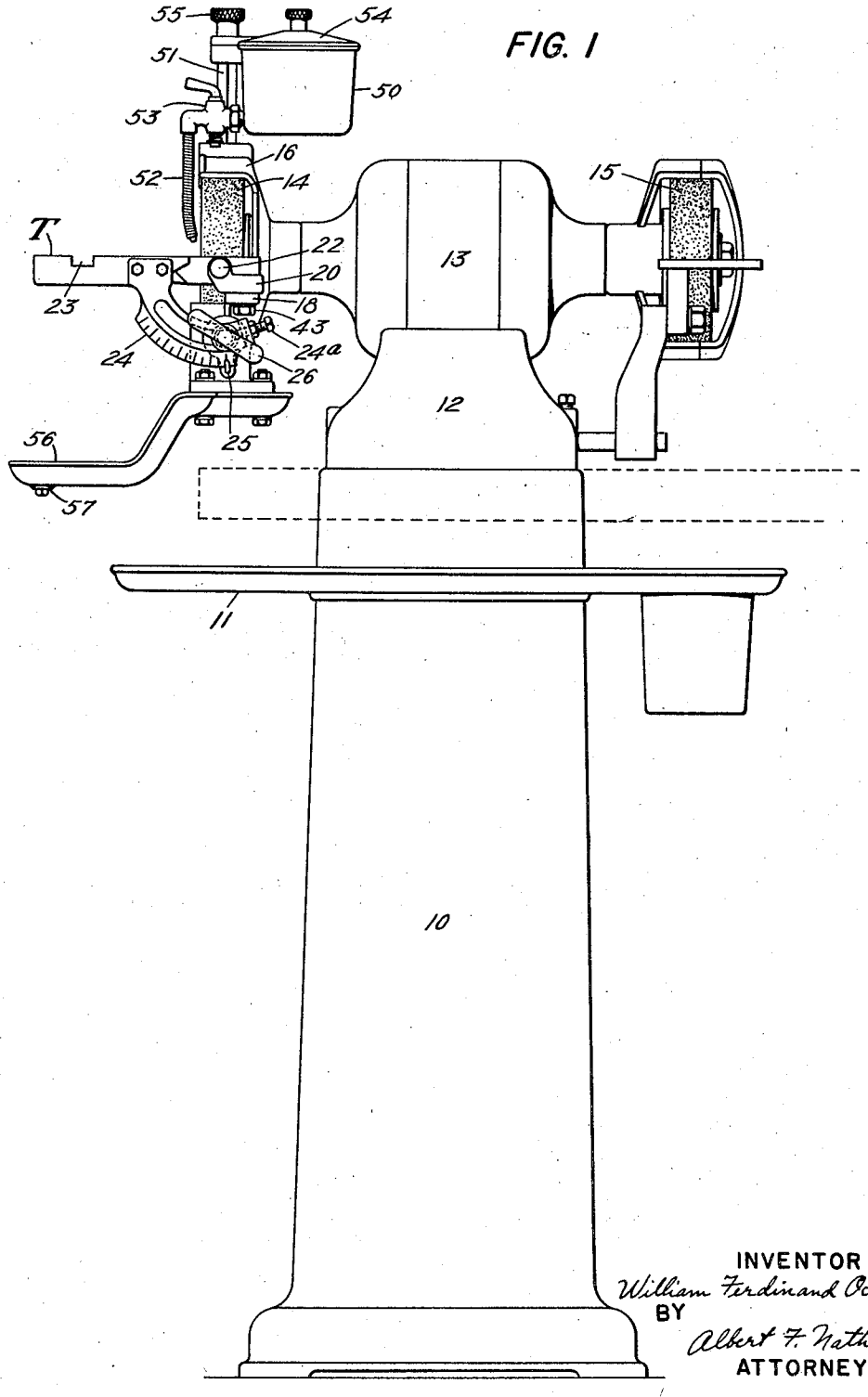
April 4, 1939. W. F. OCENASEK 2,153,502

APPARATUS FOR BENCH GRINDING LONG BLADES

Filed Oct. 12, 1936 3 Sheets-Sheet 1

FIG. 1



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Filed Oct. 12, 1936 3 Sheets-Sheet 2

