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KNIFE CHANGING DEVICE

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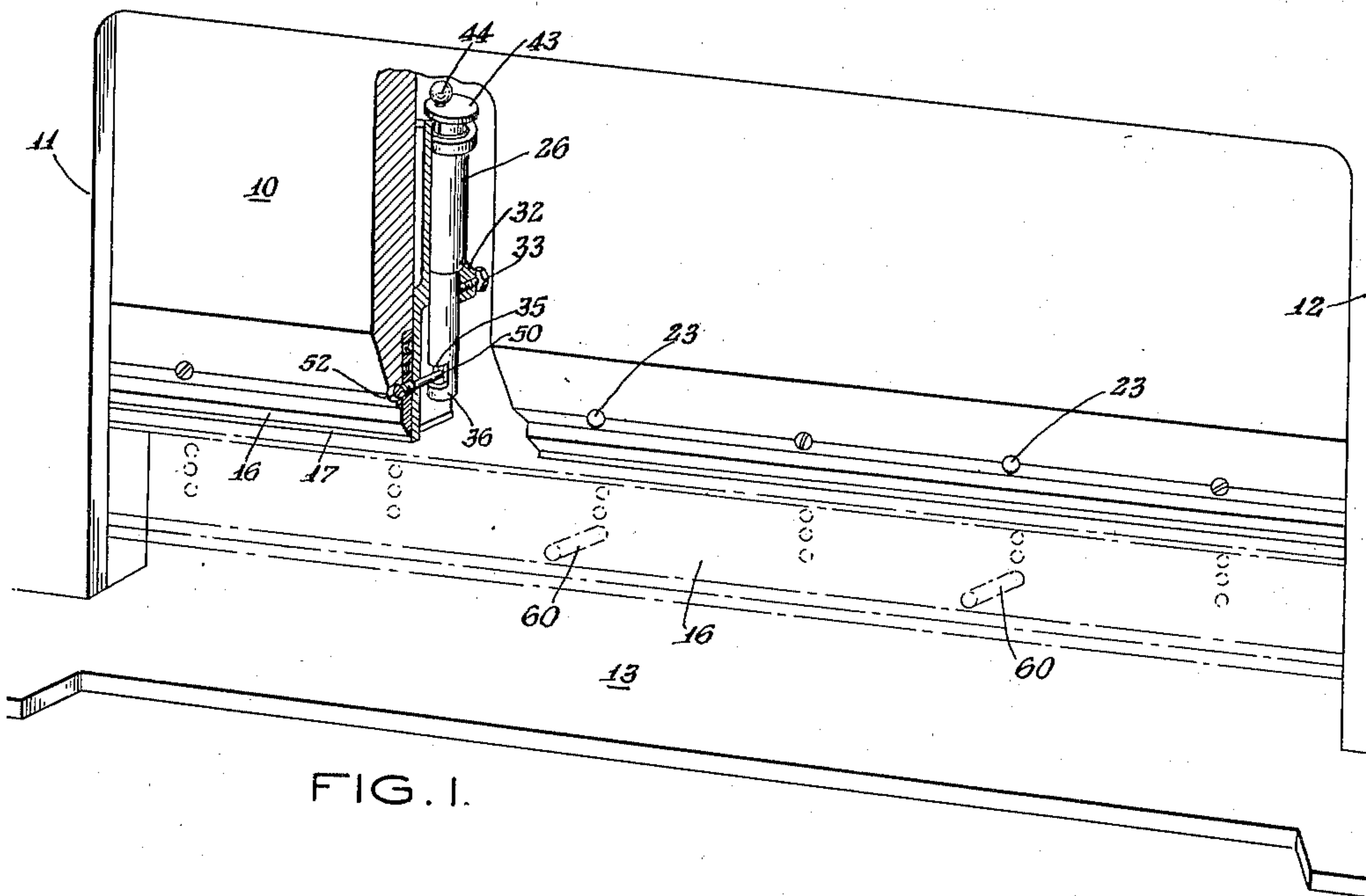


FIG. 1.

