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Printer having a cutter and protective device for use in a printer
Drucker mit Schneid- und Schutzvorrichtung
Imprimante ayant un appareil de coupe et son dispositif de protection

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References cited:
EP-A- 0 068 621
FR-A- 2 697 776

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Description

[0001] The present invention relates to a printer suitable for use with electronic cash registers used in point-of-sale (POS) systems and relates, more particularly, to a printer comprising a cutter for cutting the recording medium on which the printer prints. The invention relates further to a protective device in a printer to prevent the cutting edge of a cutting blade from being accidentally touched by a user.

[0002] Printers used in point-of-sale (POS) systems generally print to rolled paper as the recording medium using a thermal head or other type of print head, and comprise a cutter to cut the printed paper to obtain a sales receipt that can be handed to the customer.

[0003] Typical of the various cutters employed in such printers are cutters that cut the paper by pushing a cutting blade perpendicularly against the paper as described in JP-A-238970/1994, and cutters that cut the recording paper using a fixed blade and a movable blade as described in JP-B-123482/1979. A scissors-type cutter that cuts the recording paper by moving a movable blade across the paper while cutting the recording paper from one edge to the other is also known as described in JP-B-10953/1990.

[0004] The problems that arise with printers of these types are described below.

[0005] When the paper is cut by means of pushing a serrated knife edge perpendicularly against the paper, a great drive force is required because the paper is cut after the serrations of the cutting edge pierced the paper, and the cut edge of the paper is not particularly clean. This process thus produces paper chaff from the cutting process. The cutting blade also tends to chatter from the impact of the blade when cutting the recording paper, making it difficult to achieve a straight cut edge.

[0006] Problems with an uneven paper feed pitch occur both with cutters that cut by pushing a cutting blade perpendicularly against the paper, and with cutters that cut the paper using a fixed blade and movable blade combination. This is because both of these cutters pull the recording paper on the upstream side of the cutting position during the cutting operation.

[0007] The fixed blade and movable blade of a scissors-type cutter are coupled together by a common support pin because a change in the relative positions of the fixed blade and movable blade produces a poor cut edge. This makes it necessary when paper is loaded to the printer, to insert the paper between the fixed blade and movable blade, and this can be an awkward or difficult task.

[0008] The sliding action of the movable blade across the fixed blade in scissors-type cutters creates problems with respect to the service life of the cutting blades. It is also not easy to change the blades. When operation is interrupted while the paper is being cut with this type of cutter, it is desirable to return smoothly to the current position when operation is resumed.

[0009] The cutting blade or blades in such printer are not normally accessible from outside the printer. However, when the printer is opened to fix a paper jam condition or to load paper into the printer the cutting blades become exposed and there is a possibility that a sharp cutting edge is accidentally touched by the user causing injury.

[0010] A printer according to the preamble of claim 1 is disclosed in FR-A-2 697 776. In this prior art, different from a scissors-type cutter, the movable cutting blade is a rotary member that requires two lateral bearings even though not described in that document.

[0011] A scissors-type cutter for a printer is disclosed in EP-A-0 688 621. In this prior art, the movable cutting blade and the fixed cutting blade are both supported by the same support member and the recording medium to be cut by the cutter has to be passed through a slot provided in that support member.

[0012] The object of the present invention is to provide a printer overcoming the problems of the prior art as described above and comprising a cutter capable of producing a clean cut edge with excellent linearity (straightness), and a uniform cutting quality at all parts of the cutting blade.

[0013] Another object of the invention is to provide such printer wherein the cutter has excellent durability and ease of use when the printer stops abnormally and when the blades are replaced.

[0014] A further object of the invention is to provide such printer that has a high degree of design freedom, is safe to handle, and has a simple construction.

[0015] These objects are achieved with a printer as claimed in claim 1. Preferred embodiments of the invention are subject-matter of the dependent claims.

[0016] The fixed blade and movable blade that engage with a sliding action to cut the recording medium are disposed independently from each other. The blade support means enables one of the blades to be separated from the other. The recording medium can be easily loaded and set between the blades when the blades are thus separated, and the operability of the printer is thereby improved.

[0017] The fixed blade and movable blade cut the recording medium by means of a sliding engagement. The cut edge does not become wavy because there is no impact against the recording medium during cutting, and the cut edge is therefore good. Moreover, because no force in the direction of recording medium transportation acts on the recording medium, the recording medium is not pulled out, there is excellent linearity in the cut edge, the paper feed pitch precision improves, and print quality thus also improves.

[0018] The blade support means preferably comprises a cover member mounted to a main frame and supporting one of the two blades. The main frame defines a compartment for the recording medium. The cover member is mounted so as to be rotatable between an opened and a closed state. When the cover member is
in its opened state it exposes the compartment for the recording medium. It is then possible to put the recording medium in the compartment. When the cover member is subsequently closed the recording medium is automatically set between the fixed blade and movable blade. It is thus simple to replace the recording medium, and operability is improved.

Further objects and advantages of the present invention will become more fully understood from the detailed description of the preferred embodiments given below in conjunction with the accompanying drawings, wherein:

Fig. 1 is a perspective view showing the internal structure of a printer according to a first embodiment of the present invention with cutter frame parts disassembled;

Fig. 2 is the same view as Fig. 1 with the cutter frame parts assembled;

Fig. 3 is a perspective view of the exterior configuration of the printer of Fig. 1 with a top cover removed;

Fig. 4 is a side view of the printer of Fig. 3 with part of the case removed, showing the cover frame closed;

Fig. 5 is the same view as Fig. 4 with the cover frame open;

Fig. 6 is a perspective view of one example of the movable blade;

Fig. 7 shows a plan view and a side view of the movable blade of Fig. 6;

Fig. 8 is a plan view showing the fixed blade and the movable blade of the cutter in the printer of Fig. 1;

Fig. 9 is a schematic view illustrating the way in which the movable blade rides up on the fixed blade 14;

Fig. 10 is a side view showing the relationship between the fixed blade and the movable blade;

Fig. 11 and 12 illustrate various ways for inclining the movable blade;

Fig. 13 is a schematic view illustrating a modification in the support structure of the movable blade;

Fig. 14 is a plan view of another example of the movable blade;

Fig. 15 is a plan view of major components of the printer of Fig. 1 illustrating the movable blade in an irregular stop position;

Fig. 16 is a plan view showing an index and a window in a modification of the first embodiment;

Fig. 17 is a schematic view illustrating the relationship between the cutting edge angle of the fixed blade and that of the movable blade;

Fig. 18 and 19 illustrate the way in which the recording medium is cut in a printer according to the present embodiment, Fig. 18 showing the situation before cutting, and Fig. 19 showing the situation after cutting;

Fig. 20 is a side view of the major components with the cover frame open, showing a blade shutter according to the present embodiment.

Fig. 21 is a side view showing the blade shutter part of Fig. 20 as the cover frame is being closed;

Fig. 22 is a side view similar to Fig. 21 with the cover frame closed;

Fig. 23 is a side view showing the internal configuration of a second embodiment of a printer according to the present invention with the cover frame closed; and

Fig. 24 is a side view of the printer of Fig. 23 with the cover frame open.

