Sept. 15, 1936. W. F. OCENASEK 2,054,518

HOLD-DOWN GUARD FOR JOINTERS

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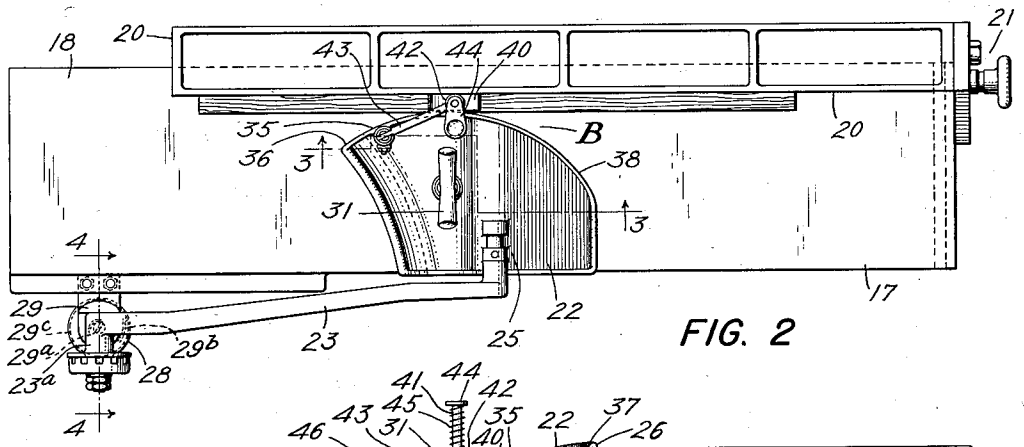


FIG. 2

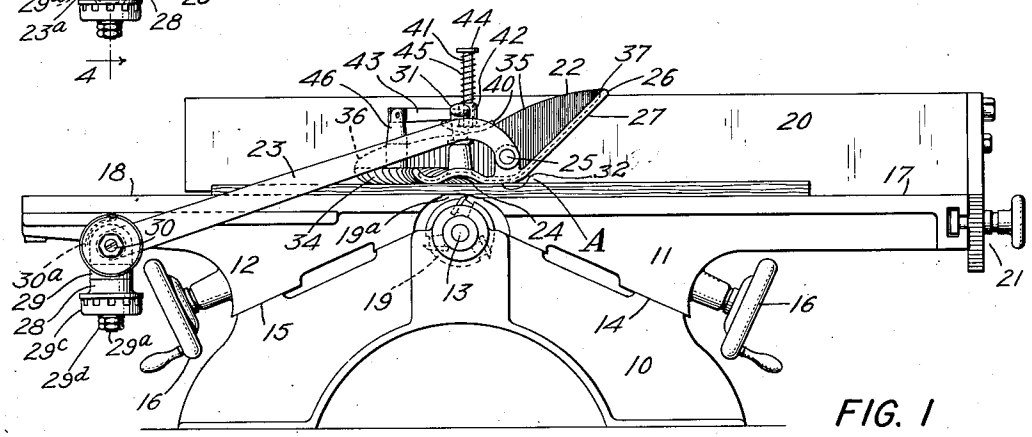
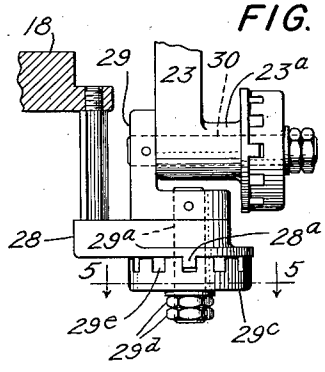


FIG. 1

FIG. 4



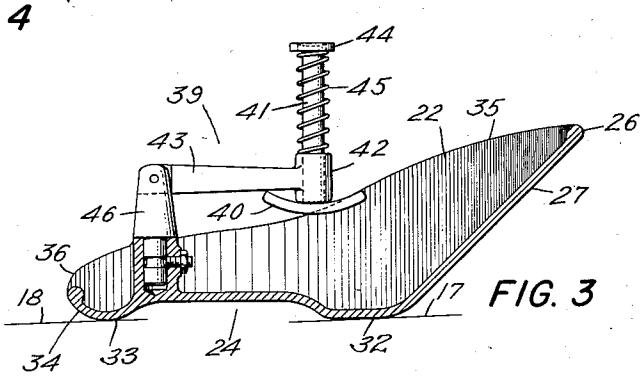


FIG. 3

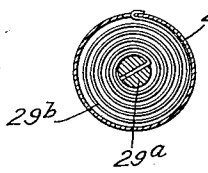


FIG. 5

INVENTOR
William Ferdinand Ocenasek
BY
Albert F. Nathan
ATTORNEY

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HOLD-DOWN GUARD FOR JOINTERS