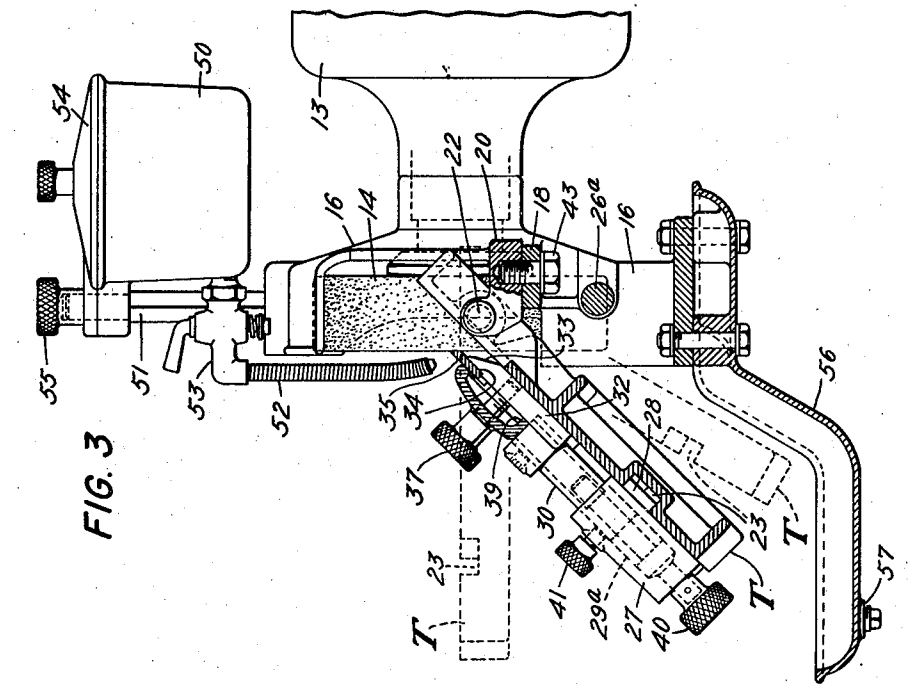


FIG. 3

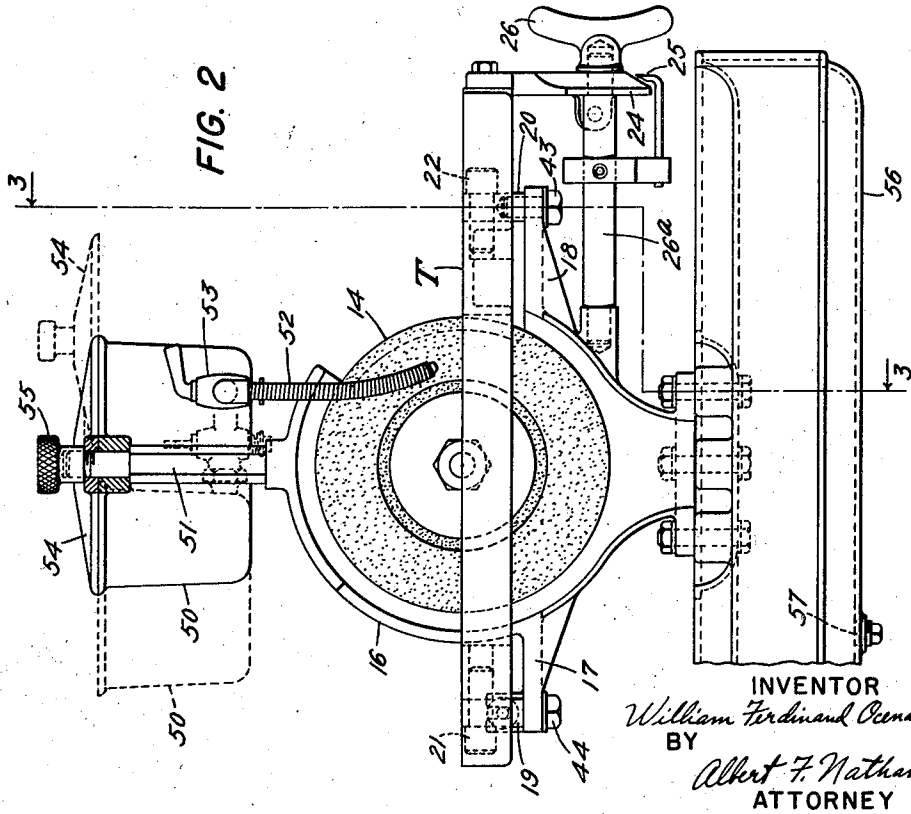


FIG. 2

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FIG. 4

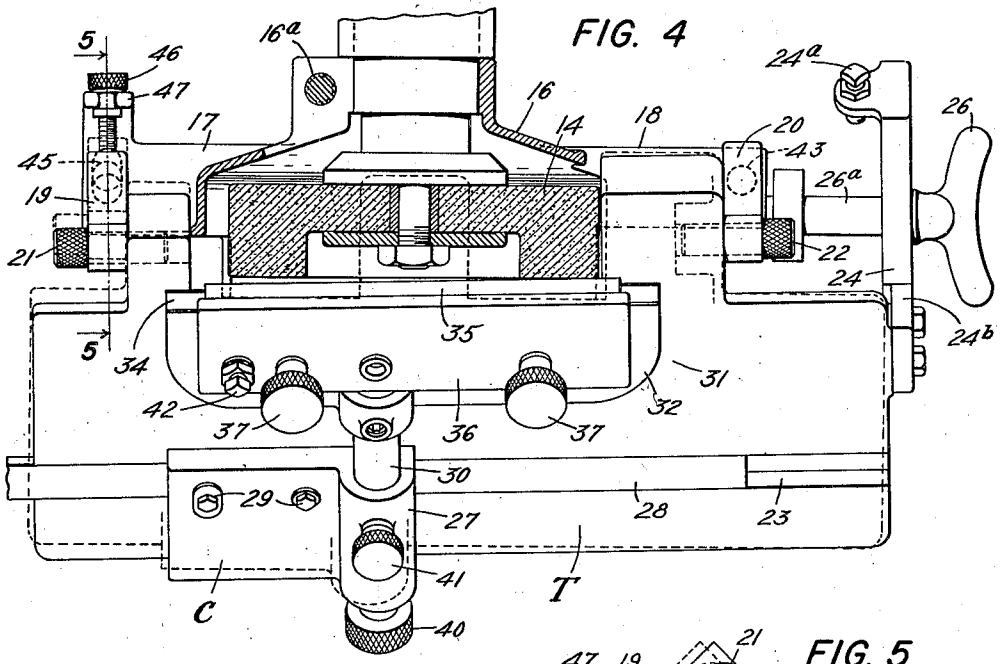


FIG. 5

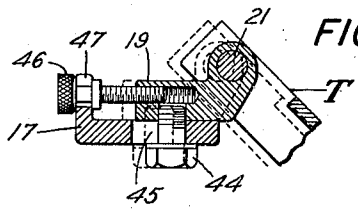


FIG. 6

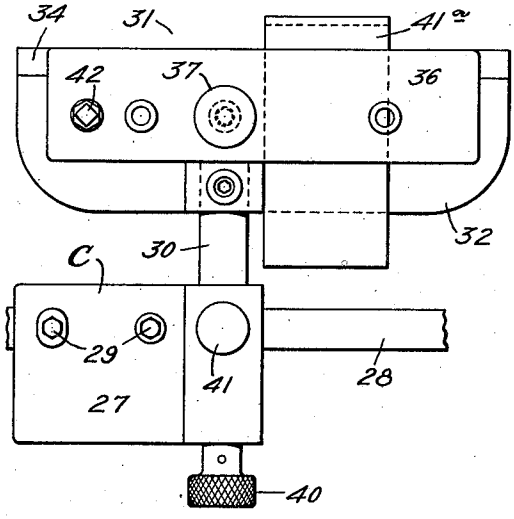
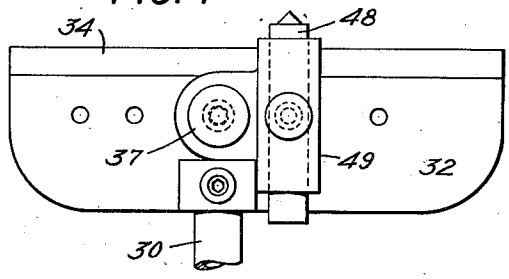


FIG. 7



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UNITED STATES PATENT OFFICE

2,153,502

APPARATUS FOR BENCH GRINDING LONG BLADES

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Application October 12, 1936, Serial No. 105,246

8 Claims. (Cl. 51—122)

The present invention relates to bench grinding machines and particularly to an apparatus for grinding relatively long pieces, such as planer knives or similar cutting blades, on small wheels.

