Dec. 2, 1952 W. L. GASKELL 2,619,997

JOINTER AND PLANER

Filed March 22, 1947 4 Sheets-Sheet 1

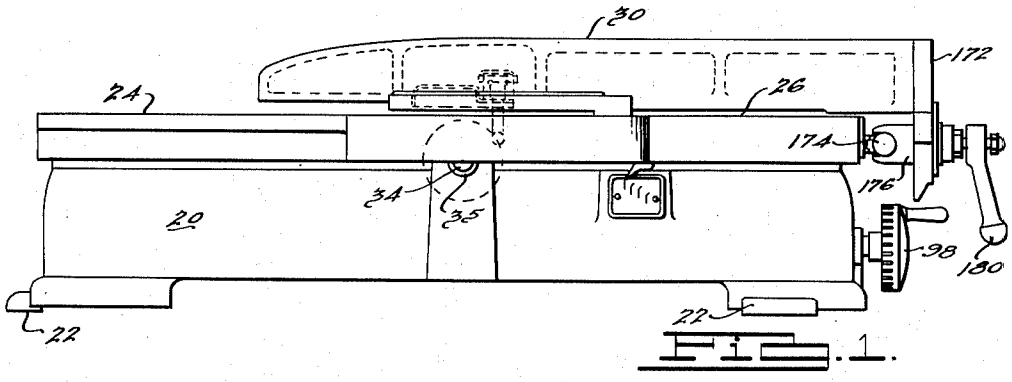


Fig. 1.

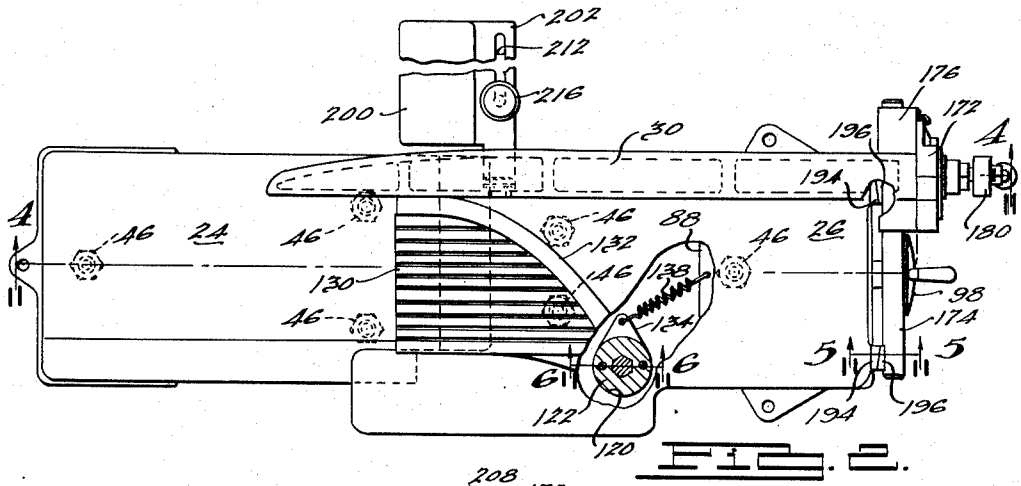


Fig. 2.

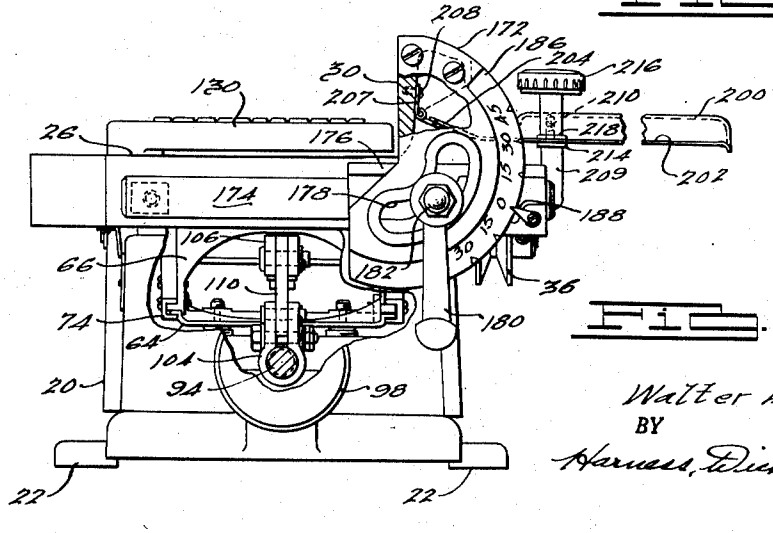


Fig. 3.

INVENTOR.

Walter L. Gaskell.

BY

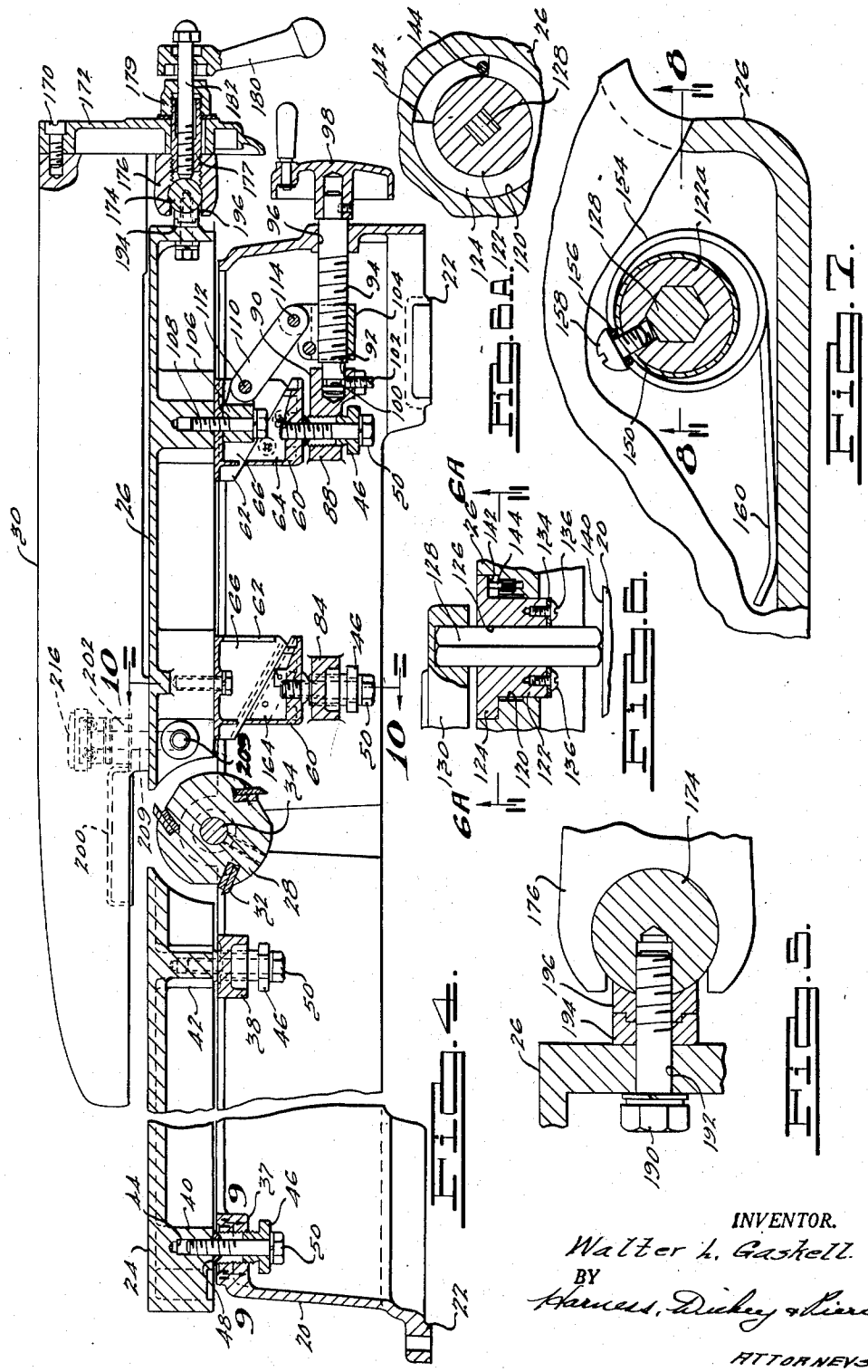
Harness, Dickey & Pierce.

