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2,113,598

METHOD FOR REMOVING AND REPLACING KNIVES OF PAPER CUTTING MACHINES

Original Filed March 30, 1935 2 Sheets-Sheet 1

FIG. 1

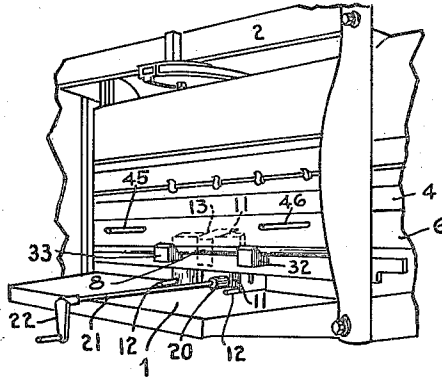


FIG. 2

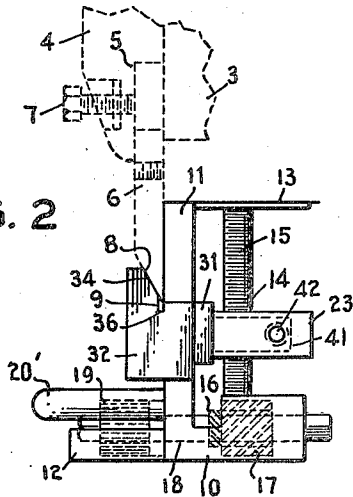


FIG. 8

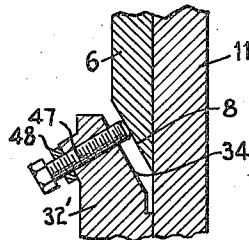


FIG. 7

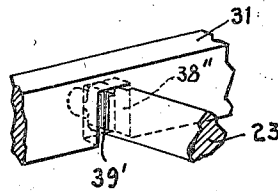
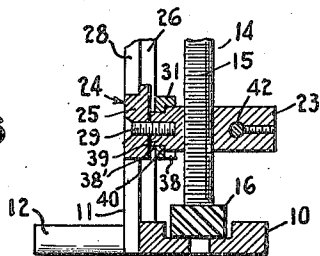


FIG. 6



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METHOD FOR REMOVING AND REPLACING
KNIVES OF PAPER CUTTING MACHINES

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Original application March 30, 1935, Serial No.
13,827. Divided and this application August
15, 1936, Serial No. 96,148

4 Claims. (Cl. 29—84)

This invention relates to paper cutting machines which include a vertically movable knife bar to which a knife is detachably connected and a clamp bar which clamps in place the paper to be cut by the knife, this clamp bar being vertically movable so as to move it into clamping position upon the paper or remove it therefrom, the clamp bar and knife bar being relatively movable, the invention being more particularly concerned with a method for removing or replacing the knife from or in operative position in the machine.

This application is a division of my prior application Serial No. 13,827, filed March 30, 1935.

Heretofore methods for facilitating the insertion and removal of the knife have required supporting means secured to the clamp bar. This however is objectionable for many reasons among which may be mentioned the necessity for formation of holes in the clamping bar into which the knife supporting means is secured whereby the machine is mutilated in a manner objectionable to the manufacturers of the machine as well as to the users, there is danger of injury to the operators' fingers by reason of entering into holes, etc.

The main object of the invention is to provide an improved method for removing a knife from or replacing it in a paper cutting machine.

It is a further object of the present invention to provide an improved method of the character as indicated which shall utilize the bed of the machine as a base, the knife being supported therefrom, a firm and reliable support being thereby provided and the objections incident to supporting the knife from the clamp bar are avoided.

A further object of the invention is to provide a method involving a knife support independent of the clamp bar whereby the mutilation of the clamp bar is unnecessary and it is left intact as put out by the manufacturer.

A further object of the invention is to provide a method of the character as indicated which requires no modification or mutilation of the paper cutting machine whatever.