Bench grinders, as a general rule, are provided with two wheels disposed one at each side of an electric motor, and being mounted directly on the motor shaft, little space was available between the grindwheel and motor housing. Consequently, after the wheel was dressed a few times its diameter was reduced to less than that of the drive motor, and the latter seriously interfered with the movement of tools across the face of the wheel.

This conditition was somewhat alleviated by necking down the motor housing and extending the motor shaft to afford more room between the wheel and motor proper. For general purposes that arrangement satisfied many of an operator's needs, but offered no solution to the problem of grinding a relatively long piece, such as the cutting edge of a planer knife, straight and true. The further difficulty being the lack of a support that would admit of the proper adjustments and the free and unobstructed movements required to resharpen a long blade at the proper angle.

Bench grinding machines heretofore, have been so constructed that the workpiece was supported and manually guided on a relatively small rest or post at the front of the wheel. Such a construction at best afforded very little guiding surface or support for the workpiece and frequently blades were spoiled because of the inability of the user to hold the correct angle or to lap the grinds properly. Also, with such devices, blades of tools could be sharpened only with extreme difficulty and great care because of the tendency of the feathered cutting edge to become blued and its temper drawn before it had been moved across the peripheral surface of the wheel. The excessive hollow ground effect produced on blades by the prior peripheral grinding methods, not only amplified the grinding problem but also made the subsequent honing operation more laborious and lengthy.

The present invention aims to overcome the difficulties heretofore encountered in the grinding of tools, by an apparatus for grinding in which the workpiece is firmly and accurately supported for translation along the side face of the wheel in such manner that there will occur but one grinding torch or region as the tool is translated along the end face of the wheel.

A furthter objective of the invention is to render available a tilting table attachment that may inexpensively and with comparative ease be applied to an existing bench grinder and when so applied be capable of tilting to any angle within the range of 0 to 60 degrees.

The invention further aims to provide a tilting guide table attachment for a grinder capable of a limited lateral shift or movement about an axis perpendicular to its axis of tilt to insure that the piece to be ground, when reciprocated on the tilted guide table, will engage the end face of the wheel at one point or region, and thus minimize burning, and will definitely clear the wheel at the opposite side of the wheel axis. By way of additional refinement, the invention further proposes a simple method and apparatus for dressing the end face of the wheel to the contour necessary to suit the type of grinding operation to be performed upon a workpiece supported upon a compoundly adjustable table.

In realizing the objectives of the invention, it is proposed to utilize a grindwheel in which the arbor shaft and clamp nut is below the plane of the end surface against which the tools or workpieces are ground, and to pivotally mount to the grinder frame a relatively wide tilting table so contoured as to extend around the front, outer side, and back of the grindwheel. This constructional arrangement of the table admits of there being formed therein one or more guide channels for the guiding of a translatable cross-slide or work holding fixture that firmly supports the piece to be ground.

Normally the axis of the pivot for the tilting table is substantially parallel to the plane of the wheel so that when grinding a relatively narrow piece, a chisel for example, the wheel area at one side of its axis may be used without danger of the ground edge of the tool contacting the diametrically opposite and reversely moving area of the wheel. In the grinding of relatively long blades it is essential, in order to prevent burning of the edge, that the wheel contact the edge at only one point or region, and also that the blade edge be positively restrained from contacting or engaging the end face of the wheel at the opposite side of the wheel axis. The tilting table of the present invention is therefore designed to have a limited angular movement about an axis perpendicular to the tilting axis so that the line of movement of the workpiece, as defined by the guideways of the table, may be adjusted and held slightly at an angle to the plane of the wheel.

By first dressing the end face of the wheel perpendicular to its axis or rotation, and then

adjusting the table laterally about one degree from parallelism, relatively long blades may be ground free of overlapping grindmarks and without danger of burning or of interference with the opposite side of the wheel or parts of the machine frame.

