Sept. 16, 1958 J. HANSEN 2,851,833

HONING DEVICE

Filed March 19, 1956 2 Sheets-Sheet 1

FIG. 1

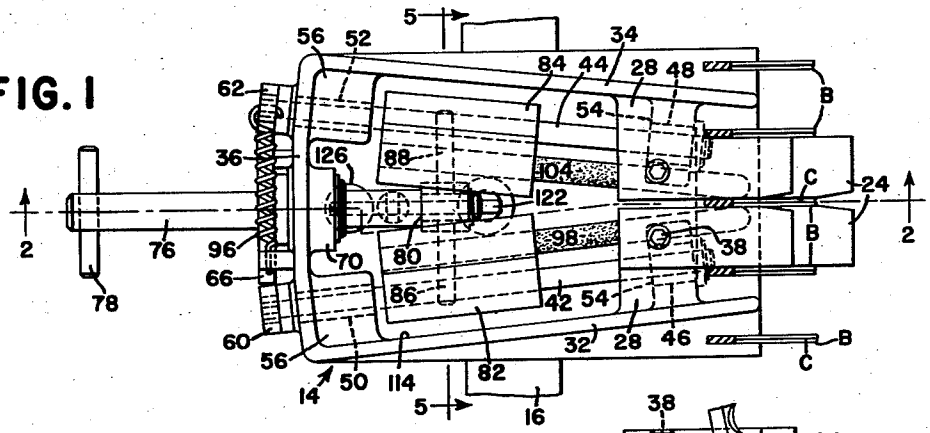


FIG. 2

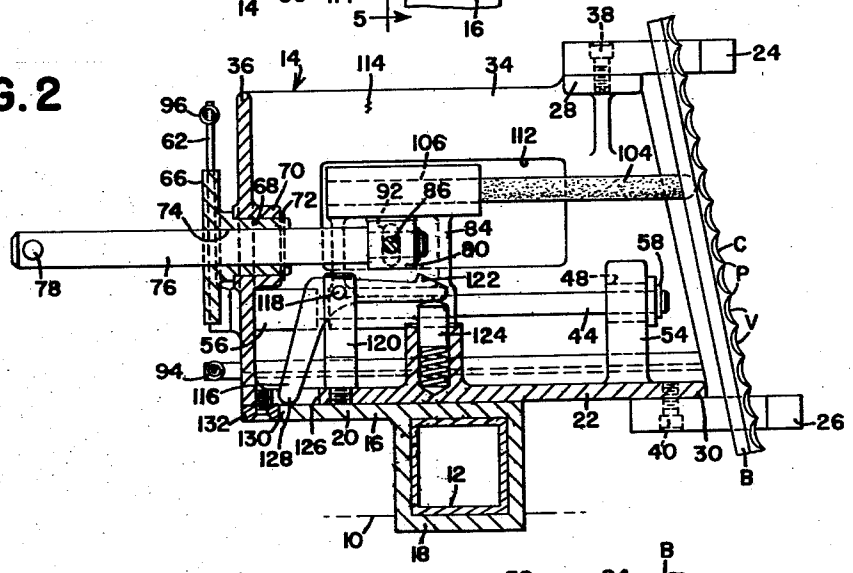
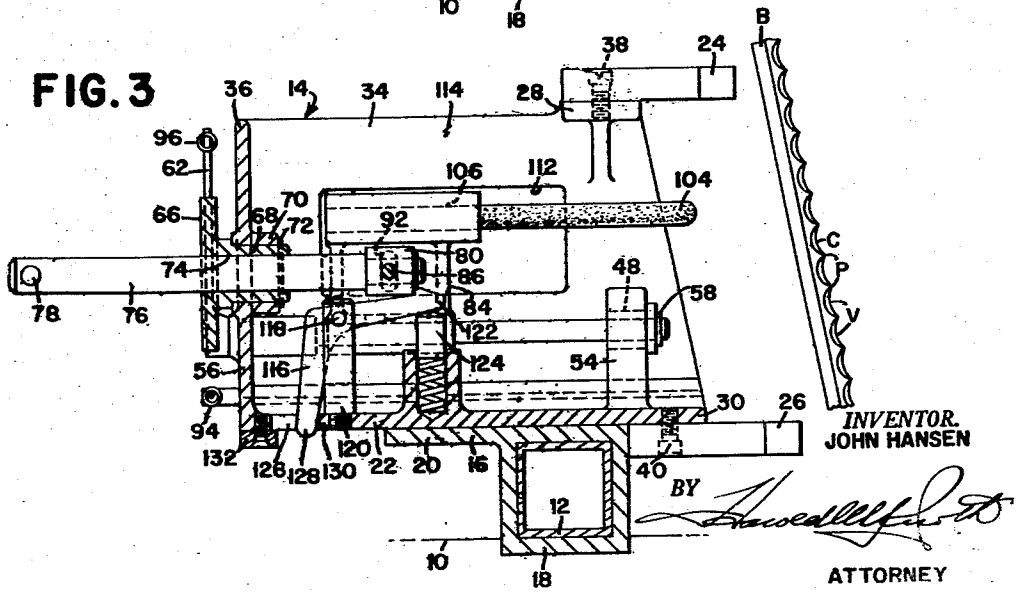