A further object of the invention is to provide a method of the character as indicated which may be operated in the limited space available in paper cutting machines.

Other and ancillary objects of the invention will appear hereinafter.

In the accompanying drawings which illustrate the invention and certain forms of apparatus by which it may be practiced—

Fig. 1 is a perspective view of a paper cutting machine, partly broken away and certain of the parts omitted for clearness, and of a device applied thereto whereby the present invention may be practiced.

Fig. 2 is an end view of the improved knife supporting device.

Fig. 3 is a top plan view of the knife supporting device of Fig. 2.

Fig. 4 is a rear elevation of the device of Figs. 2 and 3.

Fig. 5 is a front elevation of the device of Figs. 2, 3 and 4.

Fig. 6 is a partial section on the line 6—6 of Fig. 3.

Fig. 7 is a fragmentary perspective view showing a modified construction of the mounting of the supporting yoke; and

Fig. 8 is a fragmentary view in section of a modified form of knife engaging support.

Referring to the drawings, and first to Figs. 1 to 6 inclusive, the paper cutting machine comprises a bed 1 upon which the pile of paper to be cut is laid, and an upright frame 2 within which are guided the vertically movable clamp bar 3 and the knife bar 4. The bars 3 and 4 are vertically movable independently and the bar 3 is adapted to be forced against the top of the pile of paper sheets, which lie on the bed, while they are being cut and is movable upwardly to afford space for the insertion or removal of a pile of sheets. The bar 4 has a rabbet 5 at its lower edge within which is secured the knife 6 by means of the screws 7. The front lower edge of the knife 6 is bevelled at 8 and terminates in the very sharp cutting edge 9, the knife bar and its knife sliding on the surface of the clamp bar 3 as the knife bar and knife are vertically reciprocated. The clamp bar is normally held in elevated position by means of a strong spring and is moved into clamping position against the force of the spring by means of a lever not shown as this is old and well understood. The knife bar is actuated by a suitable motor mechanism under the control of the operator which is also old and well known and consequently is not shown in the drawings and requires no further description. The paper cutting machine as thus far described is old and well known.

The knives of such machines because of dullness, mutilation or other causes require to be removed from the machine from time to time so as to be replaced, sharpened or otherwise cared for. The removal and insertion of the knife is not a simple matter when it is taken into con-

sideration that the knife is very heavy, weighing 25 pounds or more and the cutting edge is of razor sharpness. It is therefore difficult to handle the knife in the removing and replacing operation without danger of damage to the operator or to the knife. The present invention supplies a safe and efficient means for handling the knife during these operations and in an illustrative form is described as follows in connection with Figs. 1 to 6 inclusive:

The means for handling the knife comprises a base 10 adapted to rest on the upper surface of the bed 1 of the paper cutting machine, wherefrom extends a vertical upright plate 11, and to provide a broader base and thereby give the device greater stability, projections 12 extend from the front of the plate 11 with their lower extremities in the plane of the bottom of the base 10.

