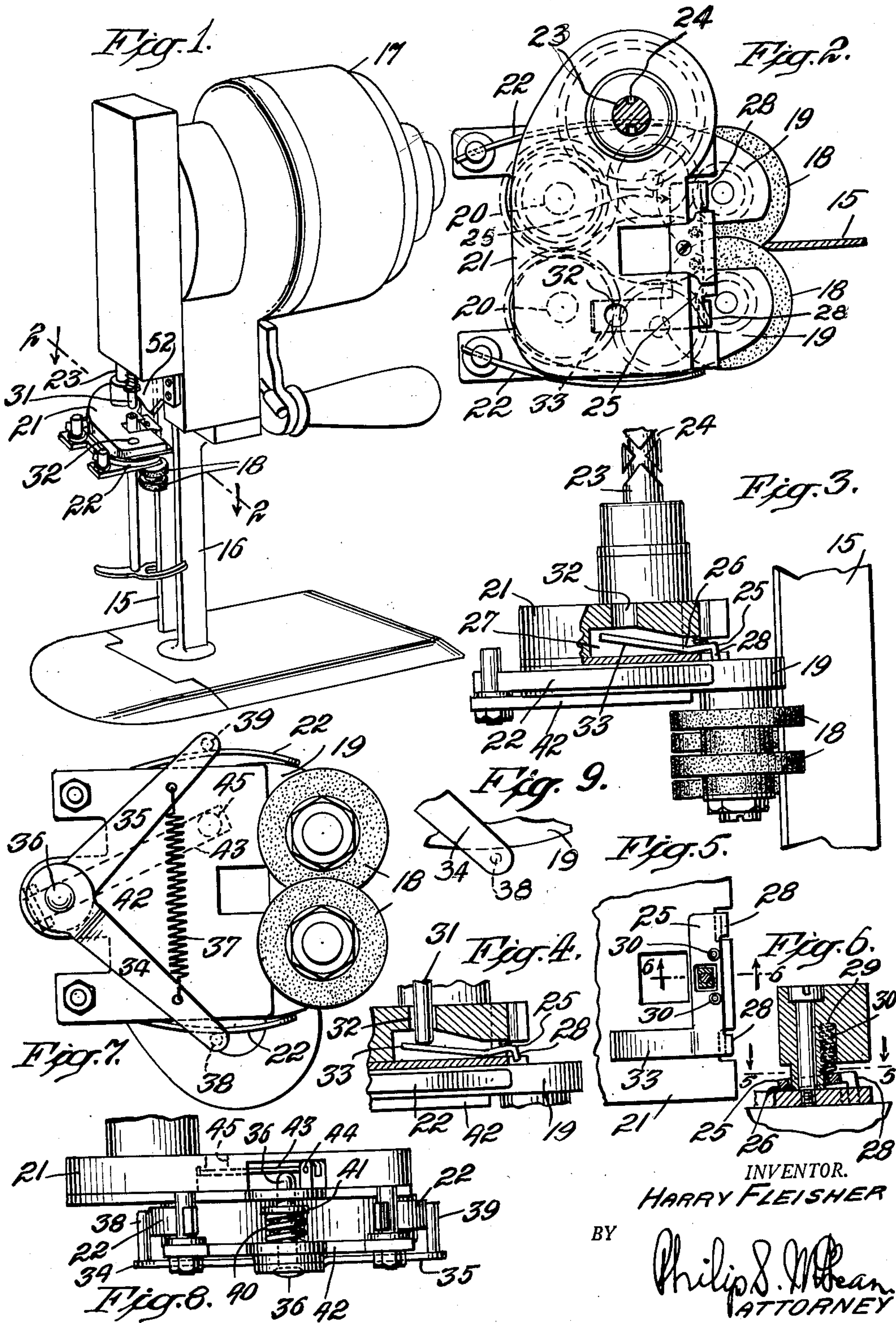


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KNIFE CLOTH CUTTING MACHINES  
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## AUTOMATIC SHARPENER FOR STRAIGHT KNIFE CLOTH CUTTING MACHINES

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The invention herein disclosed relates to the sharpening of the knives employed in cloth cutting machines of the straight knife type.