Fig. 3 is perspective view of the exterior configuration of a printer 1 according to a first embodiment of the present invention. Printer 1 comprises a case 4 made of plastic resin and having a front panel 2 and a top cover which is not shown. In its rear part printer 1 has a compartment 3 for accommodating a paper roll. A button 6 disposed on the right side of compartment 3 in case 4 serves to drive a lever 5 by which a cover frame 8 can be turned to an opened position as will be explained in more detail later.

Figs. 1, 2, 4 and 5 show various views of printer 1 illustrating the internal structure of the printer. At its rear end, cover frame 8 is pivotally supported on a main
As shown in Fig. 1, the cutter comprises a fixed blade 14 mounted on cover frame 8 and a movable blade 9 mounted on a lower frame part 11b of a cutter frame 11. Cutter frame 11 is mounted on main frame 7 adjacent to the front end of cover frame 8 and is composed of lower frame part 11b and an upper frame part 11a. Fig. 1 shows frame parts 11a and 11b separated from each other and frame part 11a turned upside down. Fig. 2 shows cutter frame 11 with frame parts 11a and 11b assembled. With this structure, when cover frame 8 is turned to its opened position, fixed blade 14 and movable blade 9 are separated from each other, while, when cover frame 8 is in its closed position fixed blade 14 and movable blade 9 are arranged to cooperate for cutting the paper.

As shown in Fig. 1, fixed blade 14 is disposed at the front end of cover frame 8. Fixed blade 14 may be manufactured, for example, from a rectangular metal plate member. Fixed blade 14 is disposed with its cutting edge 14a facing cutter frame 11. A slit-like paper exit 15 of the paper path through which paper S is transported and ejected is formed between cutting edge 14a of fixed blade 14 and lower frame part 11b.

As shown in Fig. 8, a recess 14b and a tab 14c are formed at each lateral end of fixed blade 14 for engagement with respective support members 16 (Figs. 1 and 4), which are disposed at corresponding positions on both sides of cover frame 8. As shown in Fig. 1, fixed blade 14 is pressed from above toward the surface of cover frame 8 by means of two leaf springs 17 fastened to the top of cover frame 8. Because fixed blade 14 is pressed downward by movable blade 9 at the start of each cut, as will be explained later, the pressure applied by springs 17 does not need to be particularly great. In addition, because the cutting quality is not greatly affected by the pressure applied by springs 17, this pressure only needs to be strong enough to prevent fixed blade 14 from coming off cover frame 8.

As shown in Fig. 4, each support member 16 is substantially U-shaped. The open end of the U-shape faces the printer's top. One leg of the U-shape, which faces the printer's rear side forms a rear tab 16b and the other leg facing the printer's front side forms a front tab 16a. Rear tab 16b is higher than front tab 16a.

Movable blade 9 is disposed on bottom 110 of lower frame part 11b. Movable blade 9 is rotatably mounted on a stud 18 disposed on one side of frame part 11b. Thus, movable blade 9 can be rotated freely in the direction of arrow A in Fig. 1 or in the opposite direction. Movable blade 9 is forced against bottom 110 of lower frame part 11b by means of coil spring 19. Coil spring 19 is fit around stud 18 and is secured at the top thereof by a push nut pressed onto stud 18.

An elongated hole 20 is formed at substantially the center of movable blade 9 for receiving a crank pin 24.

Drive mechanism 10 for driving movable blade 9 is mounted inside upper frame part 11a as is also shown in Fig. 1. Drive mechanism 10 comprises drive motor 21, worm gear 22 fastened to the shaft of drive motor 21, worm wheel 23 meshing with worm gear 22 and crank pin 24 fixed to worm wheel 23 and engaging elongated hole 20 of movable blade 9. A sensor 25 for detecting the angular position of worm wheel 23 and, thus, the home position of movable blade 9, is disposed between worm wheel 23 and frame part 11a and is connected by means of lead wires 26 to a circuit board 27. Drive motor 21 is also connected to circuit board 27 by means of lead wires 28.

Spur gear 29 is formed at the base of worm gear 22 and is exposed through a cutout in upper frame part 11a as shown in Fig. 2. By this, it is possible to manually turn spur gear 29 to rotate the shaft of drive motor 21 and thus move movable blade 9 without removing upper frame part 11a. The purpose of this will be discussed later in this text.

As shown in Fig. 6 which is perspective view of movable blade 9, movable blade 9 of the present embodiment is shaped substantially like one of the scissor blades of a conventional scissors-like cutter. More specifically, movable blade 9 is manufactured from a long metal plate member with a cutting edge 9a formed on the side facing fixed blade 14. Fig. 7 shows a plan view and a lateral view of movable blade 9. As shown in Fig. 7, body 90 of movable blade 9 is declined downwardly (to the back) by approximately one degree relative to its mounting portion 9b. In addition, body 90 is slightly curved forming an arc from mounting portion 9b to the tip of the blade, the concave side of the arc facing downwardly.

Note that the cutter of the present embodiment does not completely cut off the end of the paper S but leaves the cut paper end connected to the roll. To prevent the uncut strip portion from being torn by the thickness of the end of movable blade 9, a knife tip 9c that
is thinner than the cutting edge 9a is formed at the tip of movable blade 9.

[0033] As shown in Fig. 8 tab 14d is formed at the end of fixed blade 14 near mounting portion 9b of movable blade 9 but outside of the paper path. Tab 14f is formed at the opposite end of fixed blade 14. Both tabs extend beyond cutting edge 14a towards cutter frame 11, such that when cover frame 8 is closed tabs 14d and 14f contact exposed portions of bottom 110 of lower frame part 11b. As a result, since movable blade 9 is supported via a support base 30 (spacer) of approximately the same thickness as the fixed blade 14 on bottom 110 (see also Fig. 9), sliding surface 9e of movable blade 9 and sliding surface 14h of fixed blade 14 are held in approximately the same plane (height). Since the level of bottom 110 is higher than that of the surface of cover frame 8 tabs 14d and 14f resting on bottom 110 cause fixed blade 14 to be lifted, and a slight gap to be formed between fixed blade 14 and the surface of cover frame 8.

[0034] A chamfer 14e for lifting movable blade 9 is formed on the top of tab 14d on the side facing edge 14a, i.e. where the blades first meet. Because of the chamfer 14e, even if the sliding surface of the movable blade is in a plane slightly below that of the fixed blade, the fixed blade and movable blade will slide smoothly into mutual contact when the blades meet. The spring pressure acting on movable blade 9 urges tabs 14d and 14f of fixed blade 14 into contact with bottom 110 and ensures the contact between the cutting edges of the blades, i.e. prevents a gap from occurring between the opposing sliding surfaces of movable blade 9 and fixed blade 14 as would be the case if the sliding surface of the movable blade would be in a plane above that of the fixed blade. This ensures a good cutting quality. Furthermore, since there is a single-point contact between the two blades movable blade 9 is not prevented from smoothly sliding across fixed blade 14 as might be the case with an area contact and the corresponding higher friction between the two blades. Another effect of chamfer 14e is that the impact force when the blades meet will not be strong, if any, and the blades will not be damaged. Thus, as long as the plane of the movable blade tend to be lower than that of the fixed blade, high precision is not required in the parts, and manufacturing at lower cost becomes possible.

