg spring 7
8 rests against the end of connecting-rod system 5 facing
9 holdfast-raising spring 6. The other leg 7b rests against the
10 arm 8a of angled detente component 8. Angled detente
11 component 8 has another arm 8b perpendicular to arm 8a and to
12 the length of its bearing bolt 16a.

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14 As holdfast 11 moves, connecting-rod system 5 describes, due
15 to its pivoting on both angled levers 4, a motion along the
16 circumference of a circle with a radius equal to the lifting
17 arm of levers 4 between the bearing axis 23 and the point of
18 intervention against connecting-rod system 5. While holdfast
19 11 is up, holdfast-raising spring 6 is less powerfully
20 tensioned and, when it is farther down, more powerfully
21 tensioned. Holdfast-raising spring 6 draws angled detente
22 component 8 into the position represented by the solid lines
23 in Figure 2, where bolt 17 rests against one end of slot 18.
24 Without holdfast-raising spring 6, which means when it is
25 broken and is out of action, it is leg spring 7 that ensures

1 angled detente component 8 is pivoted into the position
2 represented by the broken lines in Figure 2. In this event
3 the bolt 17 at the other end of slot 18 will rest against arm
4 8a.

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6 The figures reveal how a stop 9 mounted in frame 1 and
7 accordingly stationary operates in conjunction with the arm
8 8b of angled detente component 8. The end of stop 9 facing
9 arm 8b constitutes a sliding detente 20. The contour 21 of
10 sliding detente 20, which is not actually illustrated in the
11 vicinity of the detente itself, slants, ensuring that, as
12 long as holdfast-raising spring 6 acts on angled detente
13 component 8, free end 8c will remain at the same slight
14 distance away from contour 21 no matter what the position of
15 holdfast 11. If holdfast-raising spring 6 is broken, leg
16 spring 7 will pivot angled detente component 8 into the
17 position represented by the broken line. The free end 8c of
18 arm 8b will come to rest in one of the notches 22 in sliding
19 detente 20, preventing connecting-rod system 5 from moving
20 any farther in the direction indicated by arrow Y. The
21 braking of connecting-rod system 5 will, by way of the
22 kinematic coupling associated with holdfast 11, stop the
23 holdfast when holdfast-raising spring 6 is broken. Which
24 notch 22 in sliding detente 20 angled detente component 8
25 will encounter depends on what position holdfast 11 is in

1 when holdfast-raising spring 6 is broken. The broken line in
2 Figure 2 illustrates the braking action in the event that
3 holdfast-raising spring 6 is broken while holdfast 11 is
4 almost all the way up. If the spring is broken with the
5 holdfast farther down, connecting-rod system 5 would travel
6 farther in the direction indicated by arrow Y, and the free
7 end 8c of arm 8 would come into contact with one of the rear
8 notches 22. The invisible notches 22 are included in Figure 3
9 to facilitate comprehension.

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1. Device for cutting sheets of material, with a counter (12) for the material to rest on, a blade to cut the material, and a holdfast (11) that can be lowered onto the material by a mechanism (10) and raised off it by a spring (6), characterized by an interceptor (7, 8, & 9) that brakes the holdfast when the spring that raises it is broken.

2. Device as in Claim 1, characterized in that the interceptor (7, 8, & 9) notches the holdfast indirectly when the holdfast-raising spring (6) is broken.

3. Device as in Claim 2, characterized in that the interceptor (7, 8, & 9) as a detente component (8) in the power train (3, 4, 5, & 10) leading to the holdfast (11) and a stationary stop (9) extends into the path of the holdfast when the spring is broken.

4. Device as in Claim 3, characterized in that the detente component (8) pivots in the power train (3, 4, 5, & 10) and between two stops (bolt 17 & slot 18), whereby the holdfast-raising spring (6) engages a stationary component (1) on the device and the detente component (8) while a weaker release spring (7) exerts force on the detente component in opposition to the force exerted by the holdfast-



1 raising spring.

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3 5. Device as in one of Claims 1 through 4, characterized
4 in that the holdfast (11) is accommodated in a frame (1), and
5 the power train (3, 4, 5, & 10) leading to the holdfast
6 essentially comprises rods (3) that engage each end of the
7 holdfast, angled levers (4) that pivot on the frame and
8 engage the other end of the rods, a rod system (5) that
9 connects the levers, and a mechanism (10) that operates in
10 conjunction with one of the levers, whereby the holdfast-
11 raising spring engages the frame and the detente component
12 (8), which is mounted in the connecting-rod system.

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14 6. Device as in Claim 5, characterized in that the
15 detente component (8) is angled and pivots at its vertex on
16 the connecting-rod system (5), whereby the holdfast-raising
17 spring (6) engages one arm (8a) of the detente component and
18 the free end (8c) of the other arm can operate in conjunction
19 with the stationary stop (9).

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21 7. Device as in Claim 6, characterized in that the
22 stationary stop (9) has a sliding detente (20) that allows
23 engagement of the detente component (8) in accordance with
24 the interception position of the holdfast (11).

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1 8. Device as in one of Claims 4 through 7, characterized
2 in that the two stops on the detente component (8) comprise a
3 bolt (17) mounted in the connecting-rod system (5) extending
4 remote from the axis (16) of the detente component (8)
5 through a slot (18) in the detente component and extending in
6 the direction the detente component pivots in.

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8 9. Device as in one of Claims 1 through 8, characterized
9 in that the overall mechanism (10) that pivots the holdfast
10 (11) is a hydraulic cylinder.

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