William Ferdinand Ocenasek, Plainfield, N. J., assignor to Walker-Turner Company, Inc., Plainfield, N. J., a corporation of New York

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10 Claims. (Cl. 144—251)

The invention relates to rotary cutting machines of the planer or jointer character and particularly to a guard and work holding means for such machines.

Ordinarily a machine of this type has a working surface with an opening therein through which a rapidly rotating cutter projects, and if an operator is not extremely careful as he moves the piece of stock past the exposed cutter serious injury may result. Because of the lightning like speed that the normally exposed cutters operate, and the extreme ease in which a thoughtless or inexperienced operator may reseive a serious injury, these machines are generally considered one of the most dangerous machines in the shop.

The primary aim of the present invention is to fully safeguard and protect the operator from injury while working around or using such machines.

Heretofore, guards have been provided on jointing machines which overlay the knives and were cammed or moved laterally in the plane of the table as the workpiece was moved toward the knives. The guards were so arranged, however, that long before the workpiece reached the speeding cutter, the cutter was fully exposed and created a hazardous condition. Likewise, as the cutting operation neared completion and for an appreciable interval after the cut was completed, the whirling knives were exposed and created a hazardous condition more dangerous than at the first part of the cut because an operator, in order to obtain a good purchase on the workpiece in pushing it past the cutter, would frequently and unwittingly have one or more fingers hooked over the end of the piece of stock.

Another aim of the present invention is to make it impossible for an operator to inadvertently bring his hands or fingers anywhere near the whirling knives either at the beginning of the cut or at the end or at any time during the cutting operation and thus render the machine absolutely safe for the experienced as well as the inexperienced user.

A further object of the present invention is to render available a jointing machine capable of performing a planing operation upon relatively thin strips of material, either wide or narrow, and in a manner achieving uniformity in the cross-sectional thickness of the workpiece and without the hazardous manipulation of the workpiece that has heretofore been necessary in unsuccessful attempts to accomplish a like result upon or with the conventional jointer.

This invention further aims to solve a long existing difficulty experienced in the planing of relatively narrow strips of material. With the conventional jointer a strip of small cross-sectional area could not satisfactorily be machined. An operator would attempt to hold the strip down by placing a hand on the strip at each side of the cutter and gradually move the strip along. Naturally, this type of operation left the strip unsupported in the region of the cutter which resulted in a chattering of the strip and consequently an irregular and non-uniform appearance in the finished surface. Also, at the beginning and end of the cut, the ends of the strip overhang the cutter unsupported and the vibration incident to the cutting action causes huge gouges of stock to be removed from the ends of the piece, and frequently shattering them.

The present invention aims to provide a jointing machine that may be capably and efficiently used for the planing of small strips as well as relatively wide boards in a manner productive of a uniform finish from end to end of the workpiece and in a manner entirely safe from the standpoint of the operator's use of the machine.

In the attainment of the objects of this invention it is proposed to equip a jointer machine with a vertically movable cutter guard member arranged to overlie the cutter and cutter opening at all times. The guard proper is provided with an inclined leading edge, and with a relatively high inner side flange convexedly curved and adapted to abut against the customary jointer guide fence, the inclined leading edge and curved flange of the guard cooperating with the surfaces of the table and guide fence respectively to form wedge shaped entrance gates leading to the cutter. The guard is preferably pivotally mounted whereby it is caused to rock slightly as the workpiece is passed under the leading edge and thus the far side of the cutter opening is kept fully covered. Simultaneously the guard is moved bodily upward by the workpiece until the piece passes under the trailing edge of the guard and is maintained in that position until the cut is completed. A hold-down handle is provided upon the guard so that the operator may exert a pressure thereon to hold the work firmly against the cutter and table of the machine as it is fed to the cutter. The vertical movement of the guard allows for the passage of stock of various thicknesses, all the while, however, maintaining the whirling knives completely covered.