ATTORNEYS.

Dec. 2, 1952 W. L. GASKELL 2,619,997

JOINTER AND PLANER

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INVENTOR.
Walter L. Gaskell.
BY
Harness, Dickey & Pierce
ATTORNEYS.

Dec. 2, 1952 W. L. GASKELL 2,619,997

JOINTER AND PLANER

Filed March 22, 1947 4 Sheets-Sheet 3

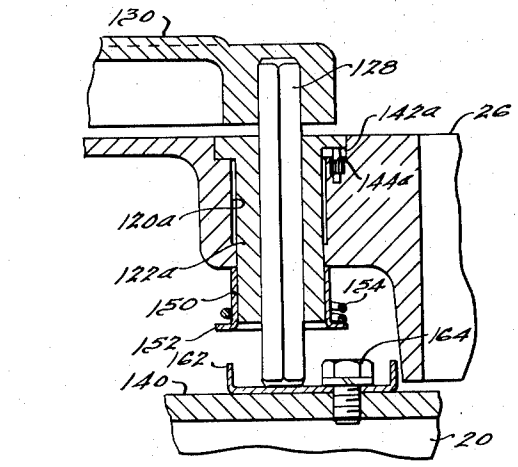


Fig. 8.

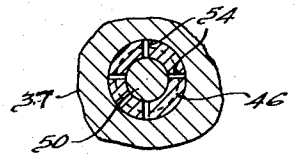


Fig. 9.

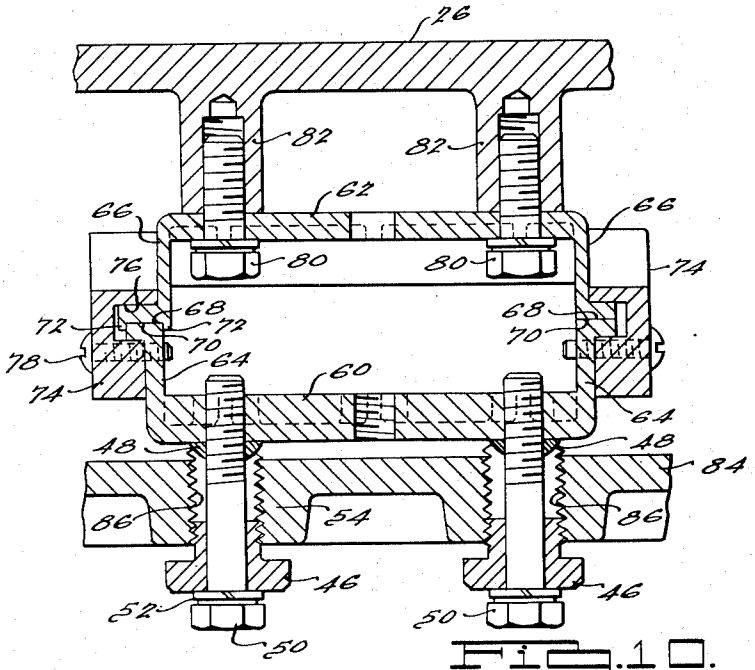


Fig. 10.

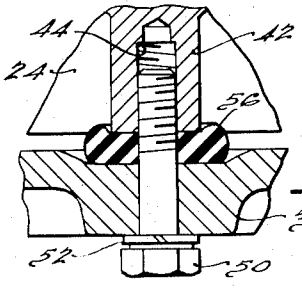


Fig. 12.

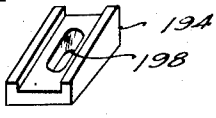


Fig. 11.

INVENTOR.
Walter L. Gaskell.
BY
Harness, Dickey & Pierce.
ATTORNEYS.

Dec. 2, 1952 W. L. GASKELL 2,619,997

JOINTER AND PLANER

Filed March 22, 1947 4 Sheets-Sheet 4

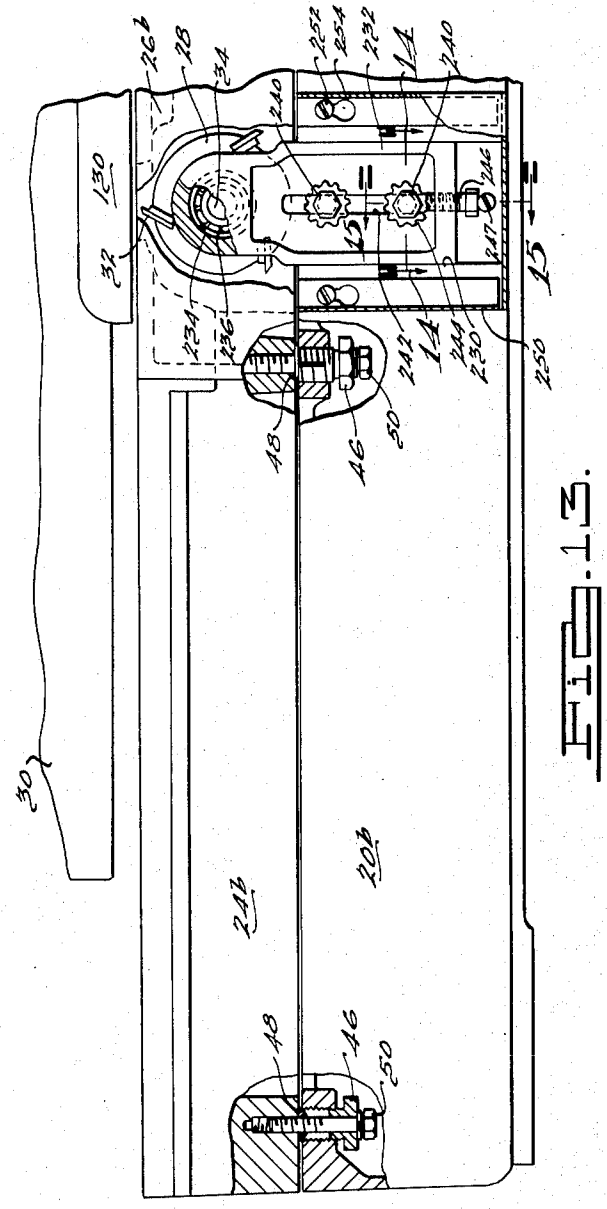


Fig. 13.

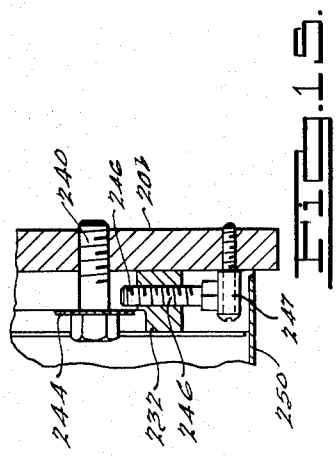


Fig. 15.