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

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, drawings depicting a preferred typical construction have been annexed as a part of this disclosure and, in such drawings, like characters of reference denote corresponding parts throughout all the views, of which:—

Figure 1 is an assembly view of a small tool grinder embodying this invention.

Fig. 2 is an enlarged end view of the assembly illustrating its unitary construction.

Fig. 3 is a sectional view along line 3—3 of Fig. 2.

Fig. 4 is a plan view of the fixture with the table tilted.

Fig. 5 is a sectional detail through line 5—5 of Fig. 4 illustrating the table mounting and means for effecting lateral adjustment thereof.

Fig. 6 is a plan view of a work holding cross-slide.

Fig. 7 is a detail view of a dressing attachment adapted to be mounted upon the cross-slide.

Referring more particularly to Fig. 1 of the drawings, the invention is disclosed embodied in a bench grinder, mounted for convenient usage in a pedestal 10 and equipped with a small work-holding and drain table 11 at a convenient height. The base 12 of the grinder is mounted on the pedestal and supports the grindwheel drive motor 13. Usually bench grinders of this general character are equipped with two wheels 14 and 15 that are mounted directly upon the motor shaft. The wheel at the right has been illustrated with the conventional guard and tool rest, whereas, the wheel at the left is illustrated with a cupped wheel and an adjustable table T that forms the subject of this invention. It will be understood, however, that either or both sides of the grinder may be equipped with cupped wheels and tilting tables.

Referring to the enlarged details of Figs. 2, 3 and 4, the wheel guard 16 is preferably removably clamped to the motor frame or arbor housing at 16a and has two lateral arms 17 and 18 that provide the main supports for the tilting table T. Each of the arms carry bearing blocks 19 and 20 respectively through which pivot pins 21 and 22, that pivotally support the table, pass. As illustrated in Fig. 4, the table T is preferably U-shaped so as to extend around the front, end, and rear portions of the wheel whereby a support for the work is provided at all available positions. The table may quickly be removed by releasing the clamp and withdrawing the pivot pins 21 and 22.

The table T is also provided with a long narrow guideway 23 in its upper surface which extends from front to back thereof in a direction substantially parallel to the axis of the pivot 21—22. An adjustable cross-slide or tool holding fixture C, (later to be referred to in more detail) is slidably mounted in the guideway and adapted for reciprocation across the end of the grindwheel.

Normally, the plane of the upper surface of the table is horizontal and substantially coincident with the wheel axis as illustrated in Fig. 2. However, when it is desired to grind a bevel on a workpiece, the table may be tilted, as illustrated in Fig. 3, to any position within the range of zero to 60 degrees, the bearing blocks 19 and 20 preferably being offset from the supporting arms 17 and 18 to allow an unusually large angle of swing for the tilting table. When the table has been tilted to the desired angle, as indicated by the scale on the protractor bracket 24 and cooperating pointer 25 at the front thereof, it is clamped in position by a hand grasp 26.

The tool holding fixture, indicated generally at C, comprises a cross head member 27 that is mounted for angular adjustment on a slide 28 that fits the groove 23 on the table top. By loosening the screws 29, the head member 27 may be adjusted relative to the slide 28 and the entire fixture positioned correctly with respect to the end face of the wheel or to the line of movement defined by slide 28 and slot 23. If desired a different form of cross-slide may be used.

The cross-slide member 27, in the present disclosure, is bored at 29a to receive a plunger 30, axially adjustable in the bore by means of a hand screw 40. The outer end of the plunger carries a blade holding and clamping fixture 31. This fixture may assume varied forms depending upon the nature of the work to be ground. A preferred form of a fixture useful for many diversified kinds of work is disclosed in the drawings and comprises a base plate 32 which has its under surface relieved, as at 33, away from the leading edge so that it may occupy a position close to the wheel in any tilted angle. The upper surface is milled out a short distance from the leading edge whereby a shouldered recess 34 is formed for the reception of a planer blade 35.