[0035] As shown in Fig. 8, the length of movable blade 9 is shorter than the length of cutting edge 14a of fixed blade 14 by a distance D to prevent paper S from being cut completely across the entire paper width and thus to leave a marginal strip portion of the paper uncut. If it is desired to cut completely across the paper, the length of the cutting edge 9a need simply be made longer by this distance D. In this case it is not necessary to form the thin knife tip 9c.

[0036] As mentioned before and shown in Fig. 8 and Fig. 9, support base 30 is disposed between movable blade 9 and bottom 110 of lower frame part 11b. This support base 30 is preferably a flat member of the same thickness as fixed blade 14. In the preferred embodiment of the invention, fixed blade 14 and support base 30 are stamped from the same piece of material in a stamping process. The relative positions of the fixed blade and movable blade are thus determined by using a support base of the same thickness as the fixed blade 14. As a result, an excellent cut edge that is as clean as the cut edge obtained with a conventional scissors-like cutter in which the blades are inseparable and fixed relative to each other can be obtained even though in this cutter the blades are separable.

[0037] Cut-outs 9d and 30a are formed in mounting portion 9b of movable blade 9 and support base 30 mutually aligned and at a predetermined position opposing fixed blade 14. As a result, the part of bottom 110 of lower frame part 11b on which tab 14d rests is exposed when movable blade 9 is retracted inside cutter frame 11 as shown in Fig. 8. Furthermore, this allows the initial angle at which cutting edge 14a of fixed blade 14 and cutting edge 9a of movable blade 9 cross, i.e., the initial cutting angle, to be relatively large, and an excellent edge can be achieved in the cut paper.

[0038] The operation of the cutter explained above is described below.

[0039] When paper S is to be cut, drive motor 21 is driven at a predetermined timing after printing on the paper has been completed. This causes worm gear 22 to rotate, thus driving worm wheel 23. Movable blade 9 is thus moved in the direction of arrow A as shown in Fig. 1 by means of the link mechanism comprising crank pin 24 and elongated hole 20. As movable blade 9 approaches fixed blade 14, it first contacts tab 14d and rides easily up along chamfer 14e onto fixed blade 14.

[0040] Next, the positional relationship between the two blades will be explained. As shown in Fig. 10 fixed blade 14 is pressed toward the bottom 110 such that its tabs 14d and 14f rest on bottom 110. Because fixed blade 14 is slightly inclined tabs 14d and 14f contact bottom 110 at its rear edge 110a such that a small gap is formed below the portion of the tabs extending forwardly from edge 110a. In this state, when movable blade 9 becomes engaged with tab 14d of fixed blade 14, a force E is exerted on tab 14d causing a moment to be applied to fixed blade 14 in the direction F around edge 110a as a fulcrum point. In response to this moment the rear part of fixed blade 14 is raised to float above cover frame 8 at the portion of support members 16. As a result, sliding face 14h of fixed blade 14 is roughly flush with the sliding face 9e of movable blade 9 across the whole length of the cutting edge. When movable blade 9 moves, cutting edge 9a of movable blade 9 and cutting edge 14a of fixed blade 14 therefore remain constantly in contact at one point, and the paper S can be cut smoothly using the same operating principle as a pair of scissors.

[0041] When movable blade 9 continues moving in the direction of arrow A, cutting edge 14a of fixed blade 14 and cutting edge 9a of movable blade 9 contact at substantially a single point because of the concave
shape of the sliding surface of movable blade 9. The contact point moves gradually along both cutting edges toward the tip of movable blade 9 as movable blade 9 continues to be driven. This causes paper S to be smoothly cut as shown in Figs. 18 and 19 as a result of a scissors action. There is no impact force acting on paper S when it is cut, and the linearity (straightness) of the cut edge is thus improved.

[0042] More specifically in the present embodiment support base 30 for movable blade 9 is pressed by coil spring 19 against bottom 110 of lower frame part 11b and movable blade 9 is pressed against fixed blade 14 with appropriate force because movable blade 9 is curved slightly in the direction of bottom 110. As a result, paper S can be cut cleanly and without tearing.

[0043] As also shown in Fig. 18 and 19, fixed blade 14 and movable blade 9 are disposed on the upstream and downstream sides, respectively, of the paper path. The position of the roll end of paper S (the end from which a length is cut off) therefore does not move or shift from the original paper path, and the paper S can be smoothly cut without paper jams occurring and without affecting the paper feed pitch.

[0044] Fixed blade 14 is pressed with a weak force by springs 17 and is supported with some vertical play, i.e., tolerance for slight vertical movement, relative to support members 16. When movable blade 9 moves, the parts of fixed blade 14 supported by support members 16 rises slightly upward as shown in Figs. 10 and 19, cutting edge 9a of movable blade 9 and cutting edge 14a of fixed blade 14 contact in an optimum condition, and the paper S can therefore be cut without curvature in the cut line and without pulling recording paper S. When movable blade 9 near stud 18 where cutting starts, however, the curvature of body 90 is very slight and an appropriate contact point between cutting edge 9a and cutting edge 14a cannot be assured. Body 90 of movable blade 9 may therefore be forcibly inclined as described below to assure this point contact with cutting edge 14a of fixed blade 14.

[0045] Moreover, as shown in Fig. 1 and Fig. 4, the U-shaped support members 16 are each formed with the rear tab 16b higher than front tab 16a and with their front face inclined from top to bottom towards the movable blade. As a result, by pushing the rear side of fixed blade 14 up it can be easily taken out of the support members toward the front, and can therefore be removed with a simple operation. When installing fixed blade 14 in the printer, fixed blade 14 contacts rear tab 16b when it is moved toward the tab 16b, is guided downward by the inclined front face of the tab, and the positioning recesses 14b and tabs 14c can thereby be engaged with support members 16. Fixed blade 14 can thus be easily installed to and removed from printer 1, and the blade can be replaced in a short time if the blade is chipped or worn.

[0046] Furthermore, because the length of movable blade 9 is shorter than the length of cutting edge 14a of fixed blade 14 as shown in Fig. 8, paper S is not cut completely across the whole width and can be ejected while still partially connected to the roll. To enable this, knife tip 9c that is thinner than cutting edge 9a in the rest of body 90 of movable blade 9 is formed at the leading tip of movable blade 9, and paper S can be cut cleanly without tearing.

[0047] It should be noted that if drive motor 21 is driven further after cutting is completed, continued rotation of crank pin 24 will drive movable blade 9 in the direction opposite to the direction of arrow A in Fig. 1, and return movable blade 9 to its home position inside cutter frame 11. Drive motor 21 is stopped when it is detected by means of sensor 25 that movable blade 9 has returned to the home position.

[0048] The basic configuration and operation of the preferred embodiment of the present invention have been described above. Alternative embodiments of selected parts of the above embodiment and the operational effects thereof are described further below.

[0049] A characteristic of a scissors-type cutter is that a single point contact is maintained between the cutting edges, which cut while moving relative to each other. As has been explained with reference to Fig. 7, movable blade 9 is, therefore, shaped with a slight arc from near the base (the mounting portion 9b) to the tip. At the part of movable blade 9 near stud 18 where cutting starts, the cutting edge 14a of fixed blade 14 can be optimally adjusted. Body 90 of movable blade 9 may therefore be forcibly inclined as described below to assure this point contact with cutting edge 14a of fixed blade 14.

