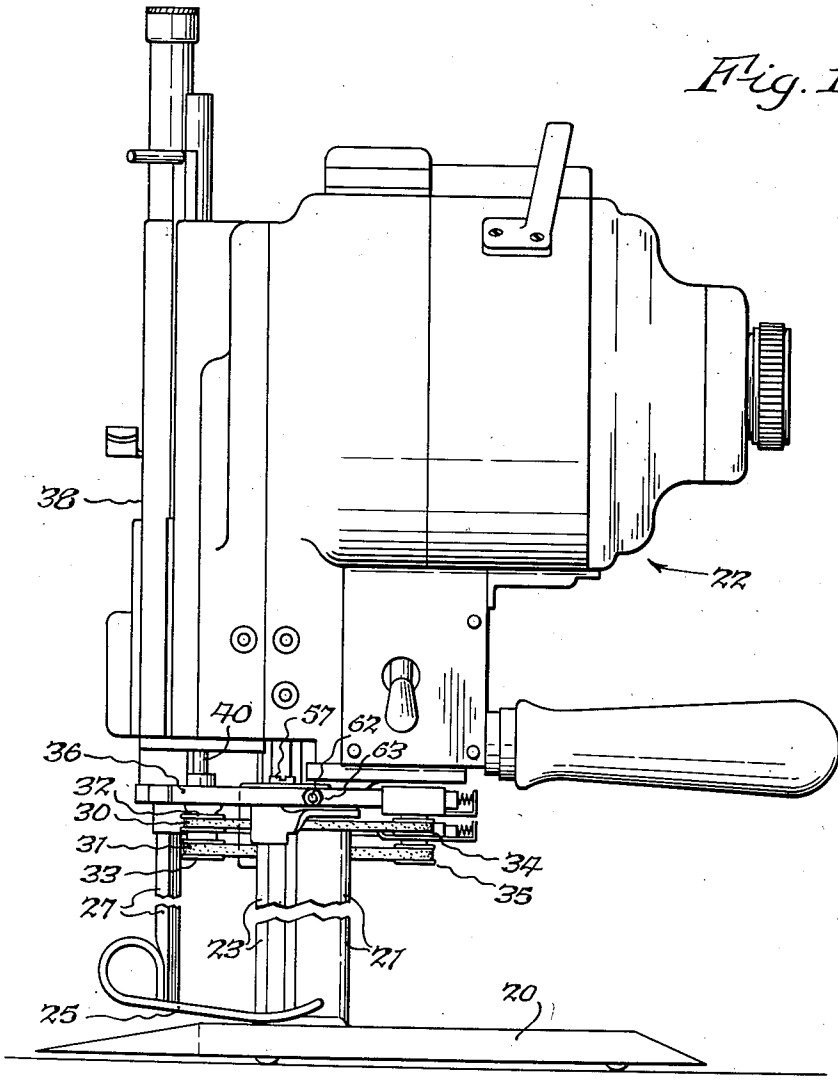
April 30, 1957 F. G. CLARK 2,790,235

KNIFE SHARPENING MECHANISM

Filed Jan. 18, 1955 2 Sheets-Sheet 1

Fig. 1.



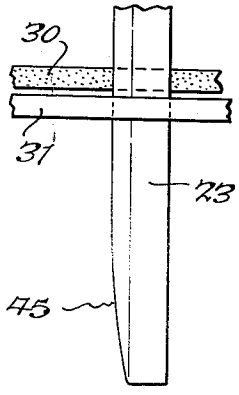


Fig. 2.

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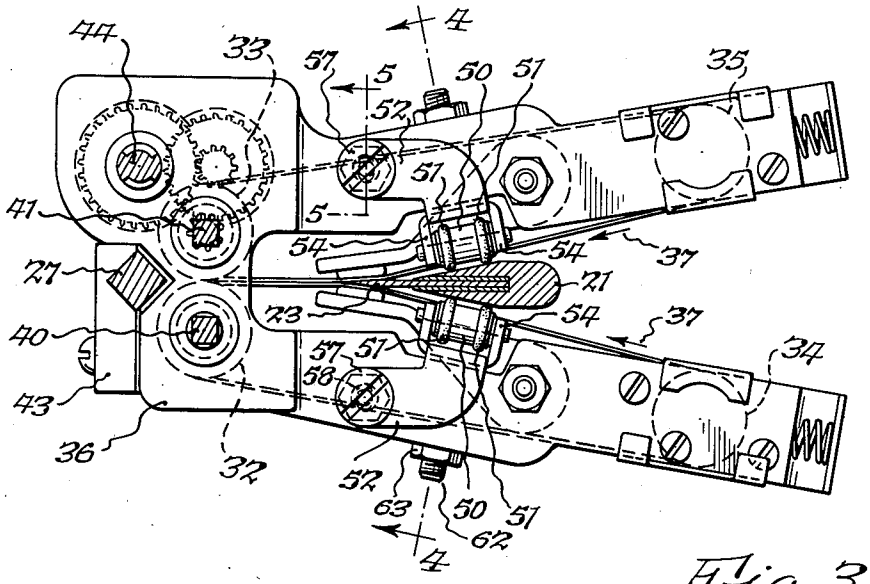


Fig. 3.