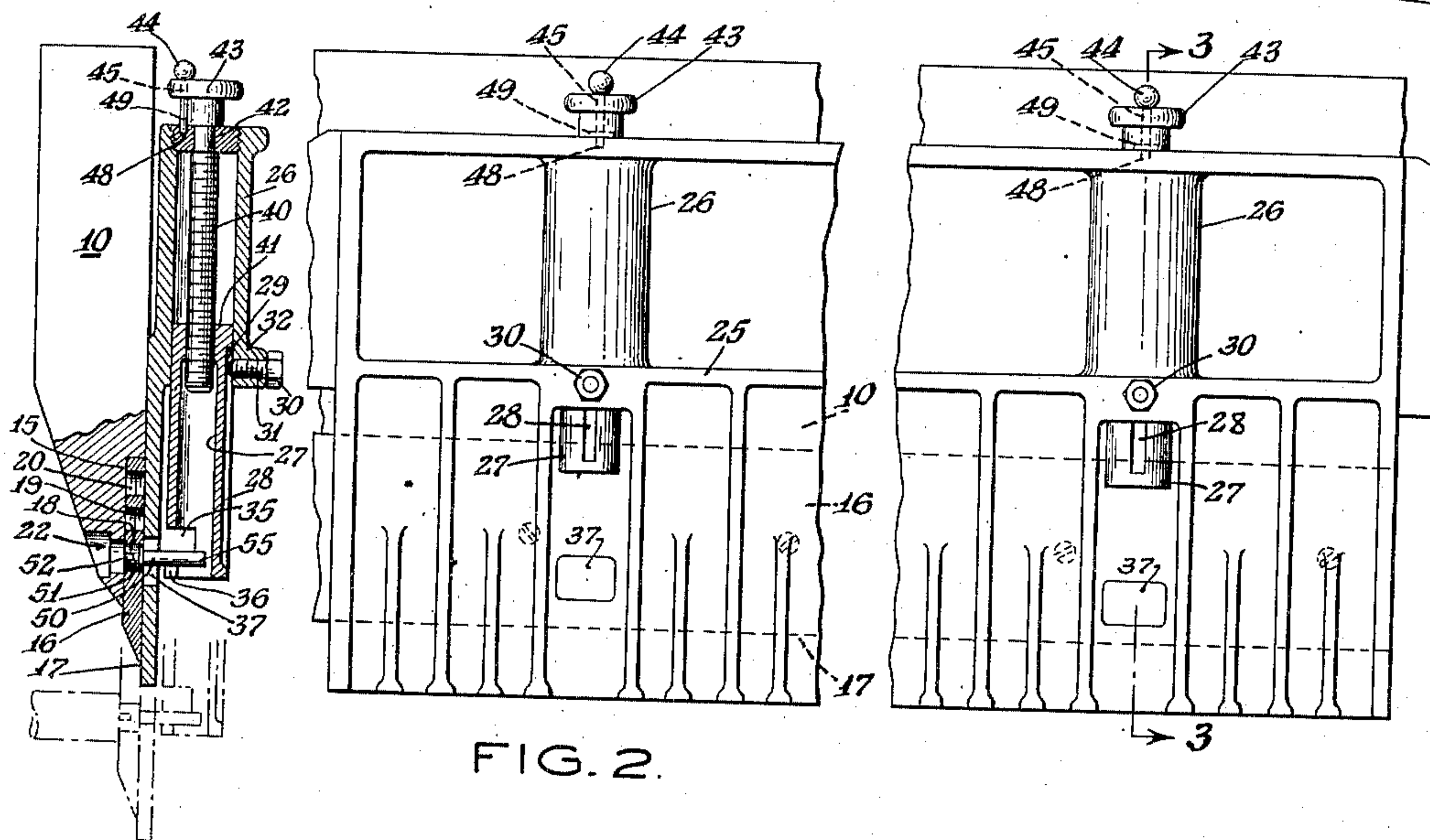


FIG. 2.

