

June 4, 1929.

R. T. HAZELTON
TILTING WORK SUPPORT

1,716,129

Filed Aug. 1, 1924

2 Sheets-Sheet 1

Fig. 1

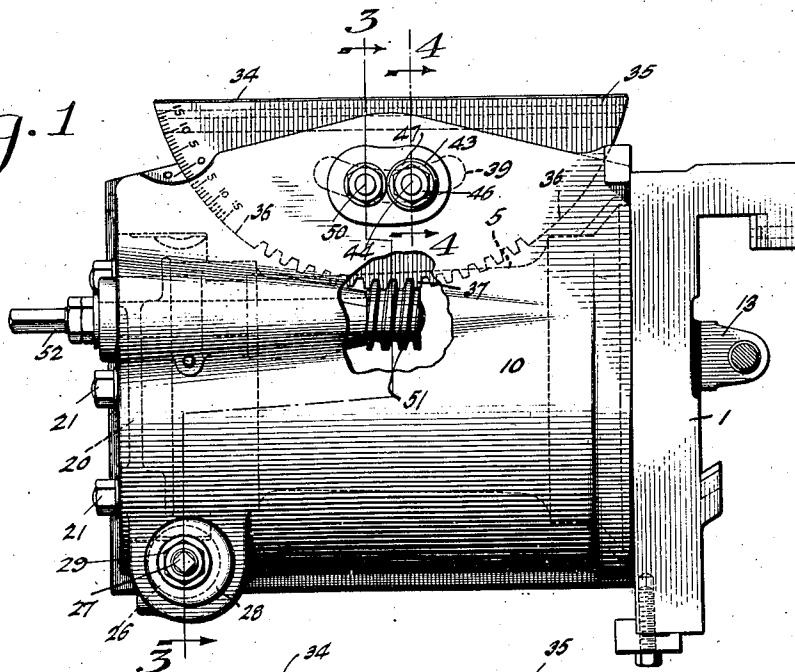
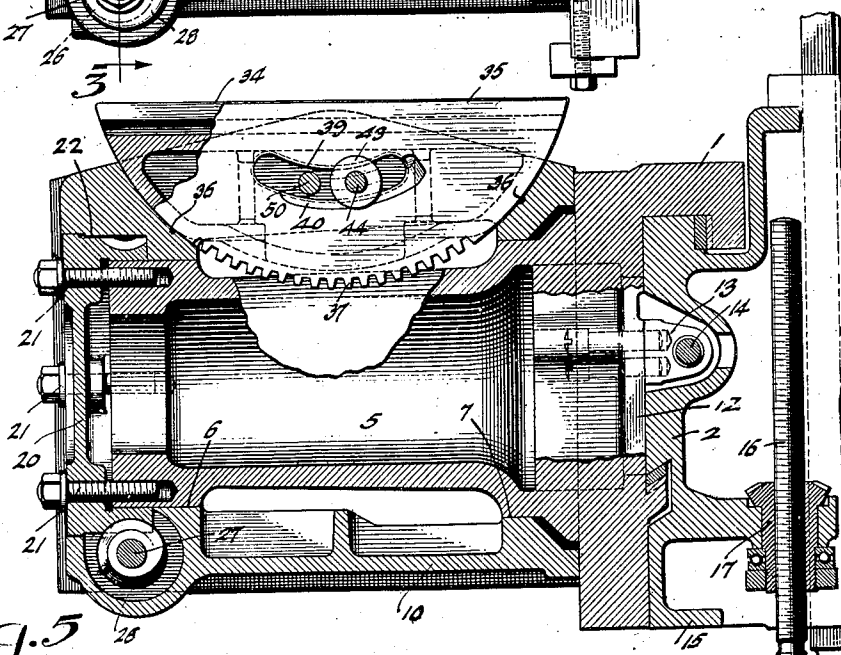