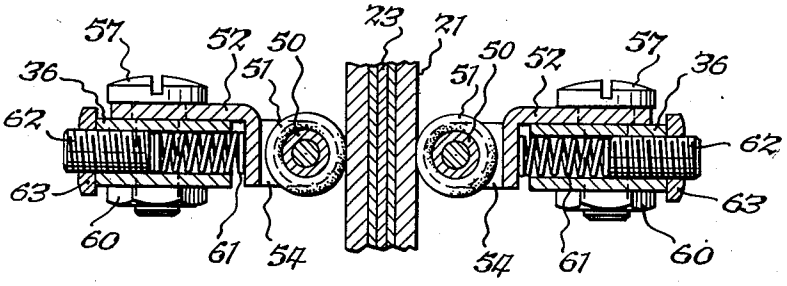


Fig. 4.

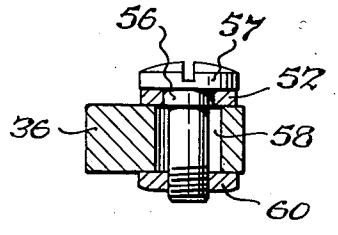


Fig. 5.

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2,790,235

KNIFE SHARPENING MECHANISM

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Application January 18, 1955, Serial No. 482,527

5 Claims. (Cl. 30—139)

This invention relates to improvements in knife sharpening mechanisms for cutting machines of the type commonly used for cutting cloth and other sheet materials and in which the cutting is effected by a reciprocatory knife, such as disclosed in Patent No. 2,563,921 dated Aug. 14, 1951.

Grinders of knife sharpening mechanisms, normally move in a direction away from the leading edge of the knife and in doing so they have a tendency to pull the grinder carriage toward the back of the knife. When the grinder carraige moves downwardly, the supports for the carriage extend more and more away from their bearings and as they approach the bottom of the knife they provide increasingly less support against movement of the carriage toward the back of the knife, and consequently, yield to the pull of the grinders on the knife. As a result of this deflection of the carriage from its vertical movement, the knife is ground to a greater extent at the lower portion thereof than at other portions, and consequently, knives frequently have to be discarded long before the upper portions of the knives have been ground down to a point at which discarding becomes necessary.

One of the objects of this invention, consequently, is to provide supporting means for enabling the grinder carriage to move throughout its stroke without substantial deflection from its path of movement parallel to the knife. It is also an object to provide a mounting for the grinder carriage which is capable of successfully resisting force on the carriage resulting from the action of the grinding elements of the knife.

The only rigid part of the machine in the vicinity of the grinders is the upright column or standard which supports the machine from its base. This standard is made of tear-drop cross sectional shape and is made as narrow and thin as is practical from a strength standpoint so as to offer the least resistance when guided through a lay of material in back of a cut. Grooves, slots or projections which would normally be used for guiding the grinder carriage in its movement are not practical on a standard of this type because they would either reduce the cross section and weaken the standard or in the case of a projection they would cause added resistance in going through the material. A further object of this invention, consequently, is to provide guide means for the grinder carriage by means of which the same may be supported from the upright column or standard of the machine. A further object is to provide improved means for guiding the grinder carriage on the column or standard of the machine in such a manner that there will be no scoring or scratching of this standard and that no change is required on the standard.

Other objects and advantages will be apparent from the following description of one embodiment of the invention and the novel features will be particularly pointed out hereinafter in connection with the appended claims.

In the accompanying drawings:

Fig. 1 is a side elevation, partly broken away, of a cloth cutting machine provided with knife sharpening mechanism embodying this invention.

Fig. 2 is a side view of a knife which has been improperly sharpened by prior art mechanisms.

Fig. 3 is a top plan view, on an enlarged scale, of my improved guide means for the grinder carriage of a knife sharpening mechanism showing the same in operative relation to a column or standard of a cutting machine.

Fig. 4 is a fragmentary transverse sectional elevation, thereof, on line 4—4, Fig. 3.

Fig. 5 is a fragmentary sectional view, on line 5—5, Fig. 3.