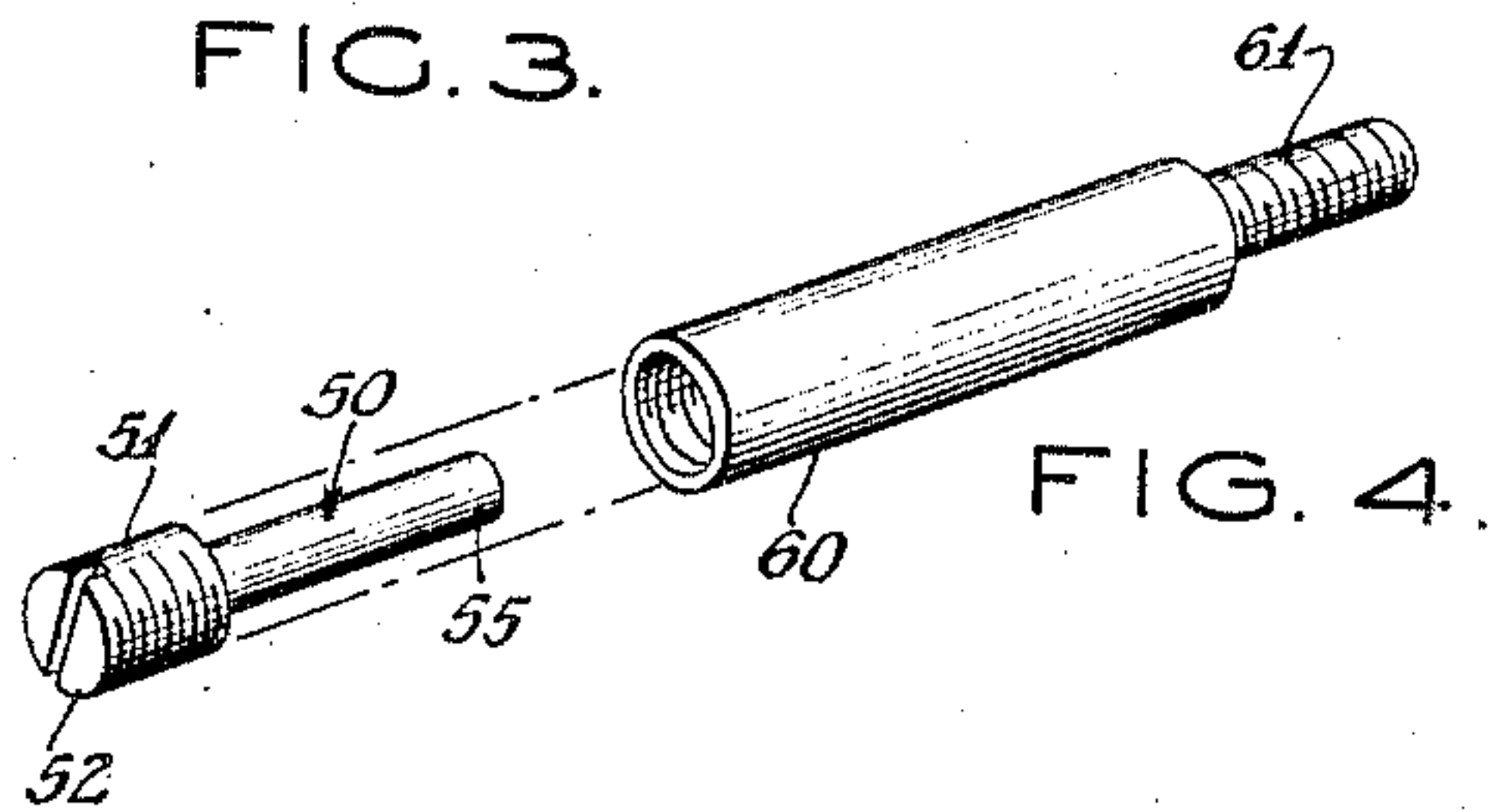


FIG. 4.