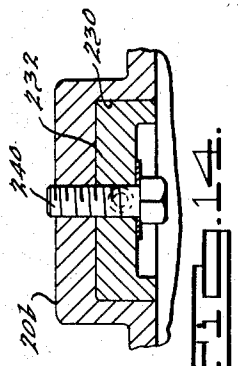


Fig. 14.

INVENTOR.
Walter L. Gaskell.
BY
Harness, Dickey & Pierce
ATTORNEYS.

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UNITED STATES PATENT OFFICE

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JOINTER AND PLANER

Walter L. Gaskell, Ypsilanti, Mich., assignor to King-Seeley Corporation, Ypsilanti, Mich., a corporation of Michigan

Application March 22, 1947, Serial No. 736,560

10 Claims. (Cl. 144—129)

1

This invention relates to jointers and planers, hereinafter referred to as jointers for ease in description, and particularly to a type thereof that is preeminently suited for use in the home workshop although not restricted to such limited use.

Objects of the invention include the provision of a jointer of new and novel construction permitting great accuracy in the relation of various parts thereof and capable of being manufactured at a minimum of cost; the provision of a jointer of rugged construction permitting a high degree of misuse without materially affecting the accuracy of the same; the provision of a jointer in which the tables thereof may be accurately aligned with one another at a minimum of manufacturing expense; the provision of a jointer in which the tables may be accurately located with respect to each other and with respect to the cutting edges of the cutter in the simple and effective manner; the provision of a jointer having a novel means for adjusting the position of the tables with respect to the base so as to enable the tables to be accurately aligned with one another; the provision of a jointer having novel means for adjustably mounting a fence guide bar thereon so as to enable it to be brought into accurate perpendicularity with respect to the axis of the cutter longitudinally of the jointer; the provision of a jointer having a guard for that portion of the cutter projecting on the inoperative side of the fence and so constructed and arranged as to provide an anchor or brace for the free end of the fence thereby to prevent it from yielding in use; the provision of a jointer having novel form of cutter guard for that portion of the cutter on the operative side of the fence; the provision of a cutter guard for a jointer as last described including means for maintaining the cutter guard at a predetermined height with respect to the rear table of the jointer regardless of the adjusted height of the front table; the provision of a cutter guard for a jointer spring pressed towards operative position at all times and so constructed and arranged as to permit substantially instantaneous removal and replacement; the provision of a jointer in which the movable table is mounted on pairs of wedges or dovetails in which one of each pairs is fixed with respect to the base, means are provided for adjusting the cutter into parallelism with the plane of the upper side of the movable table, and the fixed or rear table is adjustable mounted on the base of the jointer so as to enable it to be brought into parallel relation with respect to the surface of the movable table; and the provision of a

2

jointer having new and useful details of construction.

The above being among the objects of the present invention the same consists in certain novel features of construction and combinations of parts to be hereinafter described with reference to the accompanying drawings, and then claimed, having the above and other objects in view.

In the accompanying drawings which illustrate suitable embodiments of the present invention and in which like numerals refer to like parts throughout the several different views.

Fig. 1 is a side elevational view of a jointer embodying features of the present invention;

Fig. 2 is a partly broken plan view of the jointer shown in Fig. 1;

Fig. 3 is a partially broken end view of the jointer shown in the preceding views, taken as looking from the right-hand end of Fig. 1;

Fig. 4 is an enlarged vertical sectional view of the jointer shown in the preceding views taken on the line 4—4 of Fig. 2;

Fig. 5 is an enlarged fragmentary transverse sectional view taken on the line 5—5 of Fig. 2 and showing in greater detail the means employed for mounting the fence guide on the base;

Fig. 6 is an enlarged, fragmentary, partly broken vertical sectional view taken on the line 6—6 of Fig. 2, and illustrating the means for mounting the outer cutter guard;

Fig. 6a is a fragmentary sectional view taken on the line 6a—6a of Fig. 6;

Fig. 7 is an enlarged, fragmentary, partly broken, partly sectioned plan view of a modified form of cutter guard support;

Fig. 8 is a fragmentary, partly broken, vertical sectional view taken on the line 8—8 of Fig. 7;

Fig. 9 is an enlarged, fragmentary, transverse sectional view taken on the line 9—9 of Fig. 4;

Fig. 10 is an enlarged, fragmentary, transverse vertical sectional view taken on the line 10—10 of Fig. 4 to better illustrate the mounting of the movable table and the base;

Fig. 11 is a perspective view of one of the wedge block spacers employed in connection with the fence guide bar;

Fig. 12 is a fragmentary vertical sectional view taken through a modified form of mechanism for mounting the tables on the base;

Fig. 13 is a partly broken, fragmentary, side elevational view of a modified form of jointer construction having a vertically adjustable cutter;

Fig. 14 is an enlarged fragmentary transverse

sectional view taken on the line 14—14 of Fig. 13; and

Fig. 15 is an enlarged fragmentary vertical sectional view taken on the line 15—15 of Fig. 13.

Generally speaking the jointer of the present invention includes the same main elements as any conventional jointer. For instance it includes a base 20, shown as being provided with integral foot portions 22 adapting it to be supported on a bench or other suitable supporting structure, a so-called fixed rear table 24 and a so-called front and vertically adjustable table 26, together with a transverse cutter assembly indicated generally at 28 mounted between the opposed ends of the table 24 and 26. It is also provided with a so-called fence 30 projecting above the upper face of the tables 24 and 26 and extending longitudinally thereof in perpendicular relationship with respect to the axis of the cutter 28 so as to form a guide for the work being operated upon.

In most jointers and particularly those constructed for use in home workshops, it is customary to form the rear table 24 integrally with the base, with the result that unless the opposite ends of the cutter 28 are independently vertically adjustable great care must be exercised in machining the upper surface of the rear table into exact parallelism with the axis of the cutter, and usually requiring machining of the working faces of both the front and rear tables when assembled into conformity with each other and with the axis of the cutter. In accordance with the present invention the rear table 24 is formed separately from the base 20 and its upper surface is finally machined before application thereto. It will be understood that in the construction illustrated in Figs. 1 to 11 inclusive the cutter 28 rotates about a fixed axis on the base 20 and is incapable of vertical adjustment. In such case it will be appreciated that in mounting the table 24 on the base 20 the upper surface of the table 24 must not only be brought into parallelism with the axis of rotation of the cutter 28, but it must be so vertically positioned that the plane of its upper surface is substantially tangent to the cylinder of rotation, which the cutting edges of the cutter blades 32 of the cutter 28 describe in rotation about the axis of the shaft 34 on which the cutter 28 is mounted. The opposite ends of the shaft 34 are mounted in suitable bearings 35 (see Fig. 1), fixed in the opposite side walls of the base 20. At the right-hand side of the jointer, considered as the far side in Fig. 1 and the upper side in Fig. 2, the shaft 34 is provided with a driving pulley 36 (see Fig. 3) adapted to be connected by means of a belt or the like to a suitable driving motor.