For jointing the edge or surface of a narrow

strip, the strip is inserted between the high flange of the guard and the jointer guide fence. The lateral movement of the guard allows for various sizes of strips to be fed therethrough, each of which may be held firmly against the fence by the urge of the guard in that direction. A small plunger having a curved and polished bottom surface, movable to a position between the flange and fence is provided for holding narrow workpieces down against the cutter as they are passed between the guard and the fence. Under either condition of operation the operator's hands are positively prevented from coming anywhere near the danger zone, and the workpiece is held firmly and securely as it is moved into contact with and past the cutter blades.

Other objects and advantages will be in part indicated in the following description and in part rendered apparent therefrom in connection with the annexed drawing.

To enable others skilled in the art so fully to apprehend the underlying features hereof that they may embody the same in the various ways contemplated by this invention, drawing depicting a preferred typical construction has been annexed as a part of this disclosure and, in such drawing, like characters of reference denote corresponding parts throughout all the views, of which:—

Figure 1 of the drawing represents a jointer embodying this invention.

Figure 2 is a plan view thereof illustrating the machine set up for planing a narrow strip.

Figure 3 is a detail view of the small work hold-down.

Figure 4 is a detail thru lines 4—4 of Fig. 2 illustrating more clearly the universal mounting for the guard and a preferred method counterbalancing same.

Figure 5 is a detail section through one of the spring tensioning devices.

Referring more particularly to Fig. 1, the machine illustrated comprises essentially a base member 10, front table and rear tables 11 and 12, each slidable toward and away from the cutter arbor 13 upon inclined guideways 14 and 15 respectively. Handwheel operated table adjusting means 16 are provided for adjusting the working surfaces 17 and 18 relative to each other and to the cutter 19 for depth of cut. The table surfaces 17 and 18 lie in substantially parallel planes, the surface 18 of the rear table being substantially coincident with a cutter tangent, whereas the working surface of the front table is normally somewhat lower depending upon the depth of cut the machine is set to take.

The conventional jointer is also provided with an adjustable guide fence 20, arranged normally perpendicularly to the plane of the working surfaces 17 and 18, against which stock is urged by hand as it is moved past the knives. The fence is suitably supported upon the table as at 21 and adapted for movement laterally across the surface of the table for guiding the workpiece over different portions of the knives, or for guiding the workpiece along the outer edges of the cutter when using the machine for rabbeting operations.

Heretofore, in the normal use of the machine an operator would hold the piece of stock down upon the front work table and simultaneously against the guide fence and then gradually feed the piece toward the whirling knives that operate through the opening in the table. When the front end of the board had passed the cutter the user would shift his position and place one hand on that portion of the board that was past the knives and bearing upon the rear table. Under the best of conditions, it will be seen, the workpiece was not held firmly to the table in the region of the knives as that would place the operator's hands too close to the danger area and a slight chattering or vibration of the workpiece might easily result in serious injury.

When the operator shifted his position and moved one hand from the workpiece on the front table to the workpiece as it was moved upon the rear table, the workpiece was left still further unsupported and easily susceptible to the chattering and pounding action of the knives. This condition of operation was not only fraught with danger to the operator but resulted in a very poor quality of surface finish upon the planed piece.

Moreover, two sides of a board could not be planed parallel because it is impossible for the user to hold a board down against the knives with uniform pressure all over. As a result the planed board is found to have one of its surfaces tapered toward the other, that is one edge of the board may measure a given thickness and the opposite edge something entirely different.

The present invention aims to overcome the disadvantages existing in the conventional jointer and to eliminate the dangerous condition found in its use. Figs. 1 and 2 illustrate a preferred means and method for accomplishing the ends in view, which comprises a vertically and laterally movable imperforate guard member 22 pivoted to the free end of a supporting arm 23. The guard 22 is preferably made of metal for rigidity, and is of a width sufficient to completely cover the cutter 19 in all lateral positions of the guide fence 20.

