UNITED STATES PATENT OFFICE

2,597,826

CUTTING KNIFE SLOT CLOSING PLATE


Application December 2, 1948, Serial No. 63,000

2 Claims. (Cl. 164—53)

1. My present invention is primarily an improvement over the invention shown in my application Serial No. 673,289, filed May 31, 1946, now Patent No. 2,570,873, issued October 9, 1951, and application Serial No. 752,542, filed June 4, 1947, now U.S. Patent No. 2,467,837, and relates particularly to the construction of a slot closing plate for a cutting knife, which plate is so arranged that it will maintain the slot closed irrespective of the amount of wear or other adjustment of the knife itself during use thereof.

In the operation of cutting knives of the so-called guillotine type as exemplified by my above-mentioned applications, the knife which cuts a stack of sheets comes down not only with a downward movement but also with a swinging lateral movement, usually moving toward the left in its downward swing.

For this reason, the knife bar and blade rides in a pair of slots on opposite sides of the work table which guide the knife blade and at the same time permit the knife blade and bar to swing laterally during the downward stroke.

The lateral swing of the knife bar during the downward stroke has the effect of forcing the paper stack as a whole against the left-hand gauge and hence against the slot traversed by the knife blade.

Of course, the paper stack is placed against the left-hand gauge initially, but the pressure of the knife blade as it swings laterally tends to drive the paper stack very tightly against the left-hand gauge. Trimmings, or small narrow piles such as small labels tend, therefore, to be driven into the slot on the left side in which the knife bar rides.

Where a narrow cut is taken, the operation of the knife bar in this manner tends to sweep or pull all of the narrow strips severed into the knife slot. For this reason, it has become desirable to close the slot in such manner that the closure may automatically be opened by the descent of the knife blade but, nevertheless, so that the closure member also automatically closes up the slot at every position of the knife blade.

Thus, attempts have been made to utilize the rotatable closure plates which are swung out of the way on the descent of the knife blade or replaceable closure plates which are pushed down on the descent of the knife blade and rise up once more when the knife blade rises.

It is possible to make such closure plates either swinging or sliding so that they will operate properly for one adjustment of the knife bar and for one exact width of blade. However, as the knife continues in use, the blade is continuously sharpened and resharpened and, therefore, becomes shorter.

As a matter of fact, after it has been shortened by sharpening, it may be adjusted to an entirely new position on the knife bar, in most cases, where it is again relatively wide or projects relatively far below the knife bar.

A primary object of my present invention is to provide, therefore, an adjustable slot closing plate which may be automatically adjusted for any adjustment of the knife bar and for any relative width of knife blade so that the slot will always be completely closed.

This is extremely important since even a relatively very narrow aperture at the upper end of the slot adjacent the knife blade as the knife blade wears will permit one or two or more strips to be forced into the slot and those strips will damage the top of the paper pile in process of being cut.

A further object of my invention is the provision of simplified operating means for the slot closure plate so arranged that it will automatically follow the operation of the knife bar in both directions.

Another object of my invention is the provision of simplified adjusting elements for my novel slot closing plate:

Another object of my invention is the provision of simple spring means for supporting the slot closing plate in continuous slot closing relation with the knife and its blade.

The foregoing and many other objects of my invention will become apparent in the following description and drawings in which:

Figure 1 is a partial view in perspective of my novel slot closing plate in conjunction with a fragmentary view of the knife bar and knife with which it is to cooperate.

Figure 2 is a front elevation showing the method of attachment of my novel slot closing plate to the spring support.

Figure 3 is a side view partly in cross-section of my novel slot closing plate.

Figure 4 is an end view of my novel slot closing plate.

Figure 5 is a cross-sectional view through my novel slot closing plate and a portion of the knife frame.

Referring now to the figures, the knife bar 10 carrying the knife blade 11 is actuated up and down in a suitable manner as shown in my prior application Serial No. 673,289 in slots 16 in the main frame 14, the said slots being defined
by the side guides 12 and 13 (Figure 5). Guide 12 may be a fixed guide in each of the slots and guide 12 may be adjustable by the wedge 19 which may be moved in and out by the adjusting screw 20 as described in my aforesaid prior application. The left side gauge is formed by portion 14a of frame 14 back of slot 16, the slot closing plate 25 and the additional side gauge member 21 forward of the slot. The paper to be cut rests, of course, on table 22, the slot closing plate is guided and positioned for vertical sliding movement by guide 23 in front gauge 21 which guide cooperates with the vertical member 27 secured to the slot closing plate 25. The rear end of the slot closing plate is guided by guide 28 in slot 18 which guide however starts below the level of table 22 and does not interfere with the movement of the knife.

As previously pointed out, the knife bar 10 and its associated blade 11 not only have a downward movement but also have a movement toward the left so that the knife blade acts as a laterally swinging guillotine. This movement toward the left tends to drive scraps of paper and especially narrow strips when they are severed by the knife bar into the left hand slot 18.

For this reason, a slot closing plate is required. Various types of slot closing plates have been used. But the difficulty has arisen that as the knife blade 11 is continuously sharpened, it varies its relative width with respect to the knife bar 10 so that at first a small gap appears between the slot closing plate and the knife blade and as the blade is shortened by further continuous sharpening, the gap widens sufficiently to permit relatively large quantities of paper to be cumulatively jammed into the slot 18.