I have illustrated in the accompanying drawings my improvements as applied by way of example to a cutting machine similar to the one shown in said Patent #2,563,921. This machine comprises the usual base 20 adapted to rest on and to be moved about on a table which supports the lay of material to be cut. An upright, slender standard 21 is rigidly secured on the base and rises upwardly therefrom and supports the stationary frame 22 of an electric motor which reciprocates the knife 23 in a vertical guide at the front of the standard 21 through suitable driving mechanism (not shown). 25 represents the usual presser foot arranged on the lower end of a guide bar 27 which extends vertically in front of the knife and is suitably mounted for vertical adjustment on the machine to set the presser foot at different levels according to the thickness of different lays or piles of material.

The knife in the particular machine illustrated in the drawings is sharpened by grinding means comprising two narrow abrasive bands or belts 30 and 31 which are disposed at opposite sides of the knife to travel crosswise of the same in contact with the opposite sides of the knife edge, and these belts pass around two front drive pulleys 32 and 33 and rear spring-pressed belt tensioning pulleys 34 and 35 in the direction indicated by the arrows 37, Fig. 3. These belts are power-driven by the knife-operating motor and are mounted on the underside of a grinder carriage 36 arranged to move up and down lengthwise of the knife edge to enable the belts to sharpen the knife edge throughout its full length. This carriage 36 together with the various parts mounted thereon is movable vertically relatively to a housing or cover piece 38 which is removably secured in place on the motor frame 22 at the front of the machine and encloses parts of the knife operating and sharpening mechanisms. The grinder carriage may be mounted and guided in its up and down movements in any suitable or desired manner, for example, as disclosed in said Patent #2,563,921 and an earlier Patent #2,183,786 issued Dec. 19, 1939 to Eastman Machine Company, assignee. While the sharpening mechanism illustrated in the drawings includes flexible belt grinding means, the invention is not limited thereto, since other suitable grinding elements may be employed, if desired, and any suitable drive mechanism for the grinding belt may also be employed.

In the construction illustrated by way of example, the drive pulleys 32 and 33 are fixed on the lower ends of two vertical shafts 40 and 41 which are rotatable and held against axial movement relatively to the carriage 36 so that these shafts may move up and down with the carriage. These shafts are rotated by intermeshing pinions (not shown) arranged in the housing part 38 of the machine and suitably driven from the motor as has heretofore been customary.

The mechanism for producing the up and down travel of the grinder carriage 36 and the parts mounted thereon along the knife edge preferably includes a screw shaft 44

having crossing right and left hand threads and which is suitably rotated through gearing shown in broken lines in Fig. 3, connecting the screw shaft with the shaft 41, as in the patents hereinbefore mentioned. As the screw shaft is rotated, it moves downwardly with the grinder carriage until this carriage arrives at the bottom of its stroke, whereupon the screw shaft again moves upwardly with the carriage. The driving shafts 40 and 41 for the belts also move downwardly with the carriage while rotated, and during this movement the carriage is also guided by its sliding contact with the presser foot guide bar 27 through the medium of a block 43 secured to the grinder carriage. Consequently, as the grinder carriage approaches the lower end of its stroke, the bearings of the shafts 40, 41 and 44 and the presser foot bar provide increasingly less support against lateral movement of the carriage. The grinder carriage, consequently, is deflected toward the knife near the lower end of its path of movement because of the force exerted on the grinder carriage by the frictional contact of the grinder belts with the knife. In the past, this has resulted in the grinding of the knives approximately into the shape shown in Fig. 2, in which the knife has the lower portion thereof ground away on a curvature, as shown at 45 in Fig. 2. Because of this curvature in the front or cutting edge of the knife, it is necessary to discard these knives long before the upper portions thereof are worn out, thus adding to the expense of operating the cutting machine.

In accordance with this invention, I have provided means for guiding the grinder carriage along the converging front faces of the standard or column 21 of the machine, without providing on these surfaces any grooves or outwardly extending projections which would interfere with the passage of the standard through the cut portions of the material. For this purpose, I have provided a pair of rollers 50 which are mounted on the carriage in position to engage the converging faces of the standard. These rollers may be of any suitable construction and are provided with resilient or yielding surfaces to bear against the converging faces of the standard without cutting or marring these surfaces. For this purpose, in the construction illustrated, I have provided the rollers with rings 51 of a rubber or rubber-like material. These rings may, for example, be the well-known O-rings which are seated in grooves formed in the rollers 50.

These rollers may be mounted on the grinder carriage in any suitable manner. In the construction shown, for example, these rollers are mounted on pivoted arms 52 made of strips of metal having downwardly extending integral lugs 54 provided with apertures in which the rollers are journalled. These arms are preferably pivotally mounted on the grinder carriage, and for this purpose, are provided with apertures which bear on cylindrical portions 56 of bolts 57 extending through slots 53 in the grinder carriage 36. The enlarged portion 56 of each bolt straddles the slot 58 so that the bolt 57 may be locked in any desired position in the slot 58 by means of a nut 60. The bolts, consequently, serve the dual purpose of forming pivots for the arms 52 and also for adjusting the pivotal axes about which the arms swing so that the rollers 50 will properly engage with the converging faces of the standard.