[0050] A spacer 130 can be disposed between support base 30 and mounting portion 9b of movable blade 9 as shown in Fig. 11(a) as one means of inclining movable blade 9. As shown in Fig. 11(b), spacer 130 may alternatively be provided between support base 30 and bottom 110 of lower frame part 11b of cutter frame 11. An inclination of movable blade 9 can be alternatively accomplished by providing a shoulder 30b on the top surface of support base 30 as shown in Fig. 12(a), or by providing a foot 30c on the bottom surface of support base 30 as shown in Fig. 12(b). As shown in Fig. 11(c) and Fig. 12(c), it is also possible to provide a screw 131 in support base 30 to raise one edge of support base 30 from bottom 110 of lower frame part 11b. With this configuration the height of the cutting edge of movable blade 9, or more specifically the contact between cutting edge 9a of movable blade 9 and cutting edge 14a of fixed blade 14, can be optimally adjusted.

[0051] By giving body 90 of movable blade 9 an arc shape and inclining movable blade 9, contact at a single point between cutting edge 9a of movable blade 9 and cutting edge 14a of fixed blade 14 can be assured even when there is little curvature in body 90 at the cutting start position near stud 18, and the straightness and the cut edge can be improved.

[0052] Note further that if the angle of support base 30 is made adjustable by using a screw as shown in Fig. 11(c) or Fig. 12(c), contact between cutting edge 9a of movable blade 9 and cutting edge 14a of fixed blade 14 can be optimized according to the thickness, width, and quality of the recording medium, and can be adjusted to compensate for wear in the cutting edges 9a, 14a. As a
result, the straightness and the cut quality can be consistently maintained, and the service life of the cutter can be extended.

Note that in the scissors-type cutter described above the mounting portion of the movable blade is supported by means of a stud to enable the movable blade to pivot, and a spring disposed on this stud pushes the movable blade against the fixed blade to cut the paper. While the force of coil spring 19 is sufficient at the cutting start position near the stud 18, however, the operating force resulting from the coil spring 19 drops gradually along the length of the cutting edge and is weak at the cutting end position at the tips of the cutting edges. The reason for the drop is that the length of the lever arm of the reactive force acting on the movable blade at the contact point with the fixed blade increases as the contact point moves toward the tip of the movable blade. It is evident that a sufficient force for the cutting at the tip of the blades may be achieved by employing a stronger coil spring. This is undesirable, however, since it increases the operating force at the cutting start point far beyond what is necessary. This in turn results in an increased load on the cuttings edges of the blades, a corresponding increase in cutting edge wear and a reduced service life of the blades. This problem may be resolved as described below in accordance with the present invention.

Spacer 130 disposed between mounting portion 9b of movable blade 9 and support base 30 as shown in Fig. 11(a), may be shaped as shown in Fig. 13, i.e., a part 130a of spacer 130 contacted by mounting portion 9b when movable blade 9 rotates extends closer to stud 18 than the remaining part. More specifically, if the shortest distance between axis of rotation O of movable blade 9 and the contact area between spacer 130 and mounting portion 9b when movable blade 9 is in its home position is L1, the shortest distance between axis of rotation O and the contact area between spacer 130 and mounting portion 9b when movable blade 9 has rotated through an angle \(\theta\) toward the cutting end position is L2, with L1 > L2, and the thickness of spacer 130 is t, the slope of mounting portion 9b when movable blade 9 is in the home position is t/L1, the slope of mounting portion 9b when movable blade 9 is fully rotated is t/L2, and the relative slope of cutting edge 9a of movable blade 9 increases with the rotation of movable blade 9.

With this configuration, rotation of movable blade 9 causes the slope of the blade to increase as the cutting point moves toward the tip of the blade, further compressing coil spring 19 and thus increasing the spring force. This compensates for the increasing effect of the reactive force, and the cutting performance (quality of cut edge) does not deteriorate, without unnecessarily increasing the load on the cuttings edges; so, cutting edge wear is reduced, and the service life of the fixed blade and movable blade can be extended.

It should be noted that while the contact part 130a of spacer 130 contacted by mounting portion 9b of movable blade 9 is shown as a straight member in Fig. 13, the present invention shall not be thus limited. Contact part 130a of spacer 130 may be curved or have any form as long as the desired purpose is achieved. This method of adjusting the operating force is also not limited to spacer 130 being disposed between support base 30 and mounting portion 9b of movable blade 9, but can obviously be adapted to the configuration shown in Fig. 12(a) in which a shoulder 30b is provided on support base 30.

An alternative embodiment of movable blade 9 is shown in Fig. 14. As shown in Fig. 14, a slot 91 for engaging stud 18 is formed in mounting portion 9b of this alternative movable blade 9A. As described above, movable blade 9 of Fig. 6 is mounted by inserting the hole formed in mounting portion 9b over stud 18. When coil spring 19 is fastened to stud 18 using a push nut, however, it is difficult to remove the push nut and therefore difficult to replace movable blade 9. On the other hand, if a slot 91 is provided in mounting portion 9b as shown in Fig. 14, movable blade 9A can be easily removed and replaced. More specifically, coil spring 19 applies pressure to mounting portion 9b of movable blade 9A but does not lock movable blade 9A in place. Movable blade 9A can therefore be easily pulled out and of stud 18, and a new movable blade 9A can be easily installed by simply fitting slot 91 to stud 18. It should be noted that elongated hole 20 in movable blade 9A engages crank pin 24 when installed in the cutter, thus preventing movable blade 9A from accidentally coming off. Note, references to blade 9 in the following are intended to also cover blade 9A except where stated otherwise.

It is possible that during operation of printer 1 due to some problem movable blade 9 stops in the middle of the cutting operation as shown in Fig. 15. When this happens, by manually turning spur gear 29, which, as mentioned above, is exposed for this purpose, fixed blade 14 can be moved back to its home position inside cutter frame 11. However, as long as movable blade 9 is not within a certain tolerance range of the home position, it will not be possible to close cover frame 11 e of fixed blade 14. Therefore, as shown in Fig. 1 and Fig. 16, the present embodiment provides window 111 in frame part 11a of cover frame 11 and a triangular index 230, for example, on the surface of worm wheel 23. Index 230 is disposed to be visible in window 111 when movable blade 9 is in its home position. This configuration makes it simple to determine whether movable blade 9 has returned to its home position by looking for index 230 in window 111, and movable blade 9 can therefore be quickly returned to the home position.

If paper S is repeatedly cut by means of movable blade 9 and fixed blade 14 as described above, their cutting edges will wear, becoming rounded and dull. To extend the service life of the movable blade 9 and fixed blade 14, the configuration described below
can be used.

[0060] First, movable blade 9 and fixed blade 14 can be manufactured from materials with different hardness. In the preferred embodiments of the invention, movable blade 9 and fixed blade 14 are manufactured from stainless steel comparable to the SUS-420J2 stainless steel commonly used for scissors by means of stamping, hardening and quenching, laspening and warping (making the arc shape) in a way that the hardness of movable blade 9 becomes greater than the hardness of fixed blade 14. For example, movable blade 9 is manufactured to a Rockwell hardness of HRC50 while fixed blade 14 is manufactured to a Rockwell hardness of HRC45.