FIG. 3



INVENTOR.
JOHN HANSEN

BY

ATTORNEY

Sept. 16, 1958 J. HANSEN 2,851,833

HONING DEVICE

Filed March 19, 1956 2 Sheets-Sheet 2

FIG. 4

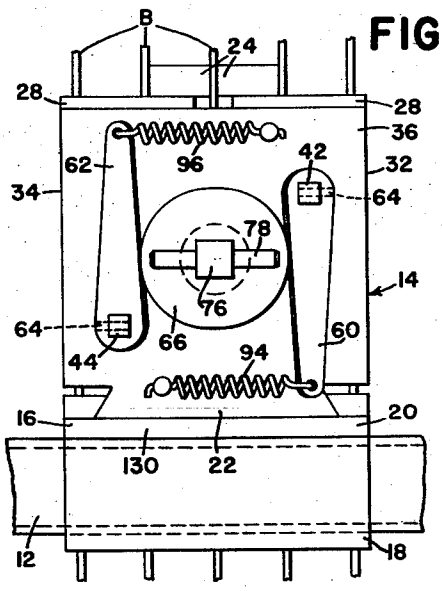


FIG. 5

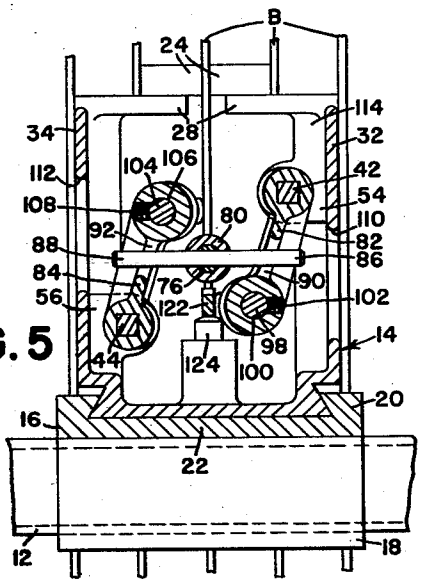


FIG. 6

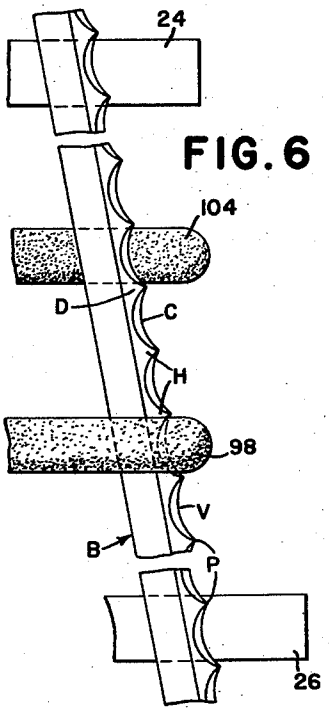
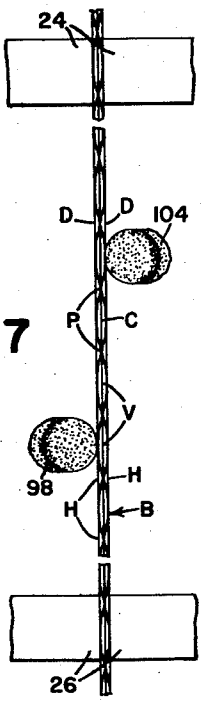


FIG. 7



INVENTOR.
JOHN HANSEN

BY

ATTORNEY

United States Patent Office 2,851,833 Patented Sept. 16, 1958

2,851,833

HONING DEVICE

John Hansen, Bettendorf, Iowa

Application March 19, 1956, Serial No. 572,369

24 Claims. (Cl. 51—250)

This invention relates to a honing device and especially to such device as capable of use in honing the several blades of bread-slicing machines, for example.

A typical bread slicer, specifically a slicer of the endless band type, includes a pair of drums rotatable about spaced apart parallel axes and a plurality of endless slicer bands trained about the drums, each band being crossed in the form of a figure eight so as to present at the zone of intersection of the straight runs of the band a pair of cutting edges maintained by appropriate guides in parallel planes normal to the drum axes. The several bands thus present several cutting edges through which loaves of bread are passed along a path cut by the blades, the loaves being thus sliced in accordance with the number of cutting edges involved. These bands have a substantial useful life measured ordinarily by the number of loaves cut before defects begin appearing in the loaves, such as crumbling, "snow," crushing etc., depending upon the nature of the loaves as to type and texture. When the bands show signs of extreme failure in any of the respects noted, they are usually removed from the slicer and returned to the manufacturer for re-sharpening, which is distinguished from honing because in the re-sharpening process the individual bands are placed on special machines and actually re-ground. Re-sharpening or re-grinding, however, is relatively costly as compared with honing and accordingly operators of the slicer machines in bakeries prefer to postpone re-grinding by honing the bands from time to time to improve the performance thereof until such time as re-grinding is inevitable. For this purpose several types of honing devices have appeared in the industry with varying degrees of commercial acceptance. It is an absolute requirement that the honing device be capable of use while the bands are still installed in the slicer, and for this purpose all such devices include means of one form or another for the mounting thereof on the slicer in the slicing zone or proximate thereto. Some devices are capable of honing only one side of one band at a time, others can hone both sides of a single band and some are designed to hone several bands simultaneously. All operate on the principle of positioning the device and running the slicer, preferably at a relatively slower speed. In addition to the foregoing, the safety factor is important, for an operator using the hone is precariously exposed to the running bands. And the device must be acceptable as to initial cost, maintenance and performance.