The blade to be ground is clamped in the recess 34 by an overlying strap member 36 and two hand screws 37 that thread into the base plate 32. The forward edge of the strap clamp 36 is rounded longitudinally to form a ball type of clamp, whereas the rear edge of the strap is provided with a depending leg or longitudinal flange 39 that serves as the fulcrum point of the clamp as the screws 37 are tightened. Such a device, it will be seen, may be used in the grinding of hand plane irons, chisels and the like, by removing if necessary, one of the screws 37 and placing the tool to be ground under both edges of the clamp 36.

Fig. 6, illustrates a plane iron 41a clamped in this manner, and in which one clamp screw 37 is used in conjunction with an adjusting screw 42. The screw 42, in this instance, serves as the fulcrum point for the clamp and is adjusted to suit the thickness of the blade being ground so that uniform clamping pressure is obtained.

When the blade to be sharpened is clamped in position, the base plate 32, which lies flat on the table T, is fed toward the end face of the grindwheel by the hand screw 40, until the edge of the blade is in the proper position, laterally and angularly with respect to the face of the grindwheel. It may then be clamped by the clamp screw 41 and thereafter the entire fixture gradually shifted radially of the wheel to perform the grinding operation.

If the device is used for grinding the end of relatively narrow stock, such as indicated in Fig. 6, only one side of the wheel ordinarily would be used and no special precautions are necessary

to guard against reciprocating the workpiece all the way across the wheel until the workpiece strikes the opposite side. When grinding long blades, however, it is important that any given point on the blade does not stay too long in grinding relation with the wheel as that would burn and draw the temper. It is equally important that the blade does not strike the opposite side of the wheel as that would result in producing a slight step in the cutting edge.

To insure that the cutting edge of the blade will be preserved, the present invention proposes a means whereby the tilting table may be adjusted bodily laterally a few degrees out of parallelism with the wheel. Figs. 3, 4 and 5, illustrate a preferred manner of accomplishing that end which consists in pivotally mounting one of the bearing blocks 20 on its supporting arm, and slidably mounting the other bearing block 19 on its supporting arm.

A combined clamp screw and pivot 43 clamps the bearing block 20 to the arm 18 and provides the necessary pivotal action at one end of the table, and a screw 44, operating in a slot 45, clamps the bearing block 19 to the arm 17 and provides for the necessary lateral movement at that end of the table. So that the lateral shift of the table may be effected with ease and precision, a thumb screw 46, held against endwise movement between upturned ears 47 provided by the arm 17, is threaded into the end of the bearing block 19. With the clamp screws 43 and 44 slightly loosened, the screw 46 may be actuated to shift one end of the table laterally the required amount. In practice, it has been found that a lateral movement of the table of one degree from normal parallelism affords sufficient clearance for the part to be ground when passed diametrically across the end face of the wheel. This slight lateral movement simultaneously results in bringing a relatively small portion of the end area of the grindwheel into grinding relation with the workpiece. In consequence, any given point on the workpiece is in contact with the wheel only an instant as it is translated across the face thereof.

As will appear from Fig. 4, the bearing block 19 may be adjusted laterally a limited amount to either side of normal parallelism and either the near or far side of the wheel used for the grinding operation depending upon the nature of the piece to be ground and whether "up" or "down" grinding is preferred. In either case, however, the angle of lateral swing the table T makes to the plane of the wheel is so slight that a substantially flat surface is ground on the workpiece.

After a number of grinding operations have been performed, the wheel will gradually develop into a flattened cone. This increases the length of the grinding region of the wheel and tends to heat and draw the temper of the edge of the tool to be ground. This invention, accordingly, proposes a wheel dressing attachment that may be used in connection with the cross-slide C for quickly redressing the surface of the wheel to its original shape.

Fig. 7, of the drawings illustrates a preferred design of wheel dresser, which consists of a diamond pointed tool 48 axially adjustable in a holder 49. The holder 49 is bored to receive one of the screws 37 by which it may be clamped to the cross-slide base 32 in the desired angular position.

To dress the end face of the wheel, the table is preferably placed in its normal position both horizontally and laterally. The diamond tool is then mounted on the cross-slide, adjusted forward until it contacts the end face of the wheel and reciprocated across the face thereof. After a few passes, the face of the wheel will be dressed true so that when the table is subsequently laterally shifted, a localized grinding region is again presented to the workpiece.