[0061] Second, the angle of the edge bevel of fixed blade 14 is greater than that of movable blade 9. For example, as shown in Fig. 17, the bevel angle of fixed blade 14 is approximately 15° to 20°, and the bevel of movable blade 9 is approximately 10°.

[0062] This design causes the cutting edge of fixed blade 14, which is softer and therefore wears more rapidly than that ofmovable blade 9, to wear while maintaining a sharp cutting edge, thereby extending the effective service life of both movable blade 9 and fixed blade 14. Note that fixed blade 14 is made softer to wear faster simply because it is easier to replace fixed blade 14 than movable blade 9. However, in case of movable blade 9A, since it can also be easily replaced, the movable blade may be manufactured to wear faster than the fixed blade.

[0063] Because the two blades for cutting paper S can be separated from each other in printer 1 according to the present invention, cutting edge 14a of fixed blade 14 is exposed when cover frame 8 is opened to, for example, replace paper S. Exposing the sharp cutting edge 14a of fixed blade 14 is obviously dangerous. To remove this problem, a blade shutter 31 for covering cutting edge 14a of fixed blade 14 is disposed in printer 1 according to a modification of the first embodiment as will be explained below with reference to Fig. 20 to Fig. 22.

[0064] Blade shutter 31 in the present embodiment is substantially U-shaped and composed of shutter leaf 32 and a pair of arms 33. Note that shutter leaf 32 is slightly wider than cover frame 8, and the leading edge 32a of shutter leaf 32 is bent slightly downward towards fixed blade 14. The pair of arms 33 of blade shutter 31 straddle cover frame 8 with the ends of the arms pivotally mounted by means of studs 34 to support member 8b of cover frame 8. As a result, blade shutter 31 is disposed to pivot freely on studs 34 about an axis extending in parallel to fixed blade 14, i.e., in the direction of arrow B in Fig. 21 and in the opposite direction.

[0065] As also shown in Fig. 20 and Fig. 21, coil spring 35 is disposed between support member 8b (hook) on the end of cover frame 8 and catch 32b of shutter leaf 32. This coil spring 35 pulls blade shutter 31 toward movable blade 9 when cover frame 8 is opened. When blade shutter 31 is pulled toward movable blade 9 as cover frame 8 is opened as shown in Fig. 20 and Fig. 21, leading edge 32a of shutter leaf 32 is caused to contact and cover cutting edge 14a of fixed blade 14. This prevents the operator’s fingers from contacting cutting edge 14a of fixed blade 14 when replacing recording paper S, for example, and thus improves the safety of printer 1.

[0066] A link 36 that is operated by cover opening lever 5 is formed or disposed at the end of one arm 33 of blade shutter 31. Abutment stud 37 for locking cover frame 8 is provided on the side of case 4 opposite on which lever 5 is disposed. Note that lever 5 is arranged to rock freely on stud 50 and stop in a position roughly parallel with the top of cover frame 8. An upward extending projection 5a is disposed on one end of lever 5.

[0067] When cover frame 8 is closed as shown in Fig. 21, leading end 33a of arm 33 of blade shutter 31 contacts abutment stud 37 causing blade shutter 31 to turn in the direction of arrow B. As cover frame 8 approaches its closed position, link 36 engages projection 5a of lever 5, and thus turns lever 5. Abutment stud 37 is disengaged from leading end 33a when cover frame 8 is closed, thereby causing blade shutter 31 to pivot in the direction opposite to arrow B until positioning part 33c of arm 33 is brought into contact with stud 37 by means of coil spring 35. When this operation is completed, engaging part 33b is positioned below stud 37 as shown in Fig. 22, lever 5 is stopped at a position roughly parallel with the top of cover frame 8, and cutting edge 14a of fixed blade 14 is exposed from leading edge 32a of shutter leaf 32.

[0068] When cover frame 8 is closed, leading edge 32a of shutter leaf 32 of blade shutter 31 retracts from the paper path, and does not interfere with paper S as it is advanced or cut. As a result, blade shutter 31 does not hinder cutting of paper S by movable blade 9 and fixed blade 14 in the way described above.

[0069] When cover frame 8 is to be opened, cover opening button 6 shown in Fig. 3 is pressed to rotate lever 5 clockwise. This causes projection 5a of lever 5 to push up link 36 of blade shutter 31. Blade shutter 31 therefore pivots clockwise on stud 34, and engaging part 33b is removed from below engaging stud 37. When lever 5 is rotated further in the clockwise direction, link 36 contacts and lifts support member 8b of cover frame 8, and thereby raises cover frame 8.

[0070] When an impact, vibration, or other force tending to open cover frame 8 is applied, engaging part 33b of blade shutter 31 contacts abutment stud 37, and this locking mechanism prevents the cover frame from opening unintentionally.

[0071] By thus providing a member to cover the cutting edge of the blade as described above, any danger of the user being injured by the sharp cutting edge of the fixed blade is removed, and user safety is thus improved. This is particularly effective when a blade shutter according to the invention is employed in combina-
tion with an automatic cutter using separable blades as described above.

[0072] As will be understood, movement of the blade shutter 31 explained above is linked to the opening and closing movement of the cover frame 8. Thus, the protective function of the blade cover becomes automatically effective when needed, i.e., when cutting edge 14a becomes exposed in response to the opening of cover frame 8. As a result, contact with the sharp cutting edge is effectively and reliably prevented even if the operator opens the cover to replace the paper S, for example, without being aware or careful of the cutting blades. A cutting apparatus that is extremely safe to use can therefore be provided.

[0073] An alternative second embodiment of a printer according to the present invention is described below with reference to Fig. 23 and Fig. 24. Note that like parts in this embodiment and the preceding embodiment are identified with like reference signs.

[0074] As shown in Fig. 23 and Fig. 24, cutter frame 11 is disposed in front of main frame 7 as in the preceding embodiment, and cover frame 80 is pivotally mounted on studs 12. In the present embodiment, however, movable blade 9 and fixed blade 14 are provided in the same direction in which cover frame 80 opens. The relative positions between movable blade 9 and fixed blade 14 remain as described in the above embodiment, i.e., fixed blade 14 is on the upstream side of the paper transportation path, and movable blade 9 is on the downstream side.

[0075] Note that in the first embodiment, movable blade 9 and fixed blade 14 are disposed perpendicularly to the direction in which cover frame 8 opens. As a result, if the cutting operation is interrupted while movable blade 9 overlaps fixed blade 14 as shown in Fig. 15, cover frame 8 cannot be opened. In this situation, if, nevertheless, an excessive force is applied to open cover frame 8, assembly components around movable blade 9 and fixed blade 14 may be broken.

[0076] This problem is resolved in the second embodiment by disposing fixed blade 14 in the same direction in which cover frame 80 opens. As a result, cover frame 80 can be opened even if movable blade 9 is stopped while overlapping fixed blade 14, and damage to assembly components around movable blade 9 and fixed blade 14 can be prevented.

[0077] It should be noted that the present invention shall not be limited to the specific configurations described above, and various modifications are possible within the scope of the present invention.

[0078] For example, while the blades may be leaf or plate like members as described above, the body of the movable blade may alternatively be a round or square column-like member. Various other shapes of blades may also be used as long as the cutting edges used to cut the paper contact at a point and slide relative to each other in a scissoring action to cut the recording medium.