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KNIFE CHANGING DEVICE

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5 Claims. (Cl. 164—58)

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My present invention relates to cutting knives of the guillotine type, and more particularly to means for readily removing and replacing a knife blade on the knife bar when the same becomes worn or dull or requires a change for any reason.

In guillotine type knife cutters of the type described in my application Serial No. 673 289 filed May 31, 1946, one type of knife is illustrated to which my invention is applicable.

Such cutting devices consist primarily of a knife bar which is reciprocated vertically and also has a lateral component motion in order to cut readily through a paper stack. The knife bar carries a replaceable blade in order to provide an appropriate cutting edge at its lower extremity. Behind the knife bar and blade is located a clamping member which is brought down on to the paper stack just before the knife blade engages the paper stack and begins to go through it.

In guillotine type cutters of this kind, the paper clamp is independently movable to and from the stack of paper to be cut in order to assist the operator in determining the exact point of registry of the cut which is to be made with respect to the paper or to manually clamp uneven piles of pamphlets or other stitched or bound work. My invention makes use of this independent movement of the clamping element in order to facilitate removal and replacement of the knife blade on the knife bar.

The knife blade has a long sharp heavy steel cutting edge secured by many bolts to a recess communicating with the undersurface of the knife bar. Owing to the fact that the knife bar travels between the frame element on the cutting device, the blade is not readily accessible except at its very edge for removal and replacement. Hence removal and replacement has always been a difficult task since it was necessary somehow to support the blade manually while the bolts were being removed and many accidents were likely to occur and actually did occur during removal and replacement.

It is extremely difficult also for more than one person to cooperate in the replacement operation since the working space is recessed and frequently relatively narrow, of the order of 39 inches wide.

An object of my invention is the provision of novel means operable in connection with the independently movable clamp member for facilitating the removal and replacement of a knife blade on the knife bar.

Essentially my invention contemplates the mounting of knife blade holding means on the

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clamp member so arranged that the knife blade may be temporarily attached to the clamping member before the knife blade is completely removed or unbolted from the knife bar. After the knife blade is unbolted from the knife bar and is thus carried by the clamping member, the clamping member may be brought down slowly independently of the knife bar and the knife blade may then readily be removed by simply pulling the same out toward the front of the machine.

Additional handling members may be arranged to be removably secured to the knife blade in order to facilitate removal and replacement thereof.

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

Figure 1 is a view in perspective, partially broken away, illustrating my novel knife blade removal facilitating elements.

Figure 2 is a rear view of the knife bar and clamp assembly further illustrating my novel knife blade removal elements.

Figure 3 is a cross-sectional view taken on line 3—3 of Figure 2.

Figure 4 is a view in perspective of a removable handle adapted to facilitate the removal and replacement of the knife blade, together with the screw which interengages the blade and clamp.

Referring now to Figures 1 to 3, the knife bar 10 is reciprocal vertically between the frame members 11 and 12 of the cutting device toward and away from the cutting table 13 on which the paper stack may be mounted. The actual means for operating the knife bar need not here be shown since it is fully illustrated in my application above referred to, and various other means for reciprocating the knife bar 10 and at the same time imparting the lateral component of motion thereto are well known.

Below the rear face of the knife bar 10 is provided a recess 15 in which is mounted the knife blade 16, said knife blade 16 having a cutting edge 17 projecting below the lowest end of the knife bar 10, as shown more specifically in Figure 3. The blade 16 is provided, as may be required, with one, two or three rows of tapped openings 18, 19, and 20.

Row 18 is used when the knife blade 16 is wide and relatively new to secure the knife blade 16 to the knife bar 10. Knife bar 10 is provided with a plurality of counterbored openings 22 spaced to register with the series of openings 18, 19 or 20, and to receive bolts 23, the heads of

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which may be recessed in the counterbored openings and which engage one row of tapped openings in the knife blade 16 to secure the blade to the knife bar 10.

As the knife blade 16 is narrowed by continuous sharpening of the edge 17, the blade 16 is removed from the knife bar 10 and moved down so that the series of tapped openings 19 register with the counterbored opening 22 of the knife bar 10 and the knife blade is resecured in that position.