By the foregoing described arrangement, complicated and expensive pivot mechanisms that ordinarily would be required to bring the pivotal axis of the table in coincidence with the line of grinding action, have been avoided and a planer blade grinding mechanism and wheel truing device of simple construction and exceedingly accurate in the performance of its functions, is achieved.

In practicing the method of grinding herein set forth, the operator will adjust the table laterally the required distance by means of the screw 46, and clamp the bearing blocks in place. The plane of the table is then tilted to the required angle and clamped by the hand clamp 26. Owing to the length and the reduced sectional area at 24^b, the bracket 24 yields slightly to compensate for the slight angular movement of the table about the pivot 43.

If the workpiece is to be ground square on its end, the table is moved to its horizontal position, and to determine that position quickly, the protractor bracket 24 is provided with a set screw 24^a which is initially adjusted to a position such that when the end thereof contacts the clamp shaft 26^a, the top of the table is in a position of zero incline relative to the axis of the wheel.

A convenient means is also provided by this invention for applying a grinding compound or coolant to the edge of the part being ground. Figs. 2 and 3 illustrate a preferred form of device for the purpose which comprises a cup 50 mounted to swing about a post 51 above the grindwheel. A semi-rigid conductor 52, in which a regulating valve 53 is inserted, leads out of the cup to the face of the wheel. By bending the conduit to the point on the wheel desired and by regulating the control valve 53, a controlled and directed flow of a coolant mixture may be obtained.

To prevent dirt or other foreign matter from entering the coolant supply, the cup 50 is provided with a cover 54 also pivoted on the post 51. A clamp screw 55 is provided for clamping the cover in closed relation to the cup, and simultaneously the cup in the proper angular position on the post 51 so to direct the flow where needed. In the dry grinding of pieces the screw clamp 55 may be released and the entire unit swung back out of the way.

After the cutting compound flows over the work and wheel, it is collected in a large pan 56 secured to the wheel guard frame 16, where it may be drained off through the plugged opening 57.

As illustrated in Figs. 1 and 2, the pan 56 has one side thereof offset and at a lower level than the other. This offset feature provides ample room for adjusting the tilting table therein, while at the same time tends toward compactness and rigidity in the assembly itself and in the mounting of the unit on the end of a bench.

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 characteris-

tics 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. An adjustable table attachment for bench grinding machines comprising a pair of supports located substantially in the plane of the grindwheel and one at each side of the axis of the grindwheel; a bearing block adjustably mounted on each of said supports, one of said blocks being pivoted to its support and the other of said blocks being slidably mounted on its support; a table member pivotally mounted in said bearing blocks, the axis of said pivotal mounting normally occupying a position parallel to the plane of the grindwheel; means for laterally adjusting said slidable bearing block on its support thereby to adjust the pivotal axis of said table out of said parallel plane; means for tilting said table on its pivotal axis whereby the plane of said table may be positioned at a compound angle relative to the plane of said wheel; and means for clamping said table in adjusted position.

2. An adjustable table attachment for bench grinding machines comprising a motor; a motor housing; a grindwheel guard member removably secured to said motor housing, a pair of supports provided by said guard member located substantially in the plane of the grindwheel and one at each side of the axis of the grindwheel; a table member pivotally mounted to said supports, the axis of said pivotal mounting normally occupying a position parallel to the plane of the grindwheel; guide-means provided by said table extending in a direction parallel to the axis of said pivotal mounting; a work holding fixture slidable in said guide-means; means for tilting said table on its pivotal axis whereby the plane of said table may be positioned at an angle relative to the plane of said wheel; means mounted on said guard member for supplying a coolant to the workpiece in the region of the grinding action; and a collecting basin suspended from said guard member and underlying said table in all positions of tilt thereof for collecting the coolant.

3. A grinding machine combining a grindwheel rotatable on a horizontal axis; a tiltable but normally stationary table member pivotally supported adjacent said grindwheel on a horizontal axis lying substantially in the plane of the wheel and on the diameter thereof; the plane of said table normally containing the axis of said wheel; means for tilting said table out of said position and for clamping said table in tilted position; a work holding fixture translatably mounted on said tilting table, said fixture being translatable in a path substantially parallel to the horizontal tilting axis of the table; means for holding a workpiece in said fixture; and means carried by the work fixture, said means being operative to feed the workpiece relative to said table toward the grindwheel in a plane substantially coincident with the plane of the tilted table.