In the present case, in order to mount the table 24 in the manner stated and to not only bring it into parallelism with the axis of the shaft 34 but also in a tangent relation with respect to the cylinder rotation defined by the cutting edges of the blades 32, the base 20 has integrally formed therewith at its rear or left-hand end as viewed in Fig. 4 a transverse flange or lug 37, and between it and the cutter 28, and closer to the cutter 28, a cross bar 38. Midway of the width of the table 24 and in vertical alignment with the flange 37, the table 24 is provided with an integrally formed depending boss 40, and, as best brought out in Figs. 2 and 4 in vertical alignment with the cross bar 38, but positioned on opposite sides of the centerline of the table 24, a pair of similar depending bosses 42. Each of the bosses 40 and 42 is provided centrally of the lower face with an upwardly extending blind threaded hole 44 and the flange 36 and the cross bar 38 in vertical alignment with each of these holes 44 is provided with an aligned threaded opening in which a hollow leveling or jack screw or stud 46 is threadably received. As best brought out in Fig. 10, in which the same leveling screws or studs 46 are employed, it will be noted that the upper end of each such screw or stud is formed to provide a concentric spherical seat for complementary reception of a partially spherical washer 48 having a flat upper face arranged in flat contacting, and therefor supporting, relationship with respect to the lower face of the corresponding boss 40 or 42.

A locking screw 50 rotatably and slidably projects up through each adjusting stud or screw 46 and its upper end threads into the corresponding opening 44. Preferably a lock washer 52 is interposed between the head of the screw 50 and the head of the adjusting screw 46 so as to prevent inadvertent displacement between these two screws once their adjusted position is established. To further hold these parts and particularly the adjusting screw 46 against movement once its adjusted position has been established, the upper ends of the adjusting screws 46 are diametrically slotted at right angles to each other as indicated at 54, and as best brought out in Figs. 9 and 10, so that when the locking screws 50 are pulled down tightly the force tending to clamp the washers 48 between the table 24 and the upper ends of the screws 46 act to radially spread the upper ends of the adjusting screws 46, and to cause them to securely bind with the cooperating threads in the flange 37 or bar 38, as the case may be.

It will be appreciated from the foregoing that the three screw assemblies described serve to support the rear table 24 from the base 20 and form a three-point support therefor. The adjusting screws 46 may be adjusted so as to raise or lower the table 24 to any desired position within the vertical adjustable range of the screws 46 and, in accordance with well known principles, by suitably adjusting the screws 46. The plane of the upper surface of the table 24 may be tipped in any direction and thus be brought into exact parallelism with the axis of the cutting shaft 34 and/or into exact parallelism with the upper face of the table 26, and once such position is attained, the table 24 may be securely locked in such position by tightening the screws 50.

In the latter connection a modified form of construction is illustrated in Fig. 12 wherein it may be assumed to be applied to the table 24 and the cross bar 38. The same locking screw 50 is employed and in this case projects directly up through the cross bar 38 and is threaded into the opening 44 in the boss 42. Between the lower face of the boss 42 and the upper face of the cross bar 38 a suitable resilient element 56 is interposed, and while in the broader aspects of the invention this may be either a relatively heavy coil spring or a block of resilient material such as rubber, preferably and as shown it comprises a relatively thick washer of rubber or rubber-like material surrounding the screw 50. It is preferably made of a grade of natural or synthetic rubber which will maintain its resiliency over a relatively long period of time even though maintained under a material compressive stress for such period of time.

In the last described form of construction the

block 56 is preferably of a vertical dimension such that in a free state it will locate the table 24 above the highest position which it will normally assume in service, so that in order to bring the upper face of the table down to an operative position the screws 50 must be tightened up to diminish the vertical dimension of the block 56 and place the same under a material vertical load greater than the normal load which may be expected to be applied to the upper surfaces of the table 24 in service. It will be appreciated that with this construction vertical adjustment of the table 24 at the location of each screw 50 is controlled solely through rotation of the screw 50. The same lockwashers 52 are preferably provided under the heads of the screws 50 in this case as in the previous case, but the friction built up between the threads of the screw 50 and the threads of the openings 44, together with the friction between the resilient block 56 and the screw 50 resulting in the squeezing of the block 56 will be ordinarily found to be sufficient to prevent disturbances of the adjustment made. This type of construction has been found particularly suitable for the smaller sizes of jointers.

The table 26, in order to be vertically adjustable, is mounted on the base 20 by means of a pair of dovetail or wedge assemblies best brought out in Figs. 4 and 10. Each assembly comprises a lower member 60 and an upper member 62 having side walls 64 and 66, respectively, and cooperating to form a box-like structure with the corresponding side walls 64 and 66 in edgewise abutting relation with respect to each other with the line of junction disposed at an angle to the horizontal as indicated in Fig. 4, preferably at an angle of 30° to the horizontal. Where the side walls 64 and 66 engage each other, as brought out in Fig. 10, they are outwardly flanged to form relatively wide opposed and contacting slide surfaces 68 and 70 respectively. Additionally, the left-hand surface as viewed in Fig. 10, is provided at each side thereof with a downwardly projecting bead 72 which embraces opposite edges of the flange forming the surface 68 so as to maintain the slide surfaces 68 and 70 in vertical alignment. Inasmuch as the engagement between the members 60 and 62 is relied upon to maintain the lateral position of the table 26 with respect to the base, to further maintain the members 60 and 62 of each assembly against lateral displacement with respect to each other a block 74 is positioned at each side of each assembly and is provided with a central groove or recess 76 which closely embraces the outwardly extending flanges at the surfaces 68 and 70. The blocks 74 are securely fastened to the lower member 64 by means of screws 78, and above the groove 76 the inner faces of the blocks 74 slidably abut against the outer surfaces of the side walls 66, thereby holding the upper member 62 against lateral displacement with respect to the lower member 60. The walls of the grooves 76 in embracing the outwardly turned flanges at the surfaces 68 and 70 slidably embraces the flange for the upper surface 70 so as not to restrict lengthwise movement between these surfaces, and in embracing the flanges as described holds the surfaces 68 and 70 in substantial contact with each other so as to prevent inadvertent vertical separation of the members 60 and 62 and consequent inadvertent upward movement of the front table 26 with respect to the base 20.

The upper member 62 of each dovetail assembly 60 may be secured to the table in any suitable

manner, this being accomplished in the case shown by projecting screws 80 upwardly through the upper wall of the upper member 62 and threading them into depending bosses 82 formed integrally with the table 26.

Particularly where the cutter 28 is vertically adjustable with respect to the base 20 and its ends may be independently adjusted so as to enable its axis to be brought into parallel relation with respect to the upper surface of the table 26, the lower member 60 of each dovetail assembly may be rigidly secured with respect to the base 20. Even where the cutter shaft 34 rotates in bearings fixed with respect to the base, that is, which are not vertically adjustable with respect to the base, it would of course be possible after assembling the table 26 to the base 20 to machine its upper surface to bring it into parallel relationship with respect to the axis of the cutter shaft 34. However, such procedure would involve manufacturing difficulties and increase the cost of production thereof, and accordingly it is preferable in such case to mount the dovetail assemblies so as to permit the same kind of adjustment of the table 26 as heretofore described in connection with the table 24. This last is the construction illustrated in Figs. 1 to 11 inclusive and is accomplished as follows.

The base 20 is provided with a transverse bar 84 formed integrally therewith below the left-hand dovetail assembly and, as best brought out in Fig. 10, such bar at points preferably spaced on opposite sides of the longitudinal centerline of the base and adjacent the sides of the lower member 60 is provided with a pair of threaded openings 86 in each of which an adjusting stud or screw 46 is received. These adjusting screws 46 are identical to those previously described in that they have diametrically slotted upper end portions and the extreme upper ends thereof are formed for complementary reception of the spherical washers 28 which are located above the upper face of the cross bar 84. Screws 50 identical to the screws previously described rotatably and slidably project up through the adjusting screws 46 and thread into the lower wall of the dovetail member 60 thereabove.