Again, as the blade 16 is further narrowed, the row of tapped openings 20 in the blade may be used to secure the knife blade 16 to the knife bar 10. When the knife blade is lowered to be supported by row of openings 19, a suitable strip of steel, known as a backing strip is inserted between the top of the blade and the knife bar casting. This strip is, of course, equal in width to the vertical distance between centers of holes 18 and 19. A correspondingly wider strip is inserted for this purpose when row 20 is used.

Thus, the problem which arises with respect to the blade 16 is not merely the actual complete removal and replacement thereof, but also the shifting of the blade 16 from the position where the row of tapped openings 18 are used for support to a position where the row of tapped openings 19 is used, and later to a position where the row 20 is used.

In order to carry out my invention, the clamp 25 which is mounted just behind the knife bar 10 is utilized in order to support the knife blade free of the knife bar when required to shift the knife blade with respect to the knife bar or to remove the knife blade entirely from the knife bar and replace the same. The clamp 25 has mounted thereon two spaced vertical sleeves 26, 26 which may be spaced adjacent the ends of the clamp or which may each be spaced substantially intermediate the center of the clamp and the end of the clamp on each side.

The spacing of the vertical tubular members 26 apart need only be sufficient to provide an adequate two-point support for the knife blade 16 when it is removed. Each tube 26 carries slidably mounted therein the sleeves 27. Each sleeve 27 is provided with a longitudinal groove 28 engaged by the dog point 29 of the set screw 30 passing through the tapped opening 31 in lug 32 of the tube 26 to prevent rotation of sleeve 27 while nevertheless permitting longitudinal movement thereof.

The lower end of each sleeve 27 facing the clamp 25 and knife bar 10 is provided with an opening 35 which may be rectangular, the bottom of the opening being defined by the ledge 36. The clamp member 25 is provided with the rectangular openings 37 on each end, said openings being aligned with the sleeves 27 on each side so that the openings 35 in the sleeves 27 may register with the openings 37 in the clamp. The openings 37 in the clamp are so arranged that in one predetermined position of the clamp and knife bar, each of these openings will register with a counterbored opening 22 of the knife bar 10.

In order to facilitate the operation of my novel device, the openings 37 and 35 are made much larger than the counterbored openings 22; this will make it easier for the operator to interengage the knife blade with the clamp as hereinbelow described. This is especially necessary because, as the knife width becomes less, the knife bar is correspondingly lowered relative to the

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clamp and is thus laterally shifted with respect thereto. Thus, the openings 22 of the knife bar may occupy any of a plurality of vertical and lateral positions with respect to openings 37; the enlargement of openings 37 allows for this difference within the range of shift caused by successive sharpenings of the blade.

Each of the sleeves 27 may be moved vertically in the tube 26 by the screw 40 which passes through the tapped opening 41 in the top of sleeve 27. The upper end of the screw 40 is rotatably mounted in bearing 42 and is provided with the handle 43 which in turn carries a slidable crank pin 44 in the opening 45. The lower end of pin 44 may engage in one or more notches 46 in the top of tube 26 to prevent turning of handle 43 and screw 40.

A pin 49 prevents accidental removal of crank pin 44 from handle 43. When it is desired to adjust the position of sleeve 27 vertically, the crank pin 44 is lifted and the handle 43 rotated to move the sleeve 27 up and down. When this adjustment is completed, the crank pin 44 is permitted to drop and is pushed into notch 46 to prevent further accidental or undesired rotation of screw 40 or movement of sleeve 27.

When now it is desired to remove and replace the blade 16 or to shift the blade 16 from one row of tapped openings 18 to another row of tapped openings 19 or 20, the knife bar 10 and the clamp 25 are brought to a specific desired elevated position, which position brings the lower end of the knife bar 10 to a vertical distance above the work table 13 which is greater than the full vertical height of the knife blade 16 so that the knife blade may be removed from the front.