As illustrated in the drawing the guard is recessed at its under surface, as at 24, to insure adequate cutter clearance in all normal positions of adjustment of the front table 17, and of the guard itself relative to its lateral movements in the plane of the table. The guard member is pivoted at 25 to the supporting arm 23, with the axis of the pivot parallel to the plane of the table so that the under surface of the guard is maintained in a plane paralleling the table in all of its vertically and laterally adjusted positions.

With the objects in view of eliminating the danger surrounding the use of a jointer and to promote efficient and proper use of the machine the present invention proposes a hold-down guard of a character designed to maintain the whirling knives of the jointer fully covered at all times. That end is achieved by the provision of the imperforate guard member, the underside of which is relatively smooth, designed to permit the passage of the stock under the guard member as it is moved toward the knives. The passage of the stock under the hold-down guard is facilitated by inclining the forward or leading edge 26 of the member 22, upward away from the work surface of the table 17. The incline of the leading edge affords a work engaging surface 27 coacting with the work surface 17 in forming a wedge shaped work entrance A leading to the cutter and effective to elevate the member 22 as the workpiece is moved thereunder toward the knives. It will be observed that the leading edge 26 of the hold-down guard member 22 is made relatively high to accommodate boards of various thicknesses and also for the purpose of affording a prominent abutment in the path of movement of the operator's hand should he attempt to bring his hand too close to the danger zone.

Vertical movement of the guard is permitted by means of the pivotal mounting of the arm **23** to the rear table of the machine. For this purpose the rear table **12** is provided with a supporting element **28**, which in turn carries a bracket **29** to which the arm **23** is connected. The connection comprises a shaft member **30** fixed to the bracket **29** and arranged also on an axis paralleling the plane of the work table. The arm **23** is provided with a hub **23***a* which fits over the shaft **30** and thus maintains the arm **23** and the guard **22** in a predetermined fixed relation with respect to the cutter opening of the jointer, yet allowing the pivoted guard member **22** to swing vertically as the workpiece is moved thereunder.

The hold-down guard member proper is provided with a centrally located handle **31** whereby the operator may exert a downward pressure upon the guard **22** to the extent required to hold the workpiece firmly against the cutter **19**. Referring to Figs. 1 and 3 of the drawing it will be noted that the pressure exerted is distributed to two regions across the width of the work. The region **32** being ahead of the cutter and region **33**, which receives the greatest pressure, being behind the cutter. Accordingly, after the workpiece has been started under the guard the operator may apply whatever pressure is necessary to hold the workpiece against the cutter and against the rear table, narrow boards requiring less pressure than wide boards because of the smaller area being machined. This arrangement applies the pressure close to the cutter where it is needed and uniformly crosswise the work piece in a perfectly safe manner. The imperforate guard completely covers the cutter and a large area around the cutter and it is impossible for the operator's hand to slip into danger. With his other hand the user feeds the work along under the guard. If he attempts to go too far, the leading edge **26** of the guard stops him and the work piece is pulled out from the other side. In this way it is impossible for either hand of the operator to come anywhere near the whirling cutter while at the same time the workpiece is held firmly, with uniform pressure, against vibration or chattering. The pivotal connection at **25**, it will be observed also allows the leading edge of the combined guard and hold-down to dip downwardly in accordance with the depth setting of the front table **11**. The trailing edge of the guard is rounded as at **34** to provide an adjustable fulcrum point for the tilting movement at the beginning and end of the planing operation.

For trimming the edges of boards and particularly the edges of small strips, the guard **22** is provided with a curved inner flange **35** which progressively increases in height from the point **36** at the trailing edge of the guard to the point **37** at the leading edge. The peripherial surface **38** of the curved flange is preferably perpendicular to the table surface and parallel to the vertical surface of the guide fence **20** whereby a strip of material to be planed may be inserted between it and the fence and firmly held from wobbling.