The principal object of the present invention is directed toward the provision of a honing device satisfactorily meeting the above requirements in addition to including several novel and significant attributes. The inventive design features the honing of both sides of a band simultaneously by hones spaced lengthwise of the band or blade, so that the hones respectively contact the blade from opposite sides, in this respect the invention providing for the utilization of the intervening portion of the blade in unsupported fashion so that the blade in the honing zone is capable of flexing to thereby improve the honing characteristics by enabling the band to yield laterally according to the uneven but regular variations in the sides of the cutting edge, at which point it is significant to note that the popular slicer bands are scalloped along their cutting edges and thus present alternate peaks and valleys that differentiate the honing problems from mere sharpening of perfectly straight edges as in ordinary knives.

The invention features also the employment of biasing means for applying a honing pressure to the hones, plus means for regulating the pressure, especially in conjunction with a single actuator that functions also to move the hones back and forth or out of and into honing position. An object of the invention is also to improve the mounting of the device for interchangeability of position on the slicer so as to be movable from blade to blade. Other objects include a safety latch for preventing positioning of the device until properly located, a simple device including relatively few working parts, and a device adapted to use elongated pencil-like hones preferably in pairs and operating along honing paths that are in convergent relation to each other, the honing paths intersecting the plane of the blade at equal angles and from opposite sides. These characteristics are present, perhaps in a lesser but nevertheless beneficial degree, in the honing of blades of the reciprocating type.

The foregoing objects and features, along with others of significance, will appear as a preferred embodiment of the invention is disclosed, by way of example, in the ensuing specification and annexed sheets of drawings, the several figures of which are described immediately below.

Figure 1 is a plan view of the honing device, shown in operating position relative to parts of a representative slicer.

Figure 2 is a longitudinal section on the line 2—2 of Figure 1.

Figure 3 is a similar section, but showing the device retracted relative to the slicer bands.

Figure 4 is a rear elevation.

Figure 5 is a section on the line 5—5 of Figure 1.

Figure 6 is an enlarged fragmentary view, in elevation, showing the hones as related to a band or blade.

Figure 7 is a front view of the structure shown in Figure 5.

A basic part of the slicer machine appears fragmentarily at 10 in Figures 2 and 3 and may be any part of such machine suitable for the mounting of the honing device thereon by means of a transverse support 12. Straight sections of several blades are shown at B, it being understood that in the case of an endless band type slicer the omitted portions of the bands are looped around spaced apart parallel drums as aforesaid; or, in a reciprocating slicer, opposite ends of the blades are supported in a reciprocating frame. These details are unimportant, it being significant only that by means of the device to be presently described, the blades may be honed while they are in situ in the machine, regardless of its type.

The blades are shown as being uniformly spaced apart on the order of the thickness of the loaf slices to be cut. Thus each blade runs or travels (as respects the part thereof material here) in a generally upright cutting plane.

Each blade shown is of the scalloped cutting edge type, typical, for example, of those shown in the U. S. patents to Hansen Nos. 2,002,812; 2,082,832 and 2,596,851, the cutting edge here being designated by the letter C, scalloped to provide alternate peaks and valleys P and V respectively and, conventionally, beveled at opposite sides as at D, whereby the intersection of the plane of each bevel with the peaks and valleys leaves the respective side of the blade, along the cutting edge C, with uniformly spaced high spots H occurring at the sides of the peaks because of the missing portions of the blade effected by the

provision of the valleys V. Consequently, it will be seen that the honing problem presents, on the basis of the nature of the blade alone, certain characteristics not involved in sharpening or honing a simple straight cutting edge; although, as will be hereinafter apparent, the principles here elaborated are beneficial in honing other types of edges.

The honing device comprises fundamentally a base **14** and a slide **16** by means of which it is mounted on the support **12** for individual location relative to the several blades B, it being clear that the device is operative to hone the blades singly from opposite sides of their respective cutting edges.

Since the support **12** is of square section, the slide **16** has a depending portion formed as a square socket **18** which receives the support so as to carry the device for lateral shifting relative to the blades, or lengthwise of the support. The upper portion of the slide is formed with the female part **20** of a dovetail connection of which the male part **22** is included in the bottom of the base **14**, the dovetail connection being at right angles to the slidable mounting of the slide on the support so that two-way movement of the base relative to the blades is achieved, whereby the base may be moved laterally on the support **12**, while rearwardly clear of the blades, and may then be shifted forwardly when base-mounted guide means, comprising upper and lower guide sets **24** and **26**, are located fore-and-aft with a selected blade. When the honing operation on that blade is completed, the base may be shifted rearwardly to a rear position and may then be shifted laterally until alined fore-and-aft with the next blade and then forwardly to a new position and so on. Figure 2 shows the operating or honing position, and Figure 3 shows the retracted position, concerning which a fuller description will appear later.