All of the bolts 23 are then removed from the front with the exception of two bolts so that the knife blade 16 is now secured to the knife bar 10 by just these two bolts. It is important and necessary that among the bolts that are removed there should be included the two bolts which pass through the counterbored opening 22 just opposite clamping opening 37.

These openings may be appropriately indicated or marked on the completed device. The crank pin 44 and handle 43 are then rotated to bring the sleeve 27 down to its lowest position where the square opening 35 in each sleeve 27 will register with the square opening 37 in the clamp 25.

The special screws 50 are then inserted in the two bolt holes 22 which register with the square openings 37 and 35. These screws 50 have a threaded head 51 with a driving socket or slot 52 so that these screws may be inserted to be flush with the front surface of the blade 16 or even recessed slightly beyond the surface.

The screws 50 also have long cylindrical extensions 55 which pass through the openings 37 and 35 in the clamp and sleeve and thus enter the sleeve 27 on each side.

The crank pin 44 and handle 43 are then rotated back to raise the sleeve 27 until the ledge 36 lightly contacts the cylindrical extension 55 of the screw 50. When this has been done, the weight of the knife blade will then rest on ledges 36 of sleeves 27 which in turn are carried by the clamp 25. At this time the remaining two screws which have secured the knife blade 16 to the knife bar 10 are removed and the knife blade is now fully supported by ledges 36 of sleeves 27.

The operator may now operate the clamp 25

to its lowest position independently of the knife bar 10 and when this has been done, the clamp will simultaneously bring down the knife blade 16 with it while the knife bar 10 remains up. The clamp is lowered until the upper end of the knife blade 16 has cleared the lowest end of the knife bar 10. The operator will then insert handles 60 having the threaded ends 61 into any two of the bolt holes 18, 19 or 20 in the most convenient position for further handling and then using the handles 60 may then remove the knife blade 16 from the cutting machine.

He may then place the handles 60 into another knife blade and the new knife blade may be placed by him in the device. The knife blade 16 must be continuously removed and replaced for sharpening, and therefore the added convenience and safety of my invention will become obvious.

Heretofore, it has been necessary for the operator to use heavy gloves or other protective means to avoid injury to his hands and to find some way of supporting the knife blade just before unscrewing the last bolt so that the knife blade will not fall and cause injury. Likewise, replacing the knife blade has been a severe problem since again the operator found it extremely difficult to support the knife blade manually while replacing the same. When the knife blade 16 is replaced, any of the sets of tapped openings 18, 19, or 20 may be positioned in registry with the counterbored openings 22 of the knife bar 10 as determined by the width of the blade after sharpening.

The new or resharpened knife blade with the handles 60 inserted therein and with the special supporting screws 50 inserted in the proper pair of openings of row 18, 19 or 20 is placed on the cutting machine while the clamp is lowered so that the cylindrical body 55 of the special screws 50 enter the registering openings 37 and 35 on each side.

The knife blade 16 is then supported by ledges 36 of the sleeves 27 on each side. Handles 60 are removed and then the clamp 25 is slowly raised until the blade 16 moves up into recess 15 of knife bar 10 and the desired row of openings 18, 19 or 20 moves opposite the counterbored openings 22 of the knife bar 10.

Bolts 23 are then passed through the counterbored openings 22 of knife bar 10 into the knife blade. The screws 50 are removed and replaced by securing bolts 23. The clamp 25 is now completely disengaged from the knife blade 16.

Appropriate indicators may be placed on the clamp casting 25 of the machine cooperating either with the top edge of the knife casting 10 or any other suitable indicating mark on the knife casting 10 to indicate the point at which the knife casting bolt holes register with the square openings in the clamp casting.

Thus, the only indicating marks required are marks which may take any form indicating which particular bolt holes 22 are aligned with the openings in the casting 25, and an additional mark indicating the position of the clamp with respect to the knife bar at which the opening 37 in the knife bar registers with the particular counterbored openings 22 above described.

An additional indication may be provided, although this is not necessary, of the position where opening 35 registers with opening 37. This position may be, however, located at the lowest point of travel of sleeve 27 so that it is then necessary only to rotate handle 43 until sleeve 27

cannot move any lower to determine that opening 35 registers exactly with opening 37.