[0079] The drive means used to drive the movable blade shall also not be limited to the drive motor and crank mechanism described above, and various other configurations are possible. Using the drive means described above does, however, make it possible to drive the movable blade by means of a simple design.

[0080] The positions at which the fixed blade and movable blade are disposed on opposite sides of the recording paper transportation path shall also not be limited to those described above. For instance, the movable blade may be mounted on the cover frame and the fixed blade on the main frame. However, by mounting the fixed blade on the cover frame and the movable blade above the printing unit, a simple configuration can be achieved.

[0081] The inclination of the movable blade can be slightly modified, but the most effective inclination angle is approximately one degree as described above.

[0082] The location and shape of the spacer may also be varied. The index mark provided on the worm wheel can also be disposed in various positions and shapes as long as the index is visible when the movable blade is in its home position.

[0083] The structure of the blade shutter covering the fixed blade can also be variously defined. The blade shutter 31 covering the cutting edge of the exposed blade has been described in the preceding embodiment as effectively improving the safety of a motor-driven automatic paper cutter, and particularly improving the safety of such automatic paper cutter comprising separable blades. This blade shutter mechanism shall not, however, be limited to a use in combination with such automatic paper cutters, and can also be applied to manual cutters in which a cutting blade is disposed on an openable cover.

[0084] Furthermore, a printer comprising a cutter according to the present invention shall not be limited to printers using a roll-type recording medium, and can obviously be applied to a variety of other printer designs. However, the invention described above is a particularly effective for simplifying the cutter design, and therefore reducing the size and cost of the cutter and, hence, printer, when applied to a printer that uses a roll-type recording medium.

[0085] The embodiments described above have been described with reference to a printer comprising a thermal recording head. The invention shall not be limited by the type of recording or printing head used, however, and can also be applied, for example, to ink jet printers and dot impact printers using a wire dot print head.

[0086] The above embodiments have further been described with the fixed blade mounted on a cover frame used as the blade support means and the movable blade on the main frame side. The invention shall not be so limited, however, and the movable blade can be mounted on the cover frame with the fixed blade disposed on the main frame.

[0087] As described hereinabove, the present invention provides a printer comprising a cutter with a high
degree of design freedom, abolishing the need of the recording medium to be actively loaded between the fixed blade and movable blade, a good cutting quality producing a clean cut edge, and producing minimal paper chaff from the recording medium. This is achieved in accordance with the present invention by providing a pair of cutting blades, a fixed blade and a movable blade, disposed independently on opposite sides of the recording medium, a blade support means for supporting the fixed blade or the movable blade in a manner whereby the cutting edge of the fixed blade can be disposed in proximity to the cutting edge of the movable blade and can be separated from the movable blade, and movable blade drive means for sliding the movable blade across the fixed blade in a scissors-like cutting action with the cutting edges of the two blades contacting at a single cutting point.

It is also possible to prevent variations in the feed pitch of the recording medium because the recording medium is not pulled during the cutting operation, unlike cutting apparatuses that cut by severing the recording medium with a cutting edge driven perpendicularly to the surface of the recording medium, and cutting apparatuses that cut using a fixed blade and rotary blade combination.

Recording medium jams between the fixed blade and movable blade can be prevented, and a highly reliable printer can thus be achieved, by disposing the fixed blade on the upstream side and disposing the movable blade on the downstream side in the direction of the recording medium transportation.

Installing and removing the fixed blade is also simplified and improved by using a configuration in which the fixed blade is forced against a support means, one side of which is open, by means of a flexible member.

Furthermore, by imparting a different hardness to the cutting edges of the fixed blade and movable blade, and setting the bevels of the cutting edges of the fixed blade and movable blade to different angles, rounding of the cutting edge on the blade that wears faster, i.e., the softer cutting edge, is retarded, said blade wears while maintaining a sharp cutting edge, and it is therefore not necessary to replace the blade for a longer period of time. The effective service life of both the fixed blade and movable blade is therefore increased.

When a cutting blade is disposed at an openable cover member as in the cutter described above, there is the danger of touching the blade when the cover is open. However, by providing a shield member covering the cutting edge, this danger is avoided even when the openable cover is opened, and user safety can therefore be improved.

By providing the fixed blade on the cover of the cutter apparatus, and disposing the movable blade on the main frame in which the recording (print) unit is disposed in a printer in which a cover is opened to replace the recording medium, it is not necessary to pass the recording medium through a narrow gap in the cutter apparatus, and it is therefore easier to load the recording medium. It is simultaneously possible to achieve a printer with a good cutting characteristic using a simple configuration.

It is also possible to achieve a printer comprising a safe cutting means characterized by excellent linearity (straightness) in the cut edge, a consistent, stable cutting edge along all parts of both the fixed blade and movable blade, and excellent durability and ease of use.

As described above, the present invention achieves in a cutting apparatus and a printer comprising said cutting apparatus improved quality in the cut edge, improved reliability, improved ease of use, and lower cost.

Claims

1. A printer having a cutter for cutting a recording medium, said cutter comprising:

   a fixed cutting blade (14) and a movable cutting blade (9; 9A), disposed independently from each other on opposite sides of a recording medium path,

   first and second support means (7, 8) for supporting said fixed and said movable cutting blades (14, 9; 9A), respectively, movable relative to one another between a first position at which the cutting blades are held in a cooperative condition opposite to each other, and a second position at which the cutting blades are held in a non-cooperative condition remote from each other, and

   drive means (21-24, 29) for sliding the movable cutting blade against the fixed cutting blade when the blades are at said first position,

   characterized in that said cutter is a scissors-type cutter and in that a recess (14b) and a tab (14c) are formed at each lateral end of the fixed cutting blade (14) for engagement with respective support members (16) which are disposed at corresponding positions on both sides of said first support means (8), said fixed blade (14) being pressed from above toward the surface of said first support means (8) by spring means (17) fastened to the top of said first support means (8).

2. The printer according to claim 1 wherein said first and second support means (7, 8) comprise a main frame (7) supporting one (14) of said cutting blades and a swingable member (8) supporting the other cutting blade (9; 9A), said swingable member being mounted to the main frame to be pivotable between an opened position corresponding to said second support means.
position and a closed position corresponding to said first position.

3. The printer according to claim 2, wherein said main frame (7) defines a recording medium compartment (3), and said swingable member (8) is arranged to provide, in its opened position, access to said compartment allowing a supply of said recording medium to be filled in the compartment.

4. The printer according to claim 2 or 3 wherein of said main frame (7) and said swingable member (8) the one supporting said movable cutting blade (9; 9A) comprises, at a position outside of said recording medium path on the side, a contact portion contacted by the fixed cutting blade (14, 14d) in said first position of the cutting blades thereby causing a sliding surface of the fixed cutting blade and a sliding surface of the movable cutting blade to be positioned on substantially the same plane.

5. The printer according to any one of claims 2 to 4 wherein said movable cutting blade (9; 9A) is mounted on said main frame (7).

6. The printer according to any one of claims 2 to 5 comprising locking means (37-33c) for engaging and locking said swingable member (8) in said closed position.

7. The printer according to any one of claims 2 to 6 wherein the direction of the initial movement of said swingable member (8) from said closed toward said opened position is substantially the same as the direction of said sliding of said movable cutting blade (9; 9A).