The guides **24** and **26** are located at the front end of the base, or that portion thereof proximate to the backs of the blades B, and are base-supported by upper and lower pads **28** and **30** integral with generally fore-and-aft side walls **32** and **34** which are also preferably integral with and extend rearwardly to a transverse rear end wall **36**. The upper guides **24** are paired, being spaced apart just enough to accept a blade B so as to confine the received portion of the blade against lateral flexing, the blade being of steel and relatively thin and therefore inherently capable of flexing, twisting, etc. The same relationship as to each other and as to a vertically spaced portion of the blade B is occupied by the lower guides **26**. In addition to these guides, the slicer will normally include permanent guides, not shown, for holding the blades in parallelism in a cutting zone through which the loaves are passed to be sliced, which details are well known to those versed in the art and need no elaboration here. The guides **24** and **26** are removably but rigidly secured to the respective mounting pads or portions as by recessed-head screws **38** and **40**. Removability of the lower guides **26** permits the base **14** to be removed rearwardly from the slide **16** as will be readily apparent from Figure 3, wherein it is shown that the guides **26** in place afford stops for limiting rearward movement of the base, it being clear that when these guides are removed the stop effect disappears and rearward withdrawal of the base via the dovetail **20—22** may be achieved. Hence, the support **12**, together with the slide **16**, may be left in place and only the base removed if desired. Replacement of the base is accomplished by merely sliding the base forwardly in the dovetail **20—22** and replacing the lower guides **26**.

In that form of device illustrated, the base and its components are reversed but symmetrically; that is, the structure at laterally opposite sides of the median plane of the base, which is coincident with the plane of the blade, are "upside down" as respects each other. Hence, the base carries a pair of carrier shafts **42** and **44**, the former being an upper shaft and the latter a lower shaft (Figures 4 and 5). These shafts are not only offset both horizontally and vertically but are respectively rockable on forwardly converging axes which intersect the cutting or blade plane from opposite sides and at equal angles (Figure 1). The shafts are preferably of square cross section but are appropriately rockably supported at their front ends by cylindrical front bearings or bushings **46**, **48** and at their rear ends by similar bearings or bushings **50**, **52**. Front and rear bosses **54** and **56** carry the respective bushings. Any suitable retainer may be used, at the front end of each shaft, such as a snap ring **58** in each instance, which retainer fixes its shaft against axial shifting but permits angular movement or rocking.

The shafts project rearwardly through the rear wall **36** of the base and respectively have control arms **60** and **62** affixed thereto, the former depending from its shaft **42** and the latter rising perpendicularly from its shaft **44**. Each arm is pinned at **64** to its shaft. The arms engage or ride on diametrically opposite sides of a control member in the form of an elliptical cam **66** that is angularly movable about a fore-and-aft axis vertically intermediate the horizontal planes of the shaft axes and bisecting the converging upright planes of the shaft axes. Or, stated simply, the axis of the actuator is in the median plane of the base **14**. Rockable mounting of the cam on its axis is here effected by an integral, externally cylindrical hub **68** for mounting in a fore-and-aft bored boss **70** on the rear wall **36**. A retainer, such as a snap ring **72**, prevents the cam from shifting axially.

The cam hub **68** is centrally broached or otherwise formed with a square fore-and-aft opening **74** which effects a sliding key connection with the square-sectioned part of a fore-and-aft control means or actuator shaft **76**, the rear end of which is equipped with a handle **78** rearwardly of the base **14** and the front end of which is equipped with means **80** interconnected with hone carrier arms **82** and **84** mounted respectively on the shafts **42** and **44**. The means **80** is mounted on a reduced portion of the actuator and includes a pair of laterally oppositely extending members **86** and **88** which respectively enter apertures or vertically elongated slots **90** and **92** respectively in the carrier arms **82** and **84**. The members **86—88** may comprise a single member, as shown, which serves also to connect the means **80** to the actuator. Also, since the slots **90** and **92** loosely receive the members **86** and **88**, they permit the arms **82** and **84** to easily follow their convergent paths even though the actuator **76**, which moves them fore-and-aft, is confined to a strictly fore-and-aft path because of its mounting in the square hole **74** of the cam **66**. The vertical length of each slot enables its arm also to rock about the axis of its shaft (**42** or **44**) as the cam **66** is rocked angularly by the actuator **76**, causing the control arms **60** and **62**, under action of biasing means or springs **94** and **96**, to ride the contour of the cam.

The carrier arm **82** has means at its free end for carrying or mounting a hone **98** of the elongated or pencil type, which means comprises a hone-receiving bore **100** and a set screw **102** for releasably retaining the hone. The bore **100** is parallel to the shaft **42** and hence the arm **82**, when it is moved fore-and-aft on its shaft **42**, carries the hone **98** for back and forth movement along a honing path at an angle to the blade plane. The other carrier arm **84** likewise carries a similar companion hone **104** by means including a hone-receiving bore **106** in the free end of the arm **84** and a set screw **108** for releasably retaining that hone. Since the axis of the hone bore **106** is symmetrically related to the median plane (and the blade plane), it follows that the hones **98** and **104** converge forwardly and therefore respectively engage the blade B from not only opposite sides but in vertically spaced relation and in that portion or area of the blade vertically intermediate the upper and lower guides **24** and **26** (Figures 6 and 7). In this respect it should be noted that the blade B in that portion thereof between the upper and lower guides is without lateral support. Thus the

blade portion just referred to is free to yield or flex laterally, particularly because of the vertical offset of the hones **98** and **104**, whereby the honing function is improved because, in combination with the honing pressure applied by the springs **94** and **96** according to the angular position of the cam **66**, the blade and hones may relatively accommodate themselves to the uneven sides of the cutting edge caused by the high spots H. Hence, the hones are effective to hone the entire cutting edge, including the bottoms of the valleys V as well as the tips and adjoining portions of the peaks P, as distinguished from a honing operation in which the blade is rigidly supported and which is characterized in excessive grinding off of the peaks and even cutting into the supports by the hones.