Below the forward or right-hand dovetail assembly, as viewed in Fig. 4, a cross bar 88 extends between opposite sides of the base 20 and is preferably formed integrally therewith. In this case a single adjusting screw 46 is threaded upwardly through the bar 88 on the longitudinal centerline of the base and therefore engages the lower member 60 of the corresponding dovetail at the center thereof. Likewise, a locking screw 50 rotatably and slidably projects up through the adjusting screw 46 and threads into the corresponding lower member 60 on the centerline thereof. Thus, the front table 26 through the dovetail assemblies is mounted on the base through three points of support, each of which is vertically adjustable. Thus, by adjusting the three adjusting screws 46 for the table 26, the table 26 may be brought into exact parallelism with the axis of the cutter shaft 34, and by means of the adjusting screws for both tables 24 and 26 the upper faces of both tables may be brought into absolute parallelism with the axis of the cutter shaft 34 and the upper surface of the table 24 may be brought into tangent relationship with respect to the cylinder circumscribed by the cutting edges of the cutter blades 32 of the cutter 28 in rotation, thus establishing the proper relationship

of both tables with respect to each other and to the cutter.

It will of course be appreciated that movement of the table 26 longitudinally of the jointer and acting through the dovetail assemblies is relied upon to raise or lower the table 26 to vary the depth of cut being performed upon a place of work being machined by the jointer. This longitudinal movement of the table 26 is accomplished in the following manner. Referring to Fig. 4, it will be noted that the cross bar 38 is provided centrally thereof with a lug or boss 90 projecting to the right therefrom. The boss 90 is provided in its right-hand face with a cylindrical blind bore 92 preferably positioned on the longitudinal centerline of the base. The bore 92 rotatably receives the inner reduced cylindrical end of a screw 94 projecting through a hole 96 in the right-hand wall of the base 20 where it is rotatably received, and outwardly of such wall is provided with a handwheel 98 suitably fixed thereto. The end of the screw 94 which is received within the bore 92 is provided with an annular groove 100 within the bore 92 and a dog end screw 102 is threaded transversely through the boss 90 and its dog end is received within the groove 100, thus to lock the screw 94 against axial movement without restricting rotation thereof. The screw 102 is locked in position by a suitable lock nut.

Threadably received on the screw 94 is a nut 104. A block 106 is secured to the underside of the top wall of the corresponding upper dovetail member 62 by means of a screw 108. A link 110 is pivotally connected to the block 106 by means of a pivot pin 112 and to the nut 104 by means of a pivot pin 114. The pivot pins 112 and 114 are parallel to each other and arranged with their axes in a plane parallel to the meeting faces 68 and 70 of the dovetail members and transverse to the length of the machine. Thus, upon rotation of the handwheel 98 and screw 94 the nut 104 is caused to travel longitudinally of the screw 94 and, acting through the link 110 and block 106, causes the table 26 to move longitudinally of the base 20, such longitudinal movement acting through the inclined surfaces 68 and 70 of the dovetail assemblies raising or lowering the table 26, depending upon the direction of rotation of the screw 94.

As in conventional constructions, a guard is provided in overlying relationship with respect to the cutter 28 on the operative side of the fence 30 and is automatically pushed out of the way as a piece of work is moved over the tables 24 and 26 in contact with the fence. In this case, however, the guard is mounted in a novel manner so that its lower face is maintained at a constant distance above the surface of the table 24 regardless of the vertically adjustable position of the table 26. It is further constructed and arranged so that it may be substantially instantaneously removed or reapplied to the machine without the necessity of disconnecting any screws, springs or the like. This is accomplished in the following manner. The table 26 at its left-hand side, as viewed from the operating end of the machine, and at a point located toward the operating end of the machine from the cutter 28, is provided with a vertically disposed stepped opening 120 best brought out in Fig. 6. A cylindrical plug 122 provided with an annular flange 124 at its upper end is complementarily rotatably received in the opening 120 as indicated in Fig. 6. The plug 120 is provided with a square axial bore or opening 126 in which a square shaft 128 is vertically freely slidably but non-rotatably received. The upper end of the shaft 128 has fixed thereto the cutter guard 130 which, as illustrated in Fig. 2, extends therefrom into normally overlying relationship with respect to the cutter 28 and is provided with a rounded inner edge 132 which the work is adapted to engage when being fed across the cutter 28, thereby to move the guard out of overlying relationship with respect to the cutter as the work is fed across the cutter.

A sheet metal arm 134 is secured by screws 136 to the lower face of the plug 122 below the corresponding face of the table 26. As illustrated in Fig. 2, a coil tension spring 138 is tensioned between the free end of the arm 134 and the cross bar 38 so as to constantly urge the arm 134 and consequently the plug 122 and guard 130 in a clockwise direction of rotation as viewed in Fig. 2. As best brought out in Fig. 6, the base 20 immediately below the post 128 is provided with a surface 140 upon which the lower end of the post rests, thus to hold the lower face of the guard 30 vertically spaced from the upper face of the table 24 by a predetermined distance, and because the post 128 is vertically slidable in the plug 122, this last spacing will be maintained regardless of the vertically adjusted position of the table 26.

Means are preferably provided to prevent the guard 130 from swinging in a clockwise direction under the influence of spring 138 beyond a position corresponding with a position of the fence 30 at its extreme right-hand position on the machine when viewed from the operating end thereof. In the case shown, this is accomplished by forming a notch or recess 142 in the underside of the flange 124, as brought out in Figs. 6 and 6*a*. As indicated in this latter figure the notch 142 is of an angular extent of approximately 90° about the axis of the plug 122. A pin 144 is secured, as by a drive fit, in the shoulder formed between the stepped portions of the opening 120 and projects upwardly into the notch 142. When the guard 130 is in its extreme position of rotation in a clockwise direction about the axis of the opening 120 the pin 144, as illustrated in Fig. 6*a*, contacts one end of the notch 142 and limits further movement in this direction under the influence of the spring 138. By this means the guard 130, when it is desired to remove it for any purpose whatever, is simply grasped by the hands and lifted vertically, withdrawing the post 128 with it out of the plug 122.

The plug 122 will not be lifted when the post 128 and guard 130 are lifted, inasmuch as the projecting end of the arm 134 underlies the lower face of the associated portion of the table 26 and acts to hold the plug 122 against vertical withdrawal, nor will the tension on the spring 138 be wholly relieved. When it is desired to replace the guard 130 the lower end of the post 128 is reinserted into the opening 126 in the proper rotatable position, and simply pressed downwardly until its lower end strikes the surface 140 at the base 20. To facilitate the assembly of the post 128 to the plug 122 when the fence 30 is in any position except its extreme right position, as viewed from the operating end of the machine, the post 128 is preferably of such length that its lower end may be introduced into the bore 126 of the plug 122 when the guard 130 partially overlies the upper edge of the fence 30, and in such case as soon as this is done the guard may be swung in a counterclockwise direction until it clears the fence 30, and then be

pushed downwardly to its normal operative position.