For convenience in storage, the handle 60 is tubular and tapped adjacent its outer end. The special screw 50 as seen in Figure 4 may then be screwed into the handle 60. When in use, screw 50 is, of course, removed from handle 60.

In the foregoing, I thus provide a simplified convenient method which utilizes existing elements of the machine to facilitate removal and replacement of the knife blade. Since many variations and modifications will now be obvious to those skilled in the art, I prefer to be bound not by the specific disclosures herein contained but only by the appended claims.

I claim:

1. In a cutting machine having a vertically reciprocable knife bar, a vertically reciprocable clamp behind the knife bar and a knife blade removably secured to the lower end of the knife bar at the rear face thereof; said blade being secured to the knife bar by a plurality of bolts passing through registering openings in the blade and knife bar; means for facilitating the removal and replacement of said knife blade on said knife bar, said means comprising a plurality of openings in said clamp registering with certain of said blade and knife bar openings, adjustable members carried by said clamp and registerable with the openings in said clamp; means entering said openings in said blade with which the clamp openings register and connectable with said adjustable members for interengaging said blade with said clamp; said blade being thereby transferred to the front face of said clamp.

2. In a cutting machine having a vertically reciprocable knife bar, a vertically reciprocable clamp behind the knife bar and a knife blade removably secured to the lower end of the knife bar at the rear face thereof; said blade being secured to the knife bar by a plurality of bolts passing through registering openings in the blade and knife bar; means for facilitating the removal and replacement of said knife blade on said knife bar, said means comprising a plurality of openings in said clamp registering with certain of said blade and knife bar openings, adjustable members carried by said clamp and registerable with the openings in said clamp; means entering said openings in said blade with which the clamp openings register and connectable with said adjustable members for interengaging said blade with said clamp; said blade being thereby transferred to the front face of said clamp while said knife bar and said clamp are in an elevated position, said clamp being thereafter movable downwardly independently of said knife bar to bring said blade below said knife bar, said knife blade being thereafter removable from said clamp.

3. In a cutting machine having a vertically reciprocable knife bar, a vertically reciprocable clamp behind the knife bar and a knife blade removably secured to the lower end of the knife bar at the rear face thereof; said blade being secured to the knife bar by a plurality of bolts passing through registering openings in the blade and knife bar; means for facilitating the removal and replacement of said knife blade on said knife bar, said means comprising a plurality of openings in said clamp registering with certain of said blade and knife bar openings, adjustable members carried by said clamp and registerable with the openings in said clamp; means entering said openings in said blade with which the clamp openings register and connectable with

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said adjustable members for interengaging said blade with said clamp; said blade being thereby transferred to the front face of said clamp while said knife bar and said clamp are in an elevated position, said clamp being thereafter movable downwardly independently of said knife bar to bring said blade below said knife bar, said knife blade being thereafter removable from said clamp and handle members securable to said blade to facilitate handling thereof.

4. In a cutting machine having a vertically reciprocable knife bar, a vertically reciprocable clamp behind the knife bar and a knife blade removably secured to the lower end of the knife bar at the rear face thereof; means on said clamp for supporting said knife blade; said means comprising an opening in said clamp; an adjustable supporting member behind said clamp; an opening in said knife blade; a connecting member passing through said opening in said clamp and interengaging the material defining the opening in the blade and engaging with the adjustable member.

5. In a cutting machine having a vertically reciprocable knife bar, a vertically reciprocable clamp behind the knife bar and a knife blade removably secured to the lower end of the knife

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bar at the rear face thereof; means on said clamp for supporting said knife blade; said means comprising an opening in said clamp; an adjustable supporting member behind said clamp; an opening in said knife blade; a connecting member passing through said opening in said clamp and interengaging the material defining the opening in the blade and engaging with the adjustable member, said adjustable member comprising a vertically movable element having a ledge for supporting said connecting member.

FREDERICK W. SEYBOLD.

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