The hones may be readily adjusted, removed and replaced because the respective set screws are accessible through side openings or windows **110** and **112** formed respectively in the base side walls **32** and **34**. The base is preferably open at its top **114** for convenience of access and observation.

From the description thus far, it will be seen that the base occupies a honing position as shown in Figures 1 and 2, located forwardly as respects a blade B and receiving the blade between the vertically spaced apart upper and lower guides **24** and **26**. The hones in Figures 1, 2 and 3 are shown as being retracted by the actuator **76**, which is thus in its rear position. Also, the angular position of the actuator **76** is such that the cam **66**, keyed to the actuator at **74**, has its greatest diameter horizontally or transversely, thus spreading the control arms **60** and **62** to their maximum outer positions, from which it follows that the front ends of the hones **98** and **104** are spread apart to just clear the opposite sides of a blade B. The honing operation involves shifting of the actuator forwardly, causing the hones, of course, to move along their respective convergent honing paths. If additional lateral pressure is required on the hones, the actuator is turned about its fore-and-aft axis and the springs **94** and **96** cause the control arms to follow smaller-diametered portions of the cam **66**, whereby the carrier shafts **42** and **44** turn about their respective axes and swing the free or hone-carrying ends of the carrier arms **82** and **84** inwardly. If desired, a reciprocating motion may be employed, combining, if further desired, a rocking motion of the actuator to regulate the hones laterally relative to the blade. Or, with the actuator forwardly positioned and the hones at opposite sides of the blade, the actuator may be rocked while retaining its axial position. Hence, a variety of individual and combination motions are available.

As stated above, the inherent flexibility of the blade is utilized to improve the honing operation, since the blade is laterally unopposed intermediate the upper and lower guides **24** and **26** except by the hones, but the hones too are vertically offset and the blade may, when considered in exaggeration, assume a sinuous form as it passes the hones.

When the honing operation is completed on one blade, the base is backed up via the dovetail **20—22** to a rearward position in which the hones clear the blade just honed (Fig. 3). The base and slide may then be shifted laterally to fore-and-aft alinement with the next blade, which is determined when the guides **24** and **26** are located so as to receive such next blade, after which the base may be shifted forwardly to its new position. Back and forth positioning of the base is accomplished by the actuator **76** and its handle, which are conveniently and safely remote from the traveling blades.

However, an additional safety feature is designed into the device, which prevents forward shifting of the hones to a blade-engaging position until it is assured that the guides and blade are properly alined or located. This feature involves a safety latch in the form of a bell crank **116** pivoted on a transverse pin **118** to an upright stud **120** rigid on the bottom of the base. The latch is biased

upwardly at its notched front end **122** by a spring-loaded plunger **124**. The bottom of the base has an opening **126** therein through which the bottom end **128** of the latch projects freely when the base is in its rear position (Figure 3). In that position, the notched front end **122** engages ahead of the actuator front means **80** and prevents the actuator **76** from being shifted forwardly relative to the base **14**, thus preventing inadvertent engagement of the blade by the hones when the blade is not properly alined fore-and-aft with the guides **24** and **26**. In other words, if the lateral position of the base, after it has been shifted rearwardly and then laterally, is such that one of the top guides **24**, for example, will abut the back edge of a blade, the base obviously cannot be shifted forwardly. Hence, the free lower end **128** of the latch **116** will remain as in Figure 3, under action of the plunger **124**. However, as soon as proper fore-and-aft alinement is achieved, as respects the space between the guides with reference to a blade, the base can be shifted forwardly by the actuator, since the lock-up at **80–122** affords a force-transmitting connection between the base and actuator. Now, as the base is thus moved ahead, the depending end **128** of the latch **116** will engage the rear edge **130** of the slide **16**, which will force the latch to rock clockwise about its pivot so as to ultimately retract the notched front end **122** thereof clear of the means **80** on the actuator, which occurs substantially simultaneously with the engagement between a base-mounted rear stop **132** and the rear edge **130** of the slide, the lower end **128** of the latch **116** now of course riding the proximate top surface of the slide (Figure 2). In reverse fashion, as soon as the base is retracted, the bottom **128** of the latch **116** drops through the opening **126** when a gap is opened up between the stop **132** and the edge **130**.

Objects and features of the invention that have not been categorically outlined herein will readily occur to those versed in the art, as will modifications of the preferred embodiment disclosed, all of which are attainable without departure from the spirit and scope of the present invention.