This has been accomplished by running a pair of small grindstones in overlapping order along the edge of the knife. These stones, held by spring pressure against the opposite sides of the blade, have a tendency to chatter and to bear unevenly against opposite sides of the blade and hence to put waves or "hooks" in the cutting edge. This tendency is increased by natural vibration of the machine and by a tendency of the stones to separate or spring apart as they reach opposite ends of the travel up and down the knife blade.

As a consequence, after a number of sharpenings the knife in a straight blade cutter may have a decided series of curves or uneven cutting portions and which, naturally, will have a serious effect on the cutting efficiency of the machine.

Primary objects of the present invention are to provide automatic sharpening means which will apply and maintain a true, straight cutting edge on the blade.

Particularly it is a purpose of the invention to provide such means in a simple, practical form applicable to cloth cutting machines of approved design.

Further special objects of the invention are to incorporate the uniform grinding means at low cost and without adding appreciably to the bulk or size of the machine.

Other special objects of the invention are to improve the drive and reduce vibration and thus to assist in maintenance of the desired straight cutting edge.

Other desirable objects attained by the invention are set forth or will appear in the course of the following specification.

The drawings accompanying and forming part of the specification illustrate certain preferred embodiments of the invention. Structure, however, may be modified and changed as regards the present illustration, all within the true intent and broad scope of the invention as hereinafter defined and claimed.

Fig. 1 in the drawings is a perspective view of a cloth cutting machine having the uniform grinding improvements of this invention applied thereto;

Fig. 2 is an enlarged horizontal sectional view as on substantially the plane of line 2-2 of Fig. 1, portions appearing in section;

Fig. 3 is a broken part sectional side elevation of the grinder carriage and related parts illustrated in Fig. 2, showing particularly the rocking

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clamp for holding the grinder arms in the set position for grinding a straight edge on the blade;

Fig. 4 is a similar broken part sectional detail showing the clamp released at the top of the grinder return movement;

Figs. 5 and 6 are broken sectional details of the rocking clamp structure, Fig. 5 being a horizontal sectional view as on line 5-5 of Fig. 6, Fig. 6 being a vertical sectional view as on line 6-6 of Fig. 5;

Fig. 7 is a bottom plan view of a modified form of the invention;

Fig. 8 is a broken side elevation of the latter; Fig. 9 is a broken detail of a modification of the form of the invention shown in Figs. 7 and 8.

In Fig. 1 there is shown what may be considered as a typical straight knife cloth cutter, comprising a blade 15 mounted to reciprocate in a post or standard 16 and driven by a motor 17.

A sharpener is provided for the knife in the form of companion grindstones 18 arranged in overlapping order, as indicated in Fig. 2, to engage opposite sides of the blade.

These stones are shown as carried by swinging arms 19 pivoted at 20 on the carriage structure 21 and pressed toward the blade by springs 22.

The stones are driven by gearing, indicated in broken lines in Fig. 2, within the swinging supporting arms 19 and operated from drive shaft 23 which, as shown in Fig. 3, has a fast reverse screw thread 24 cut in it for effecting down and up feeding movements of the carriage.

In conventional machines a wedge 52, Fig. 1, at the upper end of the carriage travel enters between the grinder arms to separate the wheels from the blade and as the carriage starts downward, leaving this wedge, the wheels come together against opposite sides of the blade and are held so by the springs 22 for the balance of the travel down and then back up to the point of wedge engagement at the top of the carriage travel.

In the present invention the stones are permitted to make self-adjusting engagement with the blade, but once this engagement is effected they are held, or substantially held in that relation for the balance of the down stroke and return to the released or separated relation.

Automatic means for effecting these results are present in the first illustrated form of the invention, in the nature of a clamp indicated at 25, shown in Fig. 3 as a plate mounted to rock on a fulcrum portion 26 within the cavity 27 in the head of the carriage and having downwardly projecting, angled extensions 28 to frictionally bear on top of the grinder arms 19.



Springs 29 seated in cavities 30 in the head, rock the clamp plate 25 in a downward, arm-holding direction.

Release of the clamp from holding engagement with the grinder arms is effected automatically on return of the grinder head to the top of its stroke, by a pin 31, Fig. 4, projected downward from the stationary head of the machine in position to extend through an opening 32 in the top of the carriage into engagement with a leverage extension 33 of the clamp plate.

Thus with return of the grinder head to the top of its stroke, the locking or holding clamp will be automatically released from holding engagement with the arms, and these will be held separated by the wedge or separator 52, clear of the knife.