8. The printer according to any one of claims 2 to 7 further comprising a shutter member (31) pivotally supported on one part, either said main frame (7) or said swingable member (8), and operating means (33a, 35, 37) for causing the shutter member to cover the cutting edge (14a) of the cutting blade (14) mounted to said one part (8), while the cutting blades (9; 9A, 14) are in their second position, and for keeping the shutter member retracted from said cutting edge, while the cutting blades are in their first position.

9. The printer according to claim 8 wherein said operating means (33a, 35, 37) is responsive to a movement of said swingable member (8) relative to said main frame (7).

10. The printer according to claim 8 or 9 wherein said shutter member (31) is substantially U-shaped comprising a plate member (32, 32a) and two arm members (33), said arm members being pivotally supported about a pivot axis extending substantially in parallel to said cutting blade (14) between a non-covering position in which said plate member is substantially parallel to said cutting blade leaving the cutting edge (14a) exposed, and a covering position in which said plate member is inclined with respect to said cutting blade with a part of the plate member extending across the cutting edge.

11. The printer according to claims 9 and 10 wherein said operating means (33a, 35, 37) comprises spring means (35) urging said shutter member (31) into said covering position, an engagement surface (33a) at at least one arm member (33) and a cooperating engagement member (37) fixed relative to said main frame (7) when said support member is said swingable member (8), and fixed relative to said swingable member when said support member is said main frame (7).

12. The printer according to any one of the preceding claims wherein said drive means (21-24, 29) is adapted to move said movable cutting blade (9; 9A) rotatively with respect to said fixed cutting blade (14) in a scissors like manner.

13. The printer according claim 12 wherein at least a part of said movable cutting blade (9; 9A) is inclined with respect to its rotary axis.

14. The printer according claim 13 wherein said inclination is adjustable.

15. The printer according claim 11 or 12 further comprising means (130, 130a) responsive to the rotary angle of said movable cutting blade (9, 9A) for changing said inclination such that said inclination is larger toward the end of a cut than at the start.

16. The printer according to any one of the preceding claims wherein said movable blade (9; 9A) is mounted in a cutter frame (11) and has a home position in which it is fully retracted into said cutter frame.

Patentansprüche

1. Drucker mit einer Schneidvorrichtung zum Abtrennen eines Aufzeichnungsträgers, die folgendes aufweist:

   eine feststehende Schneidklinge (14) und eine bewegliche Schneidklinge (9; 9A), die unabhangig voneinander auf gegenüberliegenden
Seiten eines Aufzeichnungsträgerweges angeordnet sind, eine erste und zweite Stützeinrichtung (7, 8) zum Abstützen der feststehenden bzw. der beweglichen Schneidklinge (14, 9; 9A) beweglich im Verhältnis zueinander zwischen einer ersten Stellung, bei der die Schneidklingen in einem Zustand des Zusammenwirkens einander gegenüber gehalten sind, und einer zweiten Stellung, in der die Schneidklingen in einem Zustand des Nichtzusammenwirkens voneinander entfernt gehalten sind, und eine Antriebseinrichtung (21-24, 29) zum Verschieben der beweglichen Schneidklinge gegen die feststehende Schneidklinge, wenn sich die Klingen in der ersten Stellung befinden,
dadurch gekennzeichnet, daß die Schneidvorrichtung eine scherenartige Schneidvorrichtung ist, und daß eine Ausnehmung (14b) und eine Lasche (14c) an jedem seitlichen Ende der feststehenden Schneidklinge (14) zum Eingriff mit jeweiligen Stützgliedern (16) ausgebildet sind, die an entsprechenden Stellen zu beiden Seiten der ersten Stützeinrichtung vorgesehen sind, wobei die feststehende Klinge (14) mittels einer oben an der ersten Stützeinrichtung (8) befestigten Federeinrichtung (17) von oben zur Oberfläche der ersten Stützeinrichtung (8) gedrückt ist.

2. Drucker nach Anspruch 1, bei dem die erste und zweite Stützeinrichtung (7, 8) einen Hauptrahmen (7), der eine (14) der Schneidklingen stützt, sowie ein schwenkbares Glied (8) aufweist, welches die andere Schneidklinge (9; 9A) stützt, wobei das schwenkbare Glied am Hauptrahmen so angebracht ist, daß es zwischen einer geöffneten Position entsprechend der zweiten Stellung und einer geschlossenen Position entsprechend der ersten Stellung schwenkbar ist.

3. Drucker nach Anspruch 2, bei dem der Hauptrahmen (7) ein Aufzeichnungsträgeraufnahmefach (3) bildet und das schwenkbare Glied (8) so angeordnet ist, daß es in seiner geöffneten Position Zugang zum Aufnahmefach bietet, was es erlaubt, einen Vorrat auf Aufzeichnungsträger in das Aufnahmefach einzufüllen.

4. Drucker nach Anspruch 2 oder 3, bei dem der Hauptrahmen (7) und das schwenkbare Glied (8), dasjenige Teil, welches die bewegliche Schneidklinge (9; 9A) stützt, an einer Stelle außerhalb des Aufzeichnungsträgerweges an der Seite einen Kontaktbereich aufweist, mit dem die feststehende Schneidklinge (14, 14d) in der ersten Stellung der Schneidklingen in Berührung tritt und dadurch eine Gleitfläche der feststehenden Schneidklinge und eine Gleitfläche der beweglichen Schneidklinge veranlaßt, im wesentlichen in der gleichen Ebene positioniert zu sein.

5. Drucker nach einem der Ansprüche 2 bis 4, bei dem die bewegliche Schneidklinge (9, 9A) an dem Hauptrahmen (7) angebracht ist.


7. Drucker nach einem der Ansprüche 2 bis 6, bei dem die Richtung der anfänglichen Bewegung des schwenkbaren Gliedes (80) aus der geschlossenen zu der geöffneten Position im wesentlichen die gleiche wie die Richtung des Gleitens der beweglichen Schneidklinge (9; 9A).

8. Drucker nach einem der Ansprüche 2 bis 7, ferner mit

   einem Verschlußglied (31), welches auf einem Teil, entweder dem Hauptrahmen (7) oder dem schwenkbaren Glied (8) schwenkbar abgestützt ist, und
einer Betätigungseinrichtung (33a, 35, 37) zum Anlassen des Verschlußgliedes, die Schneidkante (14a) der an dem einen Teil (8) angebrachten Schneidklinge (14) zu bedekken, während die Schneidklingen (9, 9A, 14) sich in ihrer zweiten Stellung befinden, und das Verschlußglied von der Schneidkante zurückgezogen zu halten, während die Schneidklingen sich in ihrer ersten Stellung befinden.

9. Drucker nach Anspruch 8, bei dem die Betätigungseinrichtung (33a, 35, 37) auf eine Bewegung des schwenkbaren Gliedes (8) gegenüber dem Hauptrahmen (7) ansprechbar ist.