A modified form of the last described mounting for the guard 130 is shown in Figs. 7 and 8. In this case, and as brought out in Fig. 8, the table 26 is similarly provided with a stepped opening 120a, corresponding with the opening 120 of the first described construction, and similarly receives a flanged plug 122a, corresponding with the plug 122 first described. The lower face of the flanged end of the plug 122a is notched out as at 142a the same as in the first described construction, and a pin 144a, corresponding to the pin 144 of the first described construction, is provided in the same cooperating relationship with respect thereto to limit the rotatable movement of the guard and the plug 122a. Instead of using a tension spring to rotate the plug 122a as in the first described construction, in this case the lower end of the plug 122a projects downwardly below the associated lower face of the table 26 where it is surrounded by a sheet metal sleeve 150 terminating at its lower end in an outwardly turned flange 152. A torsion spring 154 surrounds the sleeve 150 and, as brought out in Fig. 7, its upper free end is turned into an eye 156 which receives a screw 158 and which in turn projects through the sleeve 150 and threads into the plug 122a so as to anchor such free end of the spring to the plug 122a. The screw 158 in projecting through the sleeve 150 also serves to lock the sleeve 150 to the plug member 122a and in abutting against the overlying surface of the table 26 thus serves to lock the plug 122a against vertical withdrawal from the table 26 when the guard 130 and post 128 are raised therefrom. The remaining free end of the spring 154 is extended as at 160, shown in Fig. 7, and bears against a side wall of the table 26 so as to maintain the spring 154 under a predetermined torsion thereby to constantly urge the guard 130 in a clockwise direction of rotation as viewed in plan view. As in the first described case, the lower end of the post 128 is adapted to engage the base 20 so as to maintain the guard 130 at a constant spacing above the upper surface of the table 24, but in this case a sheet metal member 162, shown in Fig. 8, is secured to the table 20 below the post 128 by means of a screw 164, and the lower end of the post abuts the member 162 instead of directly abutting the base 20.

The fence 30 is generally of conventional construction and comprises an elongated blade-like element as shown, fixed at its rear end by screws such as 170 to the forward face of a supporting member 172 mounted for sliding movement along a transverse cylindrical guide bar 174 extending horizontally across the operating end of the table 26. This last is accomplished by means of a member 176 which surrounds the guide bar 174, which member is slotted through its forward face so as to permit passage of the member 176 over the supports for the bar 174 and which supports will hereinafter be described in detail. A sleeve member 177 is threadably received at one end by the member 176 and more or less loosely projects through an arcuate slot 178 (Fig. 3) in the member 172 in which it is rotatably and slidably received, and rearwardly of the latter receives a nut member 179 thereon which may be tightened by a wrench or handle 180 to lock the end member 172 against movement with respect to the member 176.

The sleeve 176 is internally threaded and receives therein a screw member 182 which may also be operated by the handle 180 to lock the member 176 and therefore the member 172 and fence 30 against movement axially of the guide rod 174. The lower edge of the fence 30, as brought out in Fig. 4, rests on the upper surface of the table 26 at a point in axial alignment with the axis of curvature of the arcuate opening 178 in the member 172 and thus serves as a fulcrum point about which the fence 30 may be pivoted along a line extending longitudinally of the machine. Also, in accordance with the conventional practice, the rear face of the member 172 is provided with a scale 186 cooperating with a pointer 188 for enabling the angularity of the operative face of the fence 30 with respect to the plane of the tables 26 and 24 to be visually determined.

In accordance with the present invention, the guide bar 174 is mounted on the table 26 in a new and novel manner which permits ready adjustment thereof so as to bring the operative face of the fence into exact perpendicular relationship longitudinally of the machine with respect to the axis of rotation of the cutter 28. This is accomplished as best brought out in Figs. 2 and 5. As brought out in these figures the opposite ends of the guide bar 174 are each secured to the rear edge of the table 26 by means of a screw 190. Each screw 190 projects outwardly through and is closely received in a suitable opening 192 in the rear edge of the table 26, through a pair of adjusting spacer members 194 and 196, and threads into the bar 174.

The spacer 194 is provided with an outer face adapted for flat contacting relationship with the rear edge face of the table 26, and the spacer 196 is provided with a curved outer face received in complementary relationship with respect to the curved periphery of the bar 174. The opposed and contacting faces of the spacers 194 and 196 are stepped as indicated in Fig. 5 to prevent relative rotation between them, and the spacers 194 and 196 as brought out in Fig. 2, are tapered in thickness in the opposite directions so as to act as wedges so that upon relative sliding movement in a direction longitudinally of the guide bar 174 their combined or effective thickness in spacing the guide bar 174 from the rear edge of the table 26 may be varied. The hole in the spacer 196 closely receives the screw 190, but the hole 198 in the spacer 194 through which the screw 190 projects, as brought out in Fig. 11, is elongated in the direction of the guide bar 174 to permit such relative movement between the spacers. It will be noted from Fig. 2 that the spacers 194 at opposite sides of the table 26 are disposed with their contacting faces at opposite angles to each other in the construction shown, although it will be appreciated from the following description that even though they are disposed at the same angle their adjusting function will still be preserved.

In practice, the guide bar 174 is mounted in the manner shown, the fence 30 is mounted thereon, and then suitable gage means are provided to indicate whether the operative face of the fence 30 is in perpendicular relationship with respect to the axis of the cutter 28, and if not, the spacer 194 at one end or the other of the guide bar 174 is shifted longitudinally of the guide bar 174, while its corresponding screw 190 is loosened, until the operative face of the fence 30 is in the desired perpendicular relationship with respect to the axis of the cutter 28, whereupon the screws 190 are firmly drawn into place, thus locking the guide bar 174 in a position to hold the fence in

its desired final position with respect to the axis of the cutter 28. By this means the need of accurate machining of the rear face of the table 26 and seats for the guide bar 174 is eliminated, yet the guide bar 174 may be quickly and easily adjusted upon assembly to the table 26 to insure accurate placement of the fence 30 with respect to the axis of the cutter 28.

It will be appreciated that when the fence 30 is shifted to the left, when viewed from the operating end of the jointer, a greater or lesser extent of the cutter 28 will project beyond the right-hand side of the fence and offer a hazard unless covered or enclosed. For the purpose of providing a guard for such portion of the cutter 28, a sheet metal guard 200 is provided. The main portion of the guard 200, as best brought out in Fig. 4, is made of inverted channel section in order to give it strength and rigidity, but the right-hand edge thereof, as viewed in Figs. 2 and 4 is bent horizontally outwardly as at 202. The portion 202 is extended towards the centerline of the machine and its extreme inner end is upwardly bent as indicated at 204 in Fig. 3, and is connected by a hinge indicated generally at 207 in Fig. 3 to the outer or right-hand face of the fence 30 by means of screws 208.

A member 209 (Fig. 4) is fixed with respect to the right-hand face of the table 26 and, as best brought out in Fig. 3, is provided with an upstanding post portion 209 positioned directly below the portion 202 of the guard 200, and is formed at its upper end to provide an upwardly projecting stud 210 which projects upwardly through a slot 212 formed in the portion 202 of the guard 200 in parallel relation with respect to the axis of the cutter, as brought out in Fig. 2. The shoulder which is formed between the post 209 and the stud 210 lies directly below the portion 202 of the guard 200 and is formed as a part of a spherical surface, and receives thereon a washer 214 provided with a complementary spherical surface permitting swiveling action of the washer 214 on the upper end of the part 209. The washer 214 is interposed between the aforesaid shoulder and the lower face of the portion 202 of the guard 200. Threadably received on the stud 210 above the guard 200 is a hand nut 216 and interposed between its lower end and the upper face of the portion 202 is a spherically surfaced washer 218 which cooperates therewith in the same manner as the washer 214 cooperates with the part 209.