The flange **35** purposely has been made high enough not only to give uniform support to relatively wide strips inserted for edge planing but also for the purpose of presenting a substantially rigid interference member to prevent an operator from using his hands to hold small strips in engagement with the cutter. For holding small strips there is provided an auxiliary hold-down mechanism **39** which may be positioned between the flange and fence and utilized to hold the workpiece down. Figure 3 illustrates the small work hold-down mechanism most clearly which comprises a spring retracted curved and polished shoe **40** suspended at the lower end of a shaft **41**. The shaft passes through a bearing **42** formed in a pivotally mounted lever **43**, and is provided at its upper end with a recessed finger element **44**. A coiled spring **45** interposed between the finger element and the bearing **42** normally maintains the plunger in a retracted position. The plunger arm **43** is pivoted at its other end to a swivel stud **46** carried by the guard member **22** near the inner edge thereof and so located from the center of the guard that the plunger end **40** normally overlies the cutter with the finger element conveniently within reach of the operator's thumb when grasping the main hold-down handle **31**.

When using the auxiliary hold-down, the plunger is positioned between the surface of the curved flange **35** and the surface of the jointer guide fence, and depressed by the operator until contact is made with the workpiece. Thereafter, a pressure is exerted upon the work sufficient to maintain the work in cutting relation with the cutter without vibration or chattering effects, the main guard member itself holding the work between the flange **35** and the fence **20**.

The forward portion of the flange surface **38** curves away from the guide fence and cooperates with the fence in forming a wedge shaped opening B leading to the cutter. In this instance, as in the case of the wedge opening A previously mentioned, the wedge shaped opening terminates in advance of the cutter and in any event is so narrow at the danger zone, that it is impossible for an operator, in feeding the stock to the cutter, to accidently bring his fingers into the opening or anywhere near the cutter without first striking and being stopped by some portion of the high guard **22**. When thin small strips are not being planed the auxiliary hold-down device **39**, may be elevated slightly, turned, and dropped inside of the flange **35** out of the way.

Thicker strips or boards may be edge planed in a similar manner, that is, by holding the board against the face of the fence and feeding it into the wedge shaped entrance B, the guard member **22** moving laterally as the stock approaches the cutter. The pivotal mounting of the small hold-down shoe **40**, allows the latter to be swung laterally to its proper position over the cutter. As the work piece passes from under the shoe **40**, the latter is restrained from being depressed into the cutter first by the stop provided by the pivotal stud **46** and also by the spring **45** which in its fully compressed condition stops the shoe **40** short of the cutter.

Lateral movement of the guard in the plane of the table is permitted by the pivotal connection provided between the support **28** and the bracket **29**, previously mentioned, and which comprises a vertically arranged stud **29***a* fixed to the bracket **29** and rotatably mounted in the support **28**. The stud **29***a* is slotted at its outer end to receive one end of a spiral spring **29***b*. The other end of the spring is hooked into a notch in a notched cover member **29***c*, and the whole mechanism held in place by lock nuts **29***d*. The tension of the spring may be adjusted by loosening the lock nuts and turning the notched plate until a particular notch **29***e* thereof coincides with a fixed rib **28***a* upon the support **28**. The spring **29***b* is wound so that the normal tendency thereof, when loaded, is to urge

the guard 22 into abutting contact with the guide fence 20 thus normally maintaining the cutter opening 19a and cutter 19 completely covered at all times.

A similar spring arrangement is provided upon the horizontal pivot shaft 30. In this case however, the spring 30a is wound so that its normal tendency under load is to counterbalance the weight of the guard and arm members 22 and 23 so that the guard may be elevated easily and will not fall with too severe an impact when the workpiece is withdrawn from underneath.

From the foregoing it will be evident that a combined guard and hold-down device is provided that may conveniently and easily be applied to new or existing jointers, and a device that keeps the cutter covered in all stages of face planing operations as well as in edging operations and simultaneously acts as a workpiece hold-down, through the intermediary of a guard, at the start and ending of the cut as well as during the cut. The result of its use being the uniform planing of pieces of stock of random lengths, widths and thicknesses and without the slightest danger usually surrounding and attending the use of such machines.

Without further analysis, the foregoing will so fully reveal the gist of this invention that others can, by applying current knowledge, readily adapt it for various utilizations by retaining one or more of the features that, from the standpoint of the prior art, fairly constitute essential characteristics of either the generic or specific aspects of this invention and, therefore, such adaptations should be, and are intended to be, comprehended within the meaning and range of equivalency of the following claims.