The parts are preferably proportioned, however, so that the clamp will not become fully effective to hold the grinder arms until after the arms, in the lowering movement of the carriage, have left the separator wedge and the wheels have taken their engagement with opposite sides of the blade under pressure of the springs 22.

Thus the grinding wheels are free, under tension of the springs, to approach and adjust themselves to opposite sides of the blade and, as this self-adjusting engagement is effected, the clamp 25 comes into effect to automatically "lock" the stones in this set or selected engagement. The clamp then continues its holding engagement while the grinding carriage completes its down stroke and then reverses and returns to the top of its stroke. At the end of this second, upward pass the clamp will be automatically released and the stones automatically separated, free of the blade.

The construction shown in Figs. 7 and 8 is generally similar in effect.

In this case, however, the locking or holding of the stones in their adjusted engagement with the knife is effected through a pair of swinging arms 34, 35, pivoted beneath the carriage on a stud 36 and tensioned toward each other by a connecting spring 37, said arms carrying at their free ends the pins 38, 39, bearing against the arm tensioning springs 22.

The spring connected arms 34, 35, may thus exert a holding or damping effect on the springs 22 which actually hold the stones in engagement with the knife.

Operation of the holding or locking arms 34, 35, is controlled, in the illustration, by using a coiled spring 40, Fig. 8, about the pivot pin 36, said spring acting against a shoulder 41 to hold this pin and the arms 34, 35, pivoted thereon, tensioned against the supporting surface or bottom plate 42 of the carriage; release of such holding tension being effected through a lever 43 pivoted on the carriage at 44, in position to engage the upper end of the pivot pin 36 and to be actuated by the stationary trip pin 31 entering through opening 45 in the top of the carriage.

When lever 43 is free of the trip pin 31 the spring 40 is effective to hold the spring tensioned arms 34, 35, clamped against the bottom plate 42 of the grinder head and with pins 38, 39, applying a predetermined loading to the grinder arm springs 22. The stones will then be held locked with this predetermined loading against opposite sides of the knife all during the downward advancing and upward return movement of the grinder head. This damps out vibrational tendencies and serves to maintain a substantially

constant, even "bite" of the stones on the blade, producing a continuous, straight cutting edge.

In both forms of the invention disclosed the stones are free to accommodate themselves and to take up a position of engagement with the knife at the start of the grinding cycle, and they are compelled to hold substantially this same relation during the full cycle, so that any unevenness due to wear or other influence will be automatically smoothed out or removed. Thus a blade which may have been injured may be restored to effective service by running the sharpener through one or more grinding cycles.

The pin 31 which releases the clamp may be yielding or spring pressed and located so as to trip the clamp, on the up-stroke of the carriage, before the wedge separates the stones from the blade, and so that on the down stroke of the carriage it will operate as a follow-up and prevent the clamp from becoming effective until after the wedge has permitted the stones to come into engagement with the blade.

While in Fig. 7 the holding arms 34, 35, are shown as bearing on the springs 22 which engage the grinder arms 19, it is contemplated that these holding arms may act directly on the grinder arms, as by having the pins 38, 39, engage the grinder arms instead of the springs 22, as shown in the fragmentary detail view, Fig. 9.

What is claimed is:

1. A sharpener for a straight knife cloth cutting machine having an upright post and a straight knife mounted to reciprocate vertically on said post, said sharpener comprising a carriage mounted for up and down travel along said post, arms mounted on said carriage for movement toward and away from opposite sides of the knife, sharpening members on said arms engageable with opposite sides of the knife, spring means acting on said arms for yieldingly engaging said sharpening members with the knife, releasable securing means for securing said arms with the sharpening members in the position in which they have been engaged by said spring means with the knife, means at the upper end of the post for separating the arms substantially at the end of the upward movement of the carriage to effect disengagement of the sharpening members from the knife and means for effecting the release of said securing means from said arms prior to the arm separating action of said separating means and for permitting the arm securing operation of said securing means after downward movement of the carriage has carried the arms away from said separating means.