It will be appreciated that when the hand nut 216 is tightened down on the stud 210 it acts through the washers 218 and 214 to rigidly clamp the guard 200 to the part 209, which as above described is fixed with respect to the table 26. The part 209 and the washer 214 thus not only serves as a means for supporting the outer end of the guard 200, but in conjunction with washer 218 and the hand nut 216, provides a means by which the guard 200 serves as a brace for the free end of the fence 30 to reinforce it against deflection due to lateral pressure applied to such free end during a planing or joining operation.

It will be observed that when the plane of the operative face of the fence 30 is varied with respect to the plane of the upper faces of the tables 24 and 26 by adjusting it about the axis of the arcuate slot 178, the pivot pin of the hinge 207 will be raised or lowered depending upon the direction and degree of such adjusting movement. The spherical washers 214 and 218 are provided to compensate for this condition inasmuch as under such circumstances they may shift relative to their associated parts to align their opposed flat faces with the plane of the portion 202 of the guard 200 as shifted by such adjustment, and thereby prevent any bending strain from being unnecessarily built up in the guard 200 under such circumstances. It will also be appreciated that when the hand nut 216 is loosened, the fence 30 may be shifted longitudinally of the guide bar 174 under which conditions the relative travel of the stud 210 in the slot 212 will permit the free end portion of the fence to move in accordance with such adjustment without restriction, and that when the hand nut 216 is tightened, the guard 200 will form an effective brace for the free end of the fence in its such adjusted position.

It has heretofore been explained that in cases where the cutter is vertically adjustable on the base, and particularly where the opposite ends of the cutter are independently vertically adjustable, either one of the tables may be rigidly secured with respect to the base, and the adjusting screws 46 and locking screws 50 for such table eliminated. Such construction is illustrated in Figs. 13, 14 and 15, and in this case, as a matter of illustration, it is considered that the adjusting screws under the dovetail assemblies have been eliminated and that the lower members 60 of the assemblies are nonadjustably secured to the cross bars 64 and 68, or to the equivalent thereof. Although the right-hand end of the machine is not shown in Fig. 13, it will be understood that it may be the same as shown in Fig. 4, for instance, but modified so that the screws 50 or the equivalent thereof secure the lower dovetail members 60 in rigid and fixed relation with respect to the cross bars 64 and 68. The construction of the machine shown in Fig. 13, except for the vertical adjustment of the bearings for the cutter, may be considered to be identical to that shown in Fig. 4. In other words, the base 20*b* may be considered to be identical to the base 20 in the first described construction except as changed to accommodate it for the modified cutter supporting arrangement, and the table 24*b* may be considered to be identical to the table 24 first described and mounted on the base 20*b* in identically the same manner, that is by means of adjusting screws 46, locking screws 50 and spherical washers 48. The cutter 28 may be identical to the cutter first described.

In this case, the base 20*b* in vertical central alignment with the axis of the cutter shaft 34 is provided in each of its opposite and outer side faces with a vertically extending rectangularly sectioned groove 230 therein. Vertically slidably received in each groove 230 is a bearing block or carrier 232 accurately guided between the opposite side edges thereof. At their upper ends the bearing carriers 232 are each provided on their inner face with a pocket 234 in which a ball bearing assembly 236 is suitably mounted as by press fit. The cutter shaft 34 at opposite ends of the cutter 28 is received by the inner races of the bearings 236. It will also be appreciated that the bearing carrier 232 on the opposite side of the machine from that shown in Fig. 2 is provided with a central opening of sufficient size to permit the cutter shaft 34 to project therethrough so as to receive a driving pulley on its outwardly projecting end. The bearing carriers 232 are each secured in vertically adjusted position by means of a pair of vertically spaced screws 240 which project through a central vertical slot 242 therein

and thread into the base 20b. Lock washers 244 interposed between the heads of the screws 240 and the bearing supports 232 aid in locking the bearing supports 232 in their vertically adjusted position and against inadvertent movement.

To provide a fine adjustment to the vertical positions of the bearing supports 232, thereby to enable the cutter 28 to be readily adjusted to bring its axis into accurate parallelism with the plane of the upper surface of the table 26b, each bearing support 232 is provided with a centrally located screw 246 threaded upwardly from the lower face thereof. Below the head of the screw 246 a stud or pin 247 is secured to the base 20b, as by threading thereinto, and extends into underlying relation to the head of the screw 246 and serves as a downward stop for the screw and therefore the bearing support 232. Thus, when the screws 240 are loosened, each bearing carrier 232 may be adjusted by rotating the corresponding screw 246 until the corresponding end of the cutter 28 is in the desired position, whereupon the screws 240 may be tightened to lock the corresponding carrier 232 in such position. In such adjustment it will be appreciated that when the screw 246 is threaded downwardly, its head, in bearing against the pin or stud 247, will force the corresponding bearing carrier 232 upwardly, and when turned in the opposite direction the force of gravity acting on the bearing carrier 232 and the cutter 28 will maintain the head of the screw 246 in contact with the pin or stud 247. As indicated in Figs. 13 and 15, a sheet metal housing such as 250 is preferably mounted in overlying relationship with respect to each of the bearing carriers 232 and is removably secured in place by means of screws 252 extending through keyhole slots 254 in such housing and threading into the base 20b.

Formal changes may be made in the specific embodiments of the invention described without departing from the spirit or substance of the broad invention, the scope of which is commensurate with the appended claims.

The cutter guard construction described herein forms the subject matter of my copending application, Serial No. 272,960, filed February 23, 1952, entitled "Cutter Guard."

What is claimed is:

1. In a jointer or the like, in combination, a base, rotatable cutter means disposed transversely of said base intermediate its ends, a table overlying said base on each side of said cutter, said base under one of said tables being provided with three vertically directed openings therein one of which is disposed adjacent one end thereof and approximately on the longitudinal centerline thereof and the other two of which are disposed on the same side of said cutter as the first mentioned opening but in materially closer relationship to said cutter and disposed on opposite sides of said longitudinal centerline in approximate alignment with each other transversely of said base, a hollow screw member threaded upwardly through each of said openings, a spherical washer interposed between the upper end of each of said screw members and said table, and a second screw member rotatably and slidably projecting through each of said hollow screw members and through the corresponding ones of said washers and threading into said table, the upper ends of said screw members being diametrically slotted whereby when said second screws are tightened up the force exerted between said spherical washers and the slotted ends of said hollow screw members tends to spread the ends of said hollow screw members and to lock them in said openings.

2. In a jointer or the like, in combination, a base part, a table part, a pair of dovetailed assemblies spaced longitudinally of said base part from one another interposed between said base part and said table part, each of said dovetailed assemblies including a pair of relatively shiftable members having opposed slidably engaging faces disposed at an angle with respect to the horizontal, means immovably securing one member of each of said assemblies to one of said parts, means securing the other member of one of said assemblies to the other of said parts for vertical adjustable movement with respect thereto, said last mentioned means comprising a screw device disposed approximately on the longitudinal centerline of said base, and means for vertically adjustably supporting the other member of the other of said assemblies on the other of said parts, the last mentioned means comprising a pair of screw devices spaced from one another transversely of said part and on opposite sides of said centerline.

3. In a jointer or the like, in combination, a base, a cutter rotatably mounted on said base about an axis transverse to the length of said base, a table on said base at one side of said cutter, a pair of dovetails interposed between said base and said table spaced from one another longitudinally of said base, each of said dovetails comprising a pair of cooperated members having opposed slidably engaging faces disposed at an angle with respect to the horizontal, means immovably fixing the upper of said members with respect to said table, and means securing the lower of said members to said base for vertical adjustment with respect thereto, said last mentioned means comprising three screw devices interposed between said lower members and said base, one of said screw devices serving to secure one of said lower members on said base and being located approximately on the longitudinal centerline of said base, and the two remaining screw devices serving to secure the other of said lower members to said base and being located on opposite sides of the longitudinal centerline of said base.