Having thus revealed this invention, I claim as new and desire to secure the following combinations and elements, or equivalents thereof, by Letters Patent of the United States:

1. A machine tool having a work table provided with an opening and a rotatable cutter member operating through the opening, combining an imperforate member superimposed on said table and overlying said opening, said member having a portion thereof, in advance of the opening in the table, inclined away from the table and cooperating with the table to provide a wedge shaped entrance for the workpiece leading to the cutter and effective to elevate said member as the workpiece is fed to the cutter; means maintaining said guard member in guarding relation with said cutter in all stages of the cutting operation comprising an arm member having one end pivoted to said member at a point forward of said opening, and its other end pivoted to the work table, the axes of both of said pivots lying in planes paralleling the plane of the working surface of the table; and operator operated means provided by said member at a point located rearwardly of said first mentioned pivot for exerting a pressure uniformly across the width of the workpiece in the region of the cutter to maintain the piece firmly against the cutter, said means being so positioned with respect to said pivot that a slightly greater pressure is exerted on the workpiece at the rear side of said opening.

2. A work hold-down guard for a jointer machine provided with a work table having an opening therein through which a cutting tool operates and a guide fence for guiding the work past the cutter, comprising a member normally adapted to engage the work table at opposite sides of the cutter opening and to bridge said opening, said member being substantially coextensive with the cutter in width and having an inner flange adapted to abut against said guide fence, the forward portion of said flange being curved away from said fence and effective to move the said member laterally upon engagement thereof by the workpiece; means mounting said guard member for lateral movement over the cutter opening; and means carried by said member operative between said fence and the flange on said member for maintaining the workpiece in engagement with the cutter as the workpiece is guided past the cutter between the said flange and the guide fence of the jointer.

3. A machine tool combining a work table having an opening therein; a rotatable cutter operating through said opening; a guard member movable in a plurality of transverse planes normally covering said cutter and comprising a guard member proper overlying said cutter and normally engaging said table at both sides of the cutter opening; an arm member pivoted to said guard, the axis of the pivot paralleling the plane of the table; means for pivotally mounting the other end of said arm to the work table on axes respectively parallel and transverse to the plane of the working surface of the table, whereby said guard member proper may be moved selectively away from the table over said opening while retaining its parallel relation with respect to the plane of the table or laterally in a plane parallel to the plane of the work surface of the table; manually operable means provided by the guard member proper for controlling said movements; and means normally tending to urge said guard into guarding relation with the cutter.

4. A machine tool having work tables relatively adjustable in substantially parallel planes and a cutter opening therein adapted to present a rotatable cutter to a workpiece combining a guard member for said cutter comprising a movable member provided with spaced under-surfaces adapted normally to cover the cutter opening, said guard member having a portion in advance of the cutter opening, inclined away from the work surface of the table and adapted to cooperate with the table in forming a wedge shaped work-receiving opening leading to the cutter and effective to tilt the guard member as the workpiece is passed thereunder; and vertically movable means pivotally supporting said member on an axis parallel to the plane of said tables, said spaced under surfaces of said member being adapted normally to contact the surfaces of said tables at opposite sides of the cutter opening in all positions of relative adjustment of said table.

5. A hold-down guard for jointing machines having front and rear work tables with an opening between the adjacent ends of the said tables through which a rotatable cutter operates comprising a movable member superimposed upon said tables and bridging said opening, said member being movable upwardly in planes paralleling said tables and provided with an inclined leading edge adapted to be engaged by the workpiece and effective to tilt said member as the workpiece is moved thereunder; means maintaining said member in covered relation with said opening throughout the passage of the workpiece thereunder; and a hand grasp provided by said member and located centrally of the upper surface thereof for manually exerting a pressure through said member on the workpiece therebeneath to hold the workpiece firmly against the cutter and tables at both sides of the cutter opening.

6. A jointer machine combining relatively adjustable front and rear work tables having a cutter opening therebetween; a guard for said opening comprising a member of a width substantially coextensive with the width of the jointer tables adapted normally to rest upon the front and rear tables of the machine and to bridge the cutter opening therebetween said member having its forward end inclined away from the table and effective to elevate said member as the workpiece is passed thereunder toward the cutter; an arm member pivotally supporting said guard member pivoted to the machine frame for maintaining said guard normally in cutter guarding relation over the cutter opening and normally in contact with said front and rear tables; and means normally tending to counterbalance the weight of said guard member during its vertical movements.