For this purpose and in order to obviate this difficulty, my invention contemplates an adjustable slot closing plate 25 having a main body which slides up and down in the slot and which, with the additional elements below described, completely fills the slot at all times so that paper paper and other material cannot be jammed into the slot despite the lateral movement of the knife bar 10 and the blade 11.

The main body of the slot closing plate 25 has a vertical member 27 secured thereto in any suitable manner as by the rivets 28, the said vertical element extending upward to the upper end 31 of knife bar 10.

The vertical member 27 thus comprises a rigid link extending above the main body of the slot closing plate 25 and carries at its upper end a pin 29 connected by removable hook 30 to the chain 70 which passes over pulley 71, rotatable on pin 72 carried by the main frame or cross-brace of the machine. The other end of chain 70 is connected to tension spring 73, the opposite end of spring 73 being held by pin 74 also carried by the main frame or cross-brace of the machine.

Spring 73 thus maintains the slot closing plate against knife bar 10 and its blade 11, closing the slot. Spring 73 permits the knife bar 10 to push the plate 25 down while still maintaining the slot closing plate 25 may then move downward vertically in the slot while bar 10 slides laterally and downwardly. The spring 73 then pulls plate 25 up with knife bar 10 when bar 10 rises again.

When any adjustment is to be made of blade 11 or parts thereof, hook 30 may be disengaged from pin 29 to permit the slot closing plate 25 to fall down in the slot, making the plate 25 or blade 11 accessible for adjustment. When the adjustment is made, plate 25 is lifted up in the slot and hook 30 reconnected to pin 29 whereupon spring 73 continuously supports the plate 25 against bar 10 and blade 11.

The slot closing plate has a rearward extension 35 which is vertically adjustable. The upper end 36 of the rearward extension 35 is adapted to register with the lower surface of the knife blade 11, while the upper surfaces 37 and 38 of the main body 26 of the slot closing plate are adapted to register with the lower surface of the knife bar 10.

The main body 25 of the slot closing plate is vertically slotted and undercut at 40 to provide a recess in which the vertical lug 41 of the adjustable member 35 may slide. The upper surface 39 of the main body 26 of the slot closing plate is provided with an opening 42 having the counterbore 43 to receive the bolt 44 having the head 45, the head 45 being recessed in the counterbore 44.

The head 45 of the bolt 44 is confined between the bottom of counterbore 44 and pin 34, the latter being perpendicular to the plate 25 and secured therein.

The upper surface 50 of the lug 41 of the adjustable member 35 is provided with the vertically tapped opening 51 in which the lower end of the bolt 44 is threaded. When the bolt 44 is rotated by means of a socket wrench engaged in socket 53 thereof, the vertically adjustable member 35 and its lug 41 are raised or lowered in accordance with the sense of rotation.

The adjustment is automatically locked in position by the spring biased lug 55, the point of which is pushed against the grooves 56 in the head 45 of the bolt by the compression spring 57. The locking lug 55 and spring 57 are mounted in the lateral recess 60 which communicates with the counterbore 44 and thereby permits the locking lug 55 to be effective.

Thus, as the knife blade 11 is continuously sharpened and reduced in width so that it projects to a lesser degree from the lower end of the knife bar 10, the rotation of the bolt 44 raises the adjustable element 35 so that pin 34 and slot 38 thereof is closely in engagement with the lower end of the knife blade 11. Every time the blade 11 is sharpened and thus reduced in its vertical dimension, the adjustment may be made to ensure closing of the knife slot

When the blade 11 is finally replaced by a longer blade, then the adjustment is made to lower the adjustable member 35 so that the upper end 36 thereof is in close engagement with the lower end of the blade.

The upper surface of the slot closing plate is made accessible in any suitable manner by removing hook 30 from pin 29 permitting plate 25 to fall down in the slot while knife bar 10 stays up.

By this means, therefore, a simplified adjustable slot closing plate is provided which will be universally adaptable over the entire range of use of the knife and which will automatically be adaptable to the closing of the slot irrespective of the vertical dimension of the blade.

In the foregoing, I have described my invention solely in connection with specific embodiments thereof. Since many variations and modifications of my invention will now be obvious to those skilled in the art, I prefer to be bound not by the specific disclosure herein contained, but only by the appended claims.

I claim:

1. In a guillotine type paper cutter having a frame and a vertically reciprocable knife, said
knife having a lateral movement toward and away from one side of the frame during its reciprocation and a slot in said side of the frame receiving and guiding the knife for vertical and lateral movement thereof; a slot closing plate vertically slidable in said slot and having a surface co-planar with the portions of the frame defining the slot; said plate being downwardly movable by the knife during downward movement of the knife; and resilient means retaining said plate against the lower end of said knife to close said slot continuously; said means comprising an upwardly directed extension of said plate; a tension spring connected at one end to said extension and at the other end to a stationary portion of the frame.

2. In a guillotine type paper cutter having a frame and a vertically reciprocable knife, said knife having a lateral movement toward and away from one side of the frame during its reciprocation, and a slot in said side of the frame receiving and guiding the knife for vertical and lateral movement thereof; a slot closing plate vertically slidable in said slot and having a surface co-planar with the portions of the frame defining the slot; said plate being downwardly movable by the knife during downward movement of the knife; and resilient means retaining said plate against the lower end of said knife to close said slot continuously; said means comprising an upwardly directed extension of said plate, a flexible member connected to said extension including a sheave over which said flexible member passes and bends, and a tension spring connected at one end to said flexible member and at the other end to a stationary portion of the frame.

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