4. In a jointer or the like, in combination, a base, a cutter rotatably mounted on said base about an axis transverse to the length of said base, a table on said base at one side of said cutter, a pair of dovetails interposed between said base and said table spaced from one another longitudinally of said base, each of said dovetails comprising a pair of cooperated members having opposed slidably engaging faces disposed at an angle with respect to the horizontal, means immovably fixing the upper of said members with respect to said table, and means securing the lower of said members to said base for vertical adjustment with respect thereto, said last mentioned means comprising three screw devices interposed between said lower members and said base, one of said screw devices serving to secure one of said lower members on said base and being located approximately on the longitudinal centerline of said base, and the two remaining screw devices serving to secure the other of said lower members to said base and being located on opposite sides of the longitudinal centerline of said base, said screw devices each including a vertically directed screw element interposed between said base and said table and means in closely adjacent relationship with respect to each of said

screw elements spacing said table from an adjacent portion of said base.

5. In a jointer or the like, in combination, a base, a cutter rotatably mounted on said base about an axis transverse to the length of said base, a table on said base at one side of said cutter, a pair of dovetails interposed between said base and said table spaced from one another longitudinally of said base, each of said dovetails comprising a pair of cooperated members having opposed slidably engaging faces disposed at an angle with respect to the horizontal, means immovably fixing the upper of said members with respect to said table, and means securing the lower of said members to said base for vertical adjustment with respect thereto, said last mentioned means comprising three screw devices interposed between said lower members and said base, one of said screw devices serving to secure one of said lower members on said base and being located approximately on the longitudinal centerline of said base, the two remaining screw devices serving to secure the other of said lower members to said base and being located on opposite sides of the longitudinal centerline of said base, said last mentioned means each comprising a hollow screw element threaded vertically through a portion of said base and serving to space said table from said base, and another screw element rotatably and slidably projecting up through each of said first mentioned screw elements threading into said base and tending to draw said table toward the corresponding of the first mentioned screw elements.

6. In a jointer or the like, in combination, a base, a cutter, bearings for the opposite ends of said cutter, a bearing support for each of said bearings vertically adjustably mounted on a corresponding side of said base, a table overlying said base on one side of said cutter, vertically adjustable means interposed between said base and said table supporting said table on said base, there being three of said vertically adjustable means, one located adjacent one end of said table approximately on the longitudinal centerline of said base and the remaining two of which are located adjacent that end of said table closest to said cutter, the last two mentioned adjusting means being in approximate alignment with each other transversely of said base and located on opposite sides of said longitudinal centerline of said base, a second table mounted on said base on that side of said cutter opposite the first mentioned table, and a pair of dovetailed assemblies spaced from one another longitudinally of said base interposed between the second mentioned table and said base, said dovetailed assemblies each comprising a pair of superimposed wedge shaped members one of which is fixed with respect to said second mentioned table and the other of which is fixed with respect to said base, and means interconnecting said table and said base for shifting said table longitudinally of said base on said assemblies.

7. In a jointer or the like, in combination, a base, a cutter, fixed bearings for opposite ends of said cutter mounted on said base and providing a fixed axis of rotation for the cutter, a table overlying said base on one side of said cutter, vertically adjustable means interposed between said base and said table and supporting said table on said base, there being three of said vertically adjustable means, one located adjacent one end of said table approximately on the longitudinal centerline of said base and the remaining two of which are located adjacent that end of said table closest to said cutter, the last two mentioned adjusting means being in approximate alignment with each other transversely of said base and located on opposite sides of said longitudinal centerline of said base, a second table mounted on said base on that side of said cutter opposite the first mentioned table and a pair of dove-tailed assemblies spaced from one another longitudinally of said base interposed between the second mentioned table and said base, said dove-tailed assemblies each comprising a pair of superimposed wedged members one of which is fixed with respect to said second mentioned table and the other of which is fixed with respect to said base, and means interconnecting said table and said base for shifting said table longitudinally of said base on said assemblies.

8. In a jointer or the like, in combination, a base, a cutter mounted on said base for rotation about an axis transverse to the length of said base, a front table on said base on one side of said cutter, a rear table on said base on the other side of said cutter, a pair of inclined slide assemblies interposed between said base and said front table and spaced from one another longitudinally of said base, each of said assemblies comprising a pair of cooperating members having opposed slidably engaging faces disposed at an angle with respect to the horizontal, means securing the upper of said members to the front table, means securing the lower of said members to the base, one of said means including vertically adjustable means capable of limited vertical movement to provide assembly adjustments of the front table with respect to the axis of the cutter, there being at least three of said vertically adjustable means, means interconnecting said front table and said base for shifting the table longitudinally of said base on said slidably engaging faces to provide operating adjustments in height of the table with respect to the axis of the cutter, means securing the rear table in fixed position on the base, said last means including vertically adjustable means permitting limited vertical movement of the rear table to provide assembly adjustments of its position with respect to the axis of the cutter, there being at least three of said last mentioned vertically adjustable means.

9. In a jointer or the like, in combination, a base, rotatable cutter means disposed transversely of said base intermediate its ends, a front table and a rear table each overlying said base on opposite sides of said cutter, said base under said rear table being provided with three vertically directed openings therein one of which is disposed adjacent one end thereof and approximately on the longitudinal centerline thereof and the other two of which are disposed on the same side of said cutter as the first mentioned opening and on opposite sides of said longitudinal centerline in approximate alignment with each other transversely of said base, a hollow screw member threaded upwardly through each of said openings, a spherical washer interposed between the upper end of each of said screw members and said table to permit tipping of the table relative to the axes of said openings, a second screw member rotatably and slidably projecting through each of said hollow screw members and through the corresponding ones of said washers and threading into said table, the upper ends of said screw members being diametrically slotted whereby when said second screws are tightened up the force exerted between said spherical

washers and the slotted ends of said hollow screw members tends to spread the ends of said hollow screw members and to lock them in said openings, said screw members serving to fix the rear table in longitudinal operating position on the base while permitting slight tipping of the table at assembly to align it with said cutter means, inclined slide means movably supporting the front table on said base so that it is capable of operating adjustments both longitudinally and vertically with respect to said cutter means, and means acting between the front table and base for moving the front table on said slide means.

10. In a jointer or the like, in combination, a base, rotatable cutter means disposed transversely of said base intermediate its ends, a front table and a rear table each overlying said base on opposite sides of said cutter, said base under said rear table being provided with three vertically directed openings therein one of which is disposed adjacent one end thereof and approximately on the longitudinal centerline thereof and the other two of which are disposed on the same side of said cutter as the first mentioned opening and on opposite sides of said longitudinal centerline in approximate alignment with each other transversely of said base, a screw rotatably and slidably projecting upwardly through each of said openings and threaded into said table thereabove, and means interposed between said base and said table acting to space said table from said base, said spacing means comprising rings of rubber-like material surrounding each of said screws and normally maintained under compression between said base and said table, said screws serving to fix the rear table in longitudinal operating position on the base while permitting slight tipping of the table at assembly to align it with said cutter means, inclined slide means movably supporting the front table on said base so that it is capable of operating adjustments both longitudinally and vertically with respect to said cutter means, and means acting between the front table and base for moving the front table on said slide means.

WALTER L. GASKELL.

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