What is claimed is:

1. A honing device for honing opposite sides of the cutting edge of an elongated flexible cutting blade that runs generally in an upright plane, comprising: a support positioned behind the blade; a base carried by the support and having front and rear ends respectively adjacent to and remote from the blade; blade guide means on the base and slidably engaging the blade for locating the base and blade relative to each other; upper and lower fore-and-aft shafts carried by the base for angular movement respectively about vertically spaced and laterally offset axes that converge forwardly and intersect the blade plane; a first carrier arm constrained for angular movement with the upper shaft but axially slidable back and forth therealong, said arm depending from said upper shaft to a free end at the same side of the blade plane as said upper shaft and said free end having means thereon for carrying a blade hone adapted to engage one side of the blade and movable along a hone path parallel to the upper shaft axis; a second carrier arm constrained for angular movement with the lower shaft but axially slidable back and forth therealong, said second arm rising from said lower shaft to a free end at the same side of the blade plane as said lower shaft and said free end having means thereon for carrying another blade hone adapted to engage the other side of the blade and movable along a hone path parallel to the lower shaft axis; means biasing the shafts to turn in such directions as to urge the carrier arms laterally toward each other for biasing the hones into engagement with opposite sides of the blade cutting edge; an actuator movably carried by the base; and means interconnecting the actuator and the carrier arms for moving the arms forwardly and rearwardly in unison while the biasing means urges the arms toward each other.

2. The device defined in claim 1, in which: the actuator

is reciprocable along a fore-and-aft path medially between the shafts; and the means interconnecting the actuator and the carrier arms comprises members mounted on and projecting laterally outwardly from opposite sides of the actuator, each carrier arm having an aperture therein receiving the proximate part of said cross member for fore-and-aft movement of the carrier arms with the actuator while enabling movement of the arms about their respective shaft axes under action of the biasing means.

3. The device defined in claim 1, including: an elliptical cam rockable on the base about a fore-and-aft axis laterally intermediate the shaft axes; means secured respectively to the shafts and engaging diametrically opposite portions of the cam under action of the biasing means; and means for moving the cam angularly to regulate the amount of movement of the carrier arms toward each other under action of said biasing means.

4. The device defined in claim 3, in which: the means for moving the cam angularly includes a motivating connection to the actuator so that the cam is angularly movable by the actuator as the actuator moves the carrier arms.

5. The device defined in claim 4, in which the actuator is movable fore-and-aft along and is also rockable about a fore-and-aft axis coincident with the cam axis; and the motivating connection between the cam and the actuator enables angular movement of the two in unison while permitting fore-and-aft movement of the actuator relative to the cam.

6. The device defined in claim 1, in which the blade guide means on the base includes upper and lower spaced apart guides at levels respectively above and below the hones for engaging the blade at vertically spaced apart portions to confine said blade portions against lateral displacement from the blade plane while leaving that portion of the blade between the guides free for lateral flexing whereby the engagement between each hone and the associated side of the blade is laterally unopposed.

7. The device defined in claim 1, in which each shaft projects rearwardly at the rear end of the base; the actuator is a fore-and-aft member carried by the base for reciprocation along and rocking about a fore-and-aft axis vertically and laterally intermediate the shaft axes, and said member projects at the rear end of the base; an elliptical cam is disposed coaxially with the member at its rear end and is connected to the member for angular movement with the member while permitting reciprocation of the member, said cam being confined against fore-and-aft displacement; and a pair of control arms are secured respectively to the rear ends of the shafts and riding diametrically opposed sides of the cam whereby angular movement of the cam regulates the amount of angular movement of the shafts under action of the biasing means.

8. The device defined in claim 1, in which: the support extends laterally behind the blade; and the base is mounted on the support for shifting rearwardly from its original position to a rear position disengaging the guide means from the blade, said base being also shiftable laterally on said support to a position laterally offset from said rearward position and thence shiftable forwardly to a new forward position laterally offset from said original position.

9. The device defined in claim 8, including: latch means operative upon rearward shifting of the base to engage and lock the actuator against movement relative to the base so as to prevent relative forward movement of the carrier arms by the actuator, said latch means being releasable upon forward shifting of the base to either its original or its new position.

10. A honing device for honing opposite sides of the cutting edge of an elongated flexible cutting blade that runs generally in an upright plane, comprising: a support including a base positioned behind the blade and having front and rear ends respectively adjacent to and remote from the blade; vertically spaced apart upper and lower blade guides on the front end of the base for slidably engaging and confining vertically spaced portions of the blade against lateral displacement from said plane while leaving the portion of the blade between the guides free for lateral flexing; upper and lower carriers disposed behind the blade at levels respectively below and above the upper and lower guides, said carriers being offset respectively from opposite sides of the blade plane and each being adapted to carry a blade hone; a pair of means mounting the carriers on the base for movement forwardly toward and rearwardly away from the blade respectively along forwardly converging paths so that the hones respectively contact vertically spaced portions of the blade from opposite sides in that area of the blade intermediate the upper and lower guides, each mounting means also supporting its carrier for movement laterally of its path; means biasing the carriers for movement laterally toward each other to apply honing pressure to opposite sides of the blade when engaged by the hones; an actuator movably mounted on the base; and means interconnecting the actuator and the carriers for moving the carriers forwardly and rearwardly in unison while the biasing means urges the carriers toward each other.