Extending rearwardly from the vertical plate 11 is a horizontal plate 13 in which one end of a shaft 14 is rotatably mounted, the other end of the shaft being rotatably mounted in the base 10. The shaft 14 has screw threads 15 for the greater portion of its length and fixed upon the shaft is a worm wheel 16 co-operating with a worm 17 (see Figs. 3 and 4), fixed upon a shaft 18 journaled in the base 10. Also fixed upon the shaft 18 is a spur gear 19 adapted to mesh with another spur gear 20 (see Fig. 1) fixed upon the end of a shaft 21 having a hand crank 22 at its end, the shaft 21 being sufficiently long so that the handle will be outside the front edge of the bed of the machine, so that it can be turned, and the other end of the shaft having a socket inside the gear 20 for receiving the cylindrical pin 20¹ extending from the plate 11, the pin forming a bearing for the inner end of the shaft as it is turned. The shaft 14 extends through a hole in the rearwardly extending projection 23 from a cross head 24 comprising a plate 25 sliding in rabbets 26 and extending along the vertical slot 28 in the upright plate 11 and also the integral projection from the plate 25 extending within the slot 28. The cross head 24 is secured to the projection 23 by means of screw 29. Tapped in the hole in the projection 23 through which the shaft 14 extends, are threads which engage with the threads 15 so that as the shaft 14 is turned in the manner as described, the projection 23 and its connected cross head will be moved up or down according to the direction of turning and the cross head will slide in and be guided by the walls of the slot 28 and the rabbets along the edges thereof. Mounted upon the projection 23 and movable up and down therewith is a yoke 31 extending about the sides of the plate 11 and to the front ends thereof are secured the knife supports 32 and 33 overlapping the front of the plate 11 and having beveled surfaces, as 34, conforming to the bevel of the knife to be supported and there being slots 36 and 37 cut in the supports 32 and 33 at the bottoms of the beveled surfaces. Clearances are thus provided which prevent the supports from coming against the knife edge in such manner as to dull or injure the same.

The yoke 31 is rockably mounted upon the projection 23 by having a recess 38 at substantially the middle portion of the yoke which embraces the projection 23 and a reduced portion 39 of the projection 23 enters the hole 38¹ in the yoke and forms a rocking bearing therefor, the shoulders 40 upon the projection 23 coming against the yoke to limit the movement of the

projection 23 and cross head 24 in a forward direction.

It is of advantage for the yoke to be free to tilt longitudinally so that the supporting surfaces 32 and 33 may automatically adjust themselves to the knife and accordingly the yoke 31 may rock upon the projection 23. This tilting movement is however limited by a pin 41 fixed in the yoke and having a hole into which extends a pin 42 fixed in the projection 23, there being sufficient clearance in the hole about the pin 42 to permit the tilting movement referred to but preventing tilting beyond certain limits. Also clearances 43 and 44 are provided between the edges of the plate 11 and the ends of the yoke to permit the tilting referred to. The pins 41 and 42 might be omitted by making the portion of the projection 23 of square cross section where it is embraced by the recess 38 and making the recess 38 in the yoke 31 also square but with sufficient clearance to permit a certain amount of tilting of the yoke. Under such circumstances the tilting would be limited by the sides of the yoke recess coming against the sides of the square portion of the projection 23. Such a construction is shown in Fig. 7 wherein the yoke 31 has a square recess 38¹¹ embracing the projection 23 at the flat sided portion 39¹. It will be obvious that this permits a tilting of the yoke 31 about the axis of the projection 23 but that this tilting is limited in each direction by one side or the other of the recess 38¹¹ coming against a flat side of the projection 23.

It will be observed that, in order to facilitate the cutting of the paper by the knife, the knife edge 9 is inclined from one end to the other being highest above the bed at the right hand of Fig. 1 and lowest at the left hand of that figure. The yoke 31 will therefore be normally inclined to correspond with the inclination of the knife edge so that one of the supporting members as 32 will be at a somewhat higher level than the other supporting member 33 so that the inclined knife will rest simultaneously upon these members, any slight adjustment to achieve this result being automatically accomplished by the tilting of the yoke upon the member 23 as before referred to.

In removing a knife, the clamp bar is caused to assume its raised position and the knife bar is caused to assume a position with its edge slightly below the lower edge of the clamp bar. The supporting means is then placed on the surface of the bed 1 and on account of the fact that the vertical plate 11 is made as high as possible it may be slid endwise under the highest end of the knife (at the right in Fig. 1). The support is then swung into position such that the plate 11 is parallel to and its front face is substantially in alignment with the back surface of the knife. The operating bar 21 with its hand crank is then placed in position by sliding the gear 20 into mesh with the gear 19, the pin 20¹ at the same time entering into the socket within the gear 20. The handle 22 being then turned the supports 32 and 33 will be moved upwardly into engagement with the front inclined or beveled face of the knife, the back vertical face of the knife resting against the front vertical face of the plate 11 whereby the knife is supported between the supporting means 32 and 33 and the plate 11. The screws 7, securing the knife to the bar 4, are then removed and the knife is lowered by lowering the supporting means 32 and 33 by turning the handle 22 in the appropriate direc-