2. A sharpener for a straight knife cloth cutting machine having an upright post and a straight knife mounted to reciprocate vertically on said post, said sharpener comprising a carriage mounted for up and down travel along said post, arms mounted on said carriage for movement toward and away from opposite sides of the knife, sharpening members on said arms engageable with opposite sides of the knife, spring means acting on said arms for yieldingly engaging said sharpening members with the knife, releasable securing means for securing said arms with the sharpening members in the position in which they have been engaged by said spring means with the knife, means at the upper end of the post for separating the arms substantially at the end of the upward movement of the carriage to effect disengagement of the sharpening members from the knife and means for effecting the release of said securing means from said



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arms prior to the arm separating action of said separating means and for permitting the arm securing operation of said securing means after downward movement of the carriage has carried the arms away from said separating means, said 5 releasable securing means being a spring closed clamp engageable with said arms and the means for effecting release and permitting subsequent reoperation of said clamp being a relatively fixed stop at the upper end of the post positioned for 10 releasing engagement with said spring closed clamp near the end of upward travel of the carriage.

3. A sharpener for a straight knife cloth cutting machine having an upright post and a 15 straight knife mounted to reciprocate vertically on said post, said sharpener comprising a carriage mounted for up and down travel a long said post, arms mounted on said carriage for movement toward and away from opposite sides 20 of the knife, sharpening members on said arms engageable with opposite sides of the knife, spring means acting on said arms for yieldingly engaging said sharpening members with the knife, releasable securing means for securing said 25 arms with the sharpening members in the position in which they have been engaged by said spring means with the knife, means at the upper end of the post for separating the arms substantially at the end of the upward movement of the carriage to effect disengagement of the sharpening 30 members from the knife and means for effecting the release of said securing means from said arms prior to the arm separating action of said separating means and for permitting the arm 35 securing operation of said securing means after downward movement of the carriage has carried the arms away from said separating means, said releasable securing means being a spring closed clamp engageable with said arms and the means 40 for effecting release and permitting subsequent reoperation of said clamp being a relatively fixed stop at the upper end of the post positioned for releasing engagement with said spring closed clamp near the end of upward travel of the carriage and said stop being yieldable in the direction 45 of upward movement of the carriage to an extent sufficient to permit further upward movement of the carriage enough for said separating means to effect disengagement of the sharpening 50 members from the knife.

4. A sharpener for a straight knife cloth cutting machine having an upright post and a straight knife mounted to reciprocate vertically 55 on said post, said sharpener comprising a carriage mounted for up and down travel along said post, arms mounted on said carriage for movement toward and away from opposite sides of the knife, sharpening members on said arms engageable with opposite sides of the knife, spring 60 means acting on said arms for yieldingly engaging said sharpening members with the knife, releasable securing means for securing said arms with the sharpening members in the position in which they have been engaged by said spring 65 means with the knife, means at the upper end of the post for separating the arms substantially at the end of the upward movement of the carriage to effect disengagement of the sharpening members from the knife and means for effecting the release of said securing means from said arms prior to the arm separating action of said separating means and for permitting the arm 70 securing operation of said securing means after downward movement of the carriage has carried

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the arms away from said separating means, said releasable securing means being a spring pressed clamp plate fulcrumed on the carriage in position to grip said arms and having a releasing leverage extension and said means for effecting release of said securing means being a relatively fixed stop positioned to engage said leverage extension near the end of upward travel of the carriage.

5. A sharpener for a straight knife cloth cutting machine having an upright post and a straight knife mounted to reciprocate vertically on said post, said sharpener comprising a carriage mounted for up and down travel along 15 said post, arms mounted on said carriage for movement toward and away from opposite sides of the knife, sharpening members on said arms engageable with opposite sides of the knife, spring means acting on said arms for yieldingly engaging said sharpening members with the knife, releasable securing means for securing said 20 arms with the sharpening members in the position in which they have been engaged by said spring means with the knife, means at the upper end of the post for separating the arms substantially at the end of the upward movement of the carriage to effect disengagement of the sharpening 25 members from the knife and means for effecting the release of said securing means from said arms prior to the arm separating action of said separating means and for permitting the arm securing operation of said securing means after downward movement of the carriage has carried the arms away from said separating 30 means, said spring means including spring connected levers exerting pressure on said arms, said levers having a common pivotal mounting, said releasable securing means including a spring closed clamp operating on said levers at 35 said common pivotal mounting for yieldingly holding said spring tensioned levers in the position in which the sharpening members have been engaged with the knife and said means for effecting release of said securing means including a stop positioned to effect the release of said spring closed clamp near the end of upward 40 travel of the carriage.

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