10. Drucker nach Anspruch 8 oder 9, bei dem das Verschlußglied (31) im wesentlichen U-förmig ist, ein Plattenglied (32, 32a) und zwei Armglieder (33) aufweist, wobei die Armglieder um eine sich im wesentlichen parallel zur Schneidklinge (14) erstreckende Schwenkachse zwischen einer nichtbedekkenden Stellung, bei der das Plattenglied im wesentlichen parallel zur Schneidklinge ist, die Schneidkante (14a) bloßliegend läßt, und einer bedeckenden Stellung schwenkbar abgestützt sind, bei der das Plattenglied in bezug auf die Schneidklinge geneigt ist, wobei ein Teil des Plattengliedes sich über die Schneidkante erstreckt.

11. Drucker nach Anspruch 9 und 10, bei dem die Betätigungseinrichtung (33a, 25, 37) eine Federein-
richtung (35) aufweist, welche das Verschlußglied (31) in die bedeckende Stellung drängt, eine Eingriffsüberfläche (33a) an mindestens einem Arm glied (33) und ein zusammenwirkendes Eingriffsglied (37), welches relativ zu dem Hauptrahmen (7) fixiert ist, wenn das Stützglied das schwenkbare Glied (8) ist, und relativ zu dem schwenkbaren Glied fixiert ist, wenn das Stützglied der Hauptrahmen (7) ist.

12. Drucker nach einem der vorhergehenden Ansprüche, bei dem die Antriebs einrichtung (21-24, 29) geeignet ist, die bewegliche Schneidklinge (9; 9A) drehend gegenüber der feststehenden Schneidklinge (14) auf scherenartige Weise zu bewegen.

13. Drucker nach Anspruch 12, bei dem die Neigung einstellbar ist.


15. Drucker nach Anspruch 11 oder 12, ferner mit einer Einrichtung (130, 130a), die auf den Drehwinkel der beweglichen Schneidklinge (9; 9A) zum Ändern der Neigung anspricht, so daß diese Neigung zum Ende eines Schnittes größer ist als am Beginn.

Revendications

1. Imprimante ayant un dispositif de découpe destiné à découper un support d'enregistrement, le dispositif de découpe comportant :

- une lame (14) de découpe fixe et une lame (9 ; 9A) de découpe mobile disposées indépendamment l'une de l'autre sur des côtés opposés d'un trajet de support d'enregistrement, des premier et second moyens (7, 8) de support destinés à supporter les lames (14, 9 ; 9A) de découpe mobile et fixe respectivement, mobiles les uns par rapport aux autres entre une première position à laquelle les lames de découpe sont maintenues suivant un état de coopération opposées l'une à l'autre, et une seconde position à laquelle les lames de découpe sont maintenues suivant un état de non coopération à distance l'une de l'autre, et des moyens (21-24, 29) d'entraînement desti- nés à faire coulisser la lame de découpe mobile contre la lame de découpe fixe lorsque les lames sont à ladite première position,

- caractérisée en ce que le dispositif de découpe est un dispositif de découpe de type à ciseau et en ce qu'un évidement (14b) et une patte (14c) sont formés à chaque extrémité latérale de la lame (14) de découpe fixe pour une coopération avec des éléments (16) de support respectifs qui sont disposés à des positions correspondantes sur les deux côtés des premiers moyens (8) de support, la lame (14) fixe étant pressée à partir du dessus en direction de la surface des premiers moyens (8) de support par des moyens (17) à ressort fixés au sommet des premiers moyens (8) de support.

2. Imprimante suivant la revendication 1, dans laquelle le premier et second moyens (7, 8) de support comportent un châssis (7) principal supportant l'une (14) des lames de découpe et un élément (8) pouvant basculer supportant l'autre lame (9 ; 9A) de découpe, l'élément pouvant basculer étant monté sur le châssis principal de manière à pouvoir pivoter entre une position ouverte correspondant à ladite seconde position et une position fermée correspondant à ladite première position.

3. Imprimante suivant la revendication 2, dans laquelle le châssis (7) principal définit un compartiment (3) de support d'enregistrement, et l'élément (8) pouvant pivoter est agencé de manière à permettre, dans sa position d'ouverture, l'accès au compartiment permettant une alimentation en le support d'enregistrement à remplir dans le compartiment.

4. Imprimante suivant la revendication 2 ou 3, dans laquelle du châssis (7) et de l'élément (8) pouvant basculer, celle ou celui supportant la lame (9 ; 9A) de découpe mobile comporte, à une position à l'extérieur du trajet de support d'enregistrement sur le côté, une partie de contact en contact avec la lame (14, 14d) de découpe fixe dans la première position des lames de découpe pour ainsi faire qu'une surface de coulisement de la lame de découpe fixe et une surface de coulisement de la lame de découpe mobile soient positionnées sur sensiblement le même plan.

5. Imprimante suivant l'une quelconque des revendications 2 à 4, dans laquelle la lame (9 ; 9A) de découpe mobile est montée sur le châssis (7) principal.

6. Imprimante suivant l'une quelconque des revendications 2 à 5, comportant des moyens (37-33c) de verrouillage destinés à coopérer avec l'élément (8) pouvant basculer et à verrouiller l'élément (8) pou-
vant basculer en la position fermée.

7. Imprimante suivant l'une quelconque des revendications 2 à 6, dans laquelle la direction du déplacement initial de l'élément (80) pouvant basculer à partir de ladite position fermée en direction de la disposition ouverte est sensiblement la même que la direction de coulissage de la lame (9; 9A) de découpe mobile.

8. Imprimante suivant l'une quelconque des revendications 2 à 7, comportant en outre un élément (31) obturateur supporté de manière pivotante sur une partie, soit le châssis (7) principal, soit l'élément (8) pouvant basculer, et des moyens (33a, 35, 37) d'actionnement destinés à faire que l'élément obturateur couvre le bord (14a) de découpe de la lame (14) de découpe montée sur ladite une partie (8), tandis que les lames (9; 9A, 14) de découpe sont dans leur seconde position, et destinées à maintenir l'élément obturateur rétracté du bord de découpe, tandis que les lames de découpe sont dans leur première position.

9. Imprimante suivant la revendication 8, dans laquelle les moyens (33a, 35, 37) d'actionnement sont sensibles à un déplacement de l'élément (8) pouvant basculer par rapport au châssis (7) principal.

10. Imprimante suivant la revendication 8 ou 9, dans lequel l'élément (31) formant obturateur est sensiblement en forme de U comportant un élément (32, 33a) formant plaque et deux éléments (33) formant bras, les éléments formant bras étant supportés de manière pivotante par rapport à un axe de pivot s'étendant sensiblement parallèlement à la lame (14) de découpe entre une position de non couverture dans laquelle l'élément formant plaque est sensiblement parallèle à la lame de découpe laissant le bord (14a) de découpe à nu, et une position de couverture dans laquelle l'élément formant plaque est incliné par rapport à la lame de découpe avec une partie de l'élément formant plaque s'étendant sur tout le bord de découpe.

11. Imprimante suivant la revendication 9 et 10, dans laquelle les moyens (33a, 35, 37) d'actionnement comportent des moyens (35) formant ressort sollicitant l'élément (31) d'obturation dans la position de couverture, une surface (33a) de coopération à au moins l'un des éléments (33a) de bras et un élément (37) de coopération fixe par rapport au châssis (7) principal lorsque l'élément formant support est l'élément (8) pouvant basculer, et fixe par rapport à l'élément pouvant basculer lorsque l'élément formant support est le châssis (7) principal.
FIG. 11
FIG. 12
FIG. 13
FIG. 17