The rollers are preferably yieldingly urged into engagement with the converging surfaces of the standard, and for this purpose, springs 61 are provided which are arranged in holes drilled in the grinder carriage 36. One end of each spring bears against a pivoted arm 52 and the other end bears against a screw plug 62 having a threaded engagement in the hole in which the spring is located. Consequently, the pressure which the springs exert against the pivoted arms may be varied by adjusting the screws 62 and the screws may then be locked in place by means of lock nuts 63. While I prefer to yieldingly press the rollers against the converging faces of the standard, yet it is also possible to omit the springs 61 and make the screws 62 long enough to bear directly against the swinging arms.

The soft friction material on the rollers such, for example, as the O-rings 51 prevent marring of the standard and also help to resist the inward pull of the grinder carriage toward the front edge of the knife when the carriage reaches the lower portion of its travel. By means of the pivotal mounting of the arms which support the rollers and by providing means for adjusting the axes about which these arms swing, the mechanism can be used on standards of various thicknesses and angles of convergence. By means of the adjusting screws 62, the pressure exerted by the roller against the converging surfaces of the standard may be varied in accordance with the amount of pull of the grinding belts on the carriage, which in turn depends upon the amount of pressure exerted by these belts on the knife.

The structure described has been found very useful in prolonging the useful life of knives on machines of this kind.

It will be understood that various changes in the details, materials and arrangements of parts which have been herein described and illustrated in order to explain the nature of the invention, may be made by those skilled in the art within the principle and scope of the invention, as expressed in the appended claims.

I claim as my invention:

1. In a knife sharpening mechanism for cutting machines having a base, a standard extending upwardly from said base, a knife guided for reciprocal motion along said standard and projecting forwardly therefrom, said standard having upright faces converging forwardly toward the edge of said knife, power-operated knife reciprocating mechanism mounted on the upper end of said standard, and a grinder carriage movable to and fro along the knife edge and having knife sharpening elements mounted thereon, which move relatively to the knife in a direction to urge said carriage toward said knife, that improvement which includes rollers mounted on said carriage in position to engage said converging faces of said standard, and means for yieldingly urging said rollers into engagement with said converging faces.

2. In a knife sharpening mechanism for cutting machines having a base, a standard extending upwardly from said base, a knife guided for reciprocal motion along said standard and projecting forwardly therefrom, said standard having upright faces converging forwardly toward the edge of said knife, power-operated knife reciprocating mechanism mounted on the upper end of said standard, and a grinder carriage movable to and fro along the knife edge and having knife sharpening elements mounted thereon, which move relatively to the knife in a direction to urge said carriage toward said knife, that improvement which includes rollers having resilient faces to engage the converging faces of said standard, arms on which said rollers are rotatably mounted, means for pivotally mounting said arms on said carriage, and means reacting against said carriage and said arms for pressing said rollers into engagement with said converging faces.

3. A knife sharpening mechanism according to claim 2, characterized in that said means include springs bearing against said arms.

4. In a knife sharpening mechanism for cutting machines having a base, a standard extending upwardly from said base, a knife guided for reciprocal motion along said standard and projecting forwardly therefrom, said standard having upright faces converging forwardly toward the edge of said knife, power-operated knife reciprocating mechanism mounted on the upper end of said standard, and a grinder carriage movable to and fro along the knife edge and having knife sharpening elements mounted thereon, which move relatively to the knife in a direction to urge said carriage toward said knife, that improvement which includes parts mounted on said carriage and extending into proximity to said converging faces of said stand-

ard in opposite directions, and rollers mounted on said parts and engaging said converging faces to resist movement of said carriage toward said knife edge, said rollers having resilient surfaces engaging said converging faces of said standard.

5. In a knife sharpening mechanism for cutting machines having a base, a standard extending upwardly from said base, a knife guided for reciprocal motion along said standard and projecting forwardly therefrom, said standard having upright faces converging forwardly toward the edge of said knife, power-operated knife reciprocating mechanism mounted on the upper end of said standard, and a grinder carriage movable to and fro along the knife edge and having knife sharpening elements mounted thereon, which move relatively to the knife in a direction to urge said carriage toward said knife, that improvement which includes a pair of arms mounted on said carriage at opposite sides of said standard and extending toward said converging faces of said standard, rollers mounted on said arms for engagement with said converging faces for opposing movement of said carriage toward said knife, and means for adjusting said arms relatively to said carriage and to said converging faces to provide correct bearing of said rollers on said faces.

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