4. A bench grinder comprising a frame member; a table support provided by said frame and located substantially in the plane of the grindwheel and to one side of the axis thereof; a normally stationary table member pivotally mounted to the support on a verticle axis so as to swing laterally and also upon a horizontal axis so as to be capable of tilting, the axis of said horizontal pivotal mounting being normally parallel to the plane of the grindwheel; guideways provided by said table extending in a direction parallel to the horizontal pivotal axis of the table; manually operable means for adjusting the horizontal axis of said table angularly out of said parallel plane; means for tilting said table about its horizontal axis in any angularly adjusted position of said axis, whereby the said table guideways may be caused to extend at a compound angle relative to the plane of the grindwheel; a work holding fixture adapted to clamp a workpiece in grinding relation with the grindwheel slidably mounted in the said guideways and supported by the said table; the said angular adjustment of the table resulting in effecting a line contact between the workpiece and the grindwheel as the workpiece is translated along the said guideway, and the inclined position of the table resulting in effecting a beveled ground edge on the workpiece.

5. A bench grinder combining a motor and a grindwheel driven thereby; an adjustable but normally stationary table situated in a plane containing the axis of said wheel for supporting a workpiece in cooperative relation with the end face of said grindwheel; a cross-slide member slidably mounted in guideways provided by said table, the line of movement of said cross-slide member normally being parallel to the plane of said grindwheel; means for adjusting said table angularly in its said normal plane thereby to adjust the said line of movement of said cross-slide out of parallelism with the end face of said wheel; said cross-slide being adapted to mount a wheel truing device for dressing the end face of said grindwheel, the direction of translation of said slide being such as to dress the end face of the wheel perpendicular to the axis of said grindwheel when the table axis is normal to the plane of the wheel, and to effect a line contact between the workpiece and grindwheel when said table is adjusted angularly out of parallelism with the plane of the wheel for a normal grinding operation.

6. An adjustable but non-translatable table for bench grinding machines comprising a support for said table located substantially in the plane of the grindwheel and at one side of the axis thereof, a table member whose plane normally contains the axis of said wheel pivotally mounted to said support, the axis of said pivotal mounting being normally parallel to the plane of the grindwheel and also parallel to the plane of the table manually operable means for laterally adjusting the said support to a position at an angle to said parallel plane of the wheel thereby to similarly adjust the said pivotal axis of said table out of said parallel plane of the wheel; means for tilting said table on its pivotal axis in any laterally adjusted position of said axis; and means for clamping said table in said tilted and angularly adjusted position.

7. An adjustable table bench grinding machine comprising a pair of supports located substantially in the plane of the grindwheel and one at each side of the grindwheel; a bearing block adjustably mounted on each of said supports; a non-translatable table member pivotally mounted upon a horizontal axis in said bearing blocks, the axis of said pivotal mounting being substantially parallel to the plane of the grindwheel; guide means provided by the table extending parallel to said pivotal axis; means for adjusting

the said pivotal axis of the table laterally out of the said parallel plane; means for tilting said table about its laterally adjusted axis whereby the plane of said table may be positioned at a compound angle relative to the plane of said wheel; clamp means for clamping said table in angularly adjusted and tilted position; a work holding slide translatable along the guide means provided by the table; and means carried by said slide and adapted for operation between translatory strokes for feeding the workpiece in the plane of its tilt toward the grindwheel.

8. An adjustable but normally stationary work table for bench grinding machines comprising a grindwheel housing; a pair of supporting elements carried thereby and located substantially in the plane of the grindwheel and one at each side of the axis of the grindwheel; an adjustable bearing block member mounted on each of said elements having bearing portions coaxial and normally parallel to the plane of the grindwheel but offset from their related supporting elements; a normally stationary table member pivotally mounted in the bearing portions of said blocks; means for adjusting said bearing blocks relative to their supports thereby repositioning the pivotal axis of said table out of parallelism with the plane of the wheel; means for tilting said table a predetermined amount, said offset bearing portions of said blocks affording an unrestricted range of tilt of said table from zero to approximately 60 degrees in any adjusted position of said bearing blocks; and means for clamping said table in adjusted position.

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