11. A honing device for honing opposite sides of the cutting edge of an elongated flexible cutting blade that runs generally in an upright plane, comprising: a support including a base positioned behind the blade and having front and rear ends respectively adjacent to and remote from the blade; vertically spaced apart upper and lower blade guides on the front end of the base for slidably engaging and confining vertically spaced portions of the blade against lateral displacement from said plane while leaving the portion of the blade between the guides free for lateral flexing; upper and lower carriers disposed behind the blade at levels respectively below and above the upper and lower guides, said carriers being offset respectively from opposite sides of the blade plane and each being adapted to carry a blade hone; a pair of means mounting the carriers on the base for movement forwardly toward and rearwardly away from the blade respectively along individual paths so that the hones respectively contact vertically spaced portions of the blade from opposite sides in that area of the blade intermediate the upper and lower guides, each mounting means also supporting its carrier for movement laterally of its path; means biasing the carriers for movement laterally toward each other to apply honing pressure to opposite sides of the blade when engaged by the hones; an actuator movably mounted on the base; and means interconnecting the actuator and the carriers for moving the carriers forwardly and rearwardly while the biasing means urges the carriers toward each other.

12. A honing device for honing opposite sides of the cutting edge of an elongated cutting blade that runs generally in an upright plane, comprising; a support including a base positioned behind the blade and having front and rear ends respectively adjacent to and remote from the blade; guide means on the front end of the base for slidably engaging and locating the blade relative to the base; upper and lower carriers disposed behind the blade in vertically spaced relation and further being laterally offset respectively from opposite side of the blade plane, each carrier having means thereon for carrying a blade hone adapted to engage the respective side of the blade; a pair of means mounting the carriers on the base for movement forwardly toward and rearwardly away from the blade along forwardly converging honing paths so that the hones reciprocate as they respectively contact opposite sides of the blade in vertically spaced relation to each other, each mounting means also supporting its carrier for movement laterally of its path; means biasing the carriers for movement toward each other to apply honing pressure to opposite sides of the blade when en-

gaged by the hones; an actuator movably carried by the base; and means interconnecting the actuator and the carriers for moving the carriers forwardly and rearwardly in unison while the biasing means urges the carriers toward each other.

13. A honing device for honing opposite sides of the cutting edge of an elongated cutting blade that runs generally in an upright plane, comprising: a support including a base positioned behind the blade and having front and rear ends respectively adjacent to and remote from the blade; guide means on the front end of the base for slidably engaging and locating the blade relative to the base; upper and lower carriers disposed behind the blade in vertically spaced relation and further being laterally offset respectively from opposite sides of the blade plane, each carrier having means thereon for carrying a blade hone adapted to engage the respective side of the blade; a pair of means mounting the carriers on the base for movement forwardly toward and rearwardly away from the blade along individual honing paths so that the hones reciprocate as they respectively contact opposite sides of the blade in vertically spaced relation to each other, each mounting means also supporting its carrier for movement laterally of its path; means biasing the carriers for movement toward each other to apply honing pressure to opposite sides of the blade when engaged by the hones; and means for moving the carriers forwardly and rearwardly while the biasing means urges the carriers toward each other.

14. A honing device fo honing opposite sides of the cutting edge of an elongated cutting blade that runs generally in an upright plane, comprising; a support including a base positioned behind the blade and having front and rear ends respectively adjacent to and remote from the blade; guide means on the front end of the base for slidably engaging and locating the blade relative to the base; upper and lower carriers disposed behind the blade in vertically spaced relation and further being laterally offset respectively from opposite sides of the blade plane, each carrier having means thereon for carrying a blade hone adapted to engage the respective side of the blade; a pair of means mounting the carriers on the base for movement forwardly toward and rearwardly away from the blade along forwardly converging honing paths so that the hones reciprocate as they respectively contact opposite sides of the blade in vertically spaced relation to each other, each mounting means also supporting its carrier for movement laterally of its path; an actuator movably carried by the base; and means interconnecting the actuator and the carriers for moving the carriers forwardly and rearwardly.

15. A honing device for honing opposite sides of the cutting edge of an elongated cutting blade that runs generally in an upright plane, comprising; a support including a base positioned behind the blade and having front and rear ends respectively adjacent to and remote from the blade; guide means on the front end of the base for slidably engaging and locating the blade relative to the base; a pair of hone carriers disposed behind the blade in laterally offset relation respectively at opposite sides of the blade plane, each carrier having means thereon for carrying a blade hone adapted to engage the respective side of the blade; a pair of means mounting the carriers on the base for movement forwardly toward and rearwardly away from the blade along forwardly converging honing paths so that the hones reciprocate as they respectively contact opposite sides of the blade, each mounting means also supporting its carrier for movement laterally of its path; means biasing the carriers for movement toward each other to apply honing pressure to opposite sides of the blade when engaged by the hones; an actuator movably carried by the base; and means interconnecting the actuator and the carriers for moving the carriers forwardly and rearwardly while the biasing means urges the carriers toward each other.