7. A cutter guard for a conventional jointer machine comprising an elongated arm member having a horizontally disposed hub at one end thereof; a shaft member located below the horizontal plane of the working surface of the jointer table and fitted to the hub of said arm; a bracket member for supporting said shaft; a second shaft provided by said bracket and arranged upon a vertical axis; a support provided by the jointer table for rotatively seating said second shaft; a cutter guard member; means mounting said cutter guard member to the other end of said arm; said bracket and shaft members being operative to allow movement of said guard laterally to accommodate a narrow piece of stock between the guard and the conventional jointer guide fence; and a vertically adjustable means provided by said guard member operable manually to exert a pressure upon the narrow workpiece in the region of the cutter as it passes between the edge of the guard and the guide fence to maintain proper cutting action as the workpiece is fed past the cutter.

8. A combined cutter guard, guide and work hold-down for a jointer machine combining a laterally movable guard member superimposed upon the jointer table and overlying the cutter and cutter opening therein, said member being of a width coextensive with the width of the normally exposed portion of the cutter and being provided at its inner edge with a workpiece-engaging flange diverging away from the conventional jointer guide fence to provide a work receiving entrance for a narrow workpiece and an inclined surface effective to move the guard member laterally as the narrow workpiece is advanced toward the cutter; a manually operable presser foot operative outside of the guard member between said flange and the guide fence for exerting a pressure upon a narrow workpiece in the region of the cutter as the workpiece is moved across the jointer cutter; and means mounting said presser foot for lateral movement relative to the guard member whereby said presser foot may be maintained effective in said region irrespective of the lateral position of the guard proper as determined by the width of the workpiece passing between the said flange and guide fence.

9. A guard for the knives of a jointer machine having front and rear work tables and a cutter opening therebetween, comprising a vertically movable member of a width substantially coextensive with the width of the knives of the jointer adapted normally to rest upon the workpiece on the front and rear tables of the machine and bridge the cutter opening therebetween, the under surface of said member being relieved in the region of the cutter opening to accommodate peripheral portions of the cutter, and having its forward end inclined upwardly from the work table thereby forming an entrance bevel for the workpiece effective to elevate the guard as the workpiece is passed thereunder; an arm member for restraining said guard member against endwise shift relative to its position over the cutter opening between the tables; means pivotally mounting said guard member to said arm member, the axis of the pivot being horizontally disposed; and a manually operable hand grasp on said guard member for rocking said guard about its pivot thereby to maintain its under surface coplanar with the top surface of the workpiece as the guard is elevated and the workpiece is passed thereunder and for manually exerting a downward pressure upon the workpiece in the region of the jointer cutter and apportioning the pressure to opposite sides of the cutter opening.

10. A jointer machine having relatively adjustable front and rear work tables and an opening therebetween through which a rotatable cutter is adapted to operate combining, a guide fence member adjustable over said tables in the direction of the axis of the cutter; a movable guard member superimposed on said tables and overlying the cutter opening; an arm member pivoted at one end to the machine frame and having a pivotal connection at its other end with said guard member for restraining said guard member against endwise shift relative to the table and cutter opening; said guard member being provided with an upwardly inclined leading edge forming an entrance for the workpiece as it is moved thereunder toward the cutter, and with a recess at its under surface to accommodate peripheral portions of the cutter, said recess extending from side to side of the guard member in the general direction of the cutter axis and progressively increasing in extent to permit lateral swing of the guard about the pivot of said arm as determined by the adjustment of the guide fence or width of the workpiece without interference with the cutter blades, said pivoted guard member being adapted to tilt about its floating pivotal connection provided by the said arm and normally to contact with said tables at both sides of the cutter opening in all positions of relative adjustment of the said tables; and a hand grasp carried by the upper surface of the guard member for manually exerting pressure upon the workpiece as it passes under the guard and for apportioning the pressure at both sides of the cutter to maintain the workpiece firmly in engagement therewith.

WILLIAM FERDINAND OCENASEK.