tion, until the knife has cleared the knife bar and clamp bar. The knife and support may then be swung in a horizontal plane to clear the knife from the side guides and then the support and knife together can be moved forwardly of the bed into a position where the knife may be conveniently taken hold of by the operator to remove it from the support. During these entire operations it will be observed the knife is supported on the upper face of the bed plate and the knife is much more conveniently handled by having it moved in its support to a convenient position at the front of the bed plate than was the case when the operator was obliged to extend his arms to lift it from its position adjacent the clamp and knife bars as was necessary with prior methods of removing or replacing a knife. For convenience in laying hold of the knife by the operator, handle bars 45 and 46 may have their threaded ends screwed into the tapped holes in the knife 6 which are provided for the securing screws 7.

In inserting or replacing a knife the support may be placed on the machine bed adjacent the front thereof and the knife placed in position between the supporting means 32 and 33 and the plate 11. The supporting means carrying the knife is then pushed backwardly upon the bed surface until the knife is in position below the knife bar. The operating rod 21 is then placed in position and the supports 32 and 33 are raised until the knife has been raised into securing position with regard to the knife bar. The screws 7 are then inserted and the supports 32 and 33 lowered sufficiently to permit the supporting device to be removed. It will be observed that during this entire process of inserting the knife it is supported upon the surface of the bed plate.

The supporting means as 32¹, may have adjusting means whereby the supporting means may be adjusted to the knife if they should not be moved high enough to contact the knife or for any other means adjustment is required. Such an arrangement is shown in Fig. 8 in which a supporting means 32¹, corresponding to the means 32 and 33 of Fig. 1, has screwed therein an adjusting screw 47 which by turning it in one direction or the other may be adjusted to come against the beveled or inclined face 8 of the knife and support the same at different distances from the inclined or beveled face 34¹ as may be required. The screw 47 may be locked in

any position of adjustment by means of a lock nut 48.

While the invention has been illustrated in what are considered its best applications, it may be practiced by other structures and its details varied without departing from its spirit and it is not therefor limited to the structures shown in the drawings nor to the precise details of method as recited.

What I claim is:

1. The method of removing a knife from a paper cutting machine which consists in relatively adjusting an auxiliary support on the bed of the machine beneath said knife and the knife-operating parts of said machine, into position, to support the knife, detaching the knife from the machine and lowering it in the support to clear said knife-operating parts of the machine meanwhile supporting said auxiliary support and knife on the bed of the machine.

2. The method of removing a knife from a paper cutting machine which consists in relatively adjusting an auxiliary support on the bed of the machine beneath said knife and the knife-operating parts of the machine, into position to support the knife, detaching the knife from the machine and lowering it in the auxiliary support to clear said knife-operating parts of the machine, meanwhile supporting said auxiliary support and knife on the bed of the machine, and moving said auxiliary support and knife forwardly along the bed of the machine.

3. The method of placing a knife in a paper cutting machine which consists in supporting the knife on an auxiliary support, moving said auxiliary support and knife along the bed of the machine to a position beneath the knife bar, raising the knife into cooperative relation to the knife bar, meanwhile supporting said knife upon the auxiliary support, resting on the bed of the machine securing said knife to the knife bar, and removing said auxiliary support.

4. The method of placing a knife in a paper cutting machine which consists in placing the knife in an auxiliary support resting upon the bed of the machine, moving the auxiliary support and its carried knife rearwardly upon the bed of the machine into a position such that the knife is beneath the knife bar, raising the knife into securing relation to the knife bar, meanwhile supporting the auxiliary support and knife upon the bed of the machine, securing said knife to the knife bar, and removing said auxiliary support.

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