16. A honing device for honing opposite sides of the cutting edge of an elongated flexible cutting blade that runs generally in an upright plane, comprising: a support including a base positioned behind the blade and having front and rear ends respectively adjacent to and remote from the blade; vertically spaced apart upper and lower blade guides on the front end of the base for slidably engaging and confining vertically spaced portions of the blade against lateral displacement from said plane while leaving the portion of the blade between the guides free for lateral flexing; a pair of hone carriers mounted on the base behind the blade for movement toward and away from the blade along fore-and-aft paths laterally offset respectively to opposite sides of the blade plane and for further movement laterally toward and away from each other; a pair of hone-mounting means respectively on the carriers for carrying a pair of hones to partake of said movement of the carriers and adapted to engage the blade respectively at opposite sides; and means for moving the carriers selectively fore-and-aft alone, laterally alone, or simultaneously fore-and-aft and laterally.

17. The device defined in claim 16, in which: the hone carriers are mounted for movement in such manner that their fore-and-aft paths converge forwardly from laterally opposite sides of the blade plane and intersect the blade plane at equal angles.

18. The device defined in claim 16, in which: the hone carriers are mounted for movement in such manner that their fore-and-aft paths are offset vertically relative to each other and so that said paths are both vertically intermediate the upper and lower blade guides so that the hones engage opposite sides of the blade in that portion thereof that is free for lateral flexing.

19. The device defined in claim 18, in which: the mounting of the hone carriers is additionally such that their paths converge forwardly from laterally opposite sides of the blade plane and intersect the blade plane at equal angles.

20. A honing device for honing opposite sides of the cutting edge of an elongated flexible cutting blade that runs generally in an upright plane, comprising: a support including a base disposed behind the blade and having front and rear ends respectively adjacent to and remote from the blade; a pair of vertically spaced apart and laterally offset hone carriers disposed behind the blade and respectively having means thereon for carrying hones to extend forwardly into contact respectively with opposite sides of the blade at vertically spaced portions of the blade; means mounting the hone carriers on the base for movement thereof along separate fore-and-aft paths spaced apart both vertically and laterally as aforesaid and for further movement laterally of said paths; and means for moving the carriers selectively forwardly and simultaneously laterally inwardly to increase hone contact with the opposie sides of the blade or rearwardly and simultaneously laterally outwardly to relieve hone contact with opposite sides of the blade.

21. A honing device for honing opposite sides of an elongated flexible cutting blade that runs generally in an upright plane, comprising: a support positioned behind the blade and including a base member having front and rear ends respectively adjacent to and remote from the blade; an actuator member carried by the base for back and forth movement along a fore-and-aft actuator path alined with the blade; upper and lower hone carriers behind the blade and disposed respectively above and below the actuator path and being also laterally offset respectively to opposite sides of said path; upper hone-mounting means on the upper carrier for mounting a forwardly extending upper hone adapted to engage one side of the blade; lower hone-mounting means on the lower carrier for mounting a lower hone adapted to extend forwardly into engagement with the opposite side of the blade; means supporting the carriers on one of the members for lateral movement relative to the actuator

and for fore-and-aft movement in unison with the actuator along separate fore-and-aft upper and lower honing paths spaced respectively above and below and offset laterally to opposite sides of the actuator path; biasing means acting on the carriers and reacting on one of the members for urging the carriers laterally inwardly relative to the actuator; and means for moving the actuator back and forth to incur back and forth movement of the carriers and hones.

22. The device defined in claim 21, in which: the actuator member is additionally mounted for angular movement about an axis lying along said actuator path; and said actuator includes means engageable with the carriers for moving the carriers laterally in opposition to the action of the biasing means upon turning of the actuator in one direction.

23. A honing device for honing opposite sides of the cutting edge of an elongated flexible cutting blade that runs generally in an upright plane, comprising: a support including a base disposed behind the blade and having front and rear ends respectively adjacent to and remote from the blade; a pair of vertically spaced apart and laterally offset hone carriers disposed behind the blade and respectively having means thereon for carrying hones to extend forwardly into contact respectively with opposite sides of the blade at vertically spaced portions of the blade; means mounting the hone carriers on the base for movement thereof along separate fore-and-aft paths spaced apart both vertically and laterally as aforesaid and

for further movement laterally of said paths; means for moving the carriers selectively forwardly and rearwardly; and biasing means acting on the hone carriers to move said carriers simultaneously laterally inwardly to increase hone contact with the opposite sides of the blade.

24. A honing device for honing the cutting edge of an elongated blade that runs generally in an upright plane, comprising: a support positioned behind the blade and including a base member having front and rear ends respectively adjacent to and remote from the blade; an actuator member carried by the base for back and forth movement respectively away from and toward the blade; a hone carrier connected to one member for back and forth movement in unison with the actuator member and for lateral movement relative to said actuator member; hone-mounting means on the carrier for mounting a forwardly extending hone adapted to engage one side of the blade; and biasing means acting on the carrier and reacting against one member for urging the carrier laterally in such direction as to press the hone into the blade.

References Cited in the file of this patent

UNITED STATES PATENTS

731,127	Quigley et al.	June 6, 1903
2,186,507	Trantino	Jan. 9, 1940
2,621,454	Callahan	Dec. 16, 1952
2,768,486	Jones et al.	Oct. 30, 1956
2,786,314	Simmons	Mar. 26, 1957