Fig. 5



Inventor
Robert T. Hazelton

By *Ward & Ward*

Attorneys

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Fig. 2

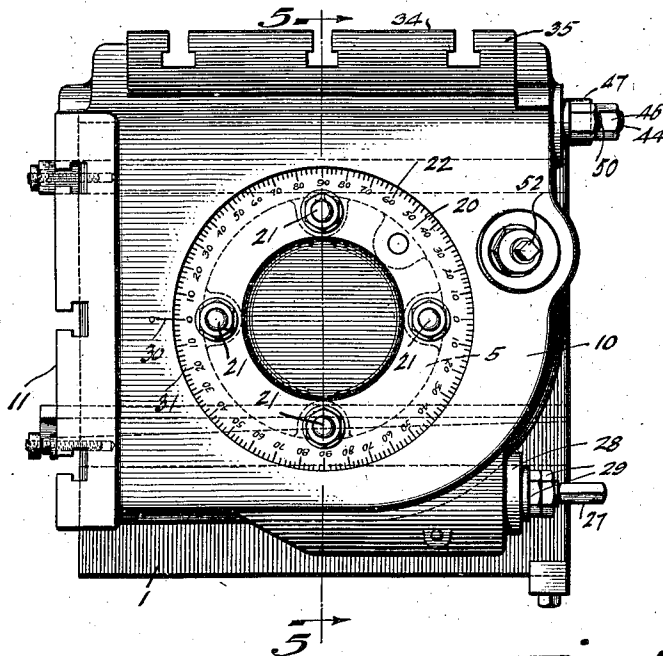


Fig. 3

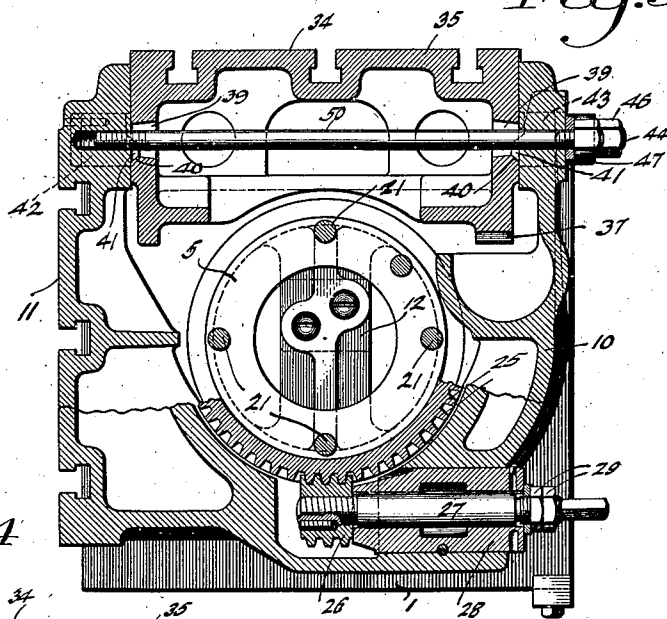
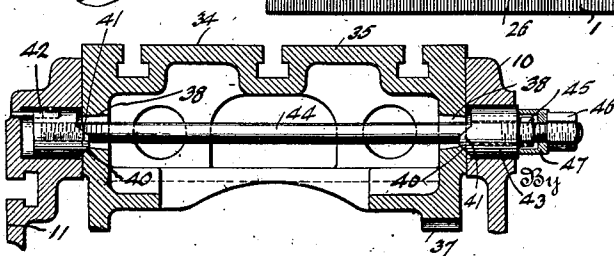


Fig. 4



Inventor

Robert T. Hazelton

Wend. Wink

Attorneys

UNITED STATES PATENT OFFICE.

ROBERT T. HAZELTON, OF CINCINNATI, OHIO, ASSIGNOR TO THE CINCINNATI SHAPER COMPANY, OF CINCINNATI, OHIO, A CORPORATION OF OHIO.

TILTING WORK SUPPORT.

Application filed August 1, 1924. Serial No. 729,622.

This invention relates to improvements in work supporting devices designed for use in conjunction with machine tools, the present design being particularly applicable to metal shapers as a universally adjustable work support or table and holder.

The device is herein shown as designed for attachment as a unit to the rail or cross-rail of a shaper, is micrometrically rotatably adjustable about a horizontal axis, and is further provided with work supporting faces at right angles to each other, one of the faces being micrometrically angularly adjustable about an axis right angularly related to the axis of rotation of the other adjustable portion of the unit.

An important feature of the invention resides in the provision of at least two work supporting faces one of which is adjustable and which when in mid-position has its face related to the other, as the adjacent sides of a cube, thus providing means whereby either of two right angularly related work supporting faces can be alternately opposed to the tool.

Another feature of the invention is the provision of a retaining and wear take-up cap which further is adapted to function as a stationary gear with which is meshed a corresponding gear mounted on the rotatable section of the unit for angularly adjusting the section.

Another feature of the invention resides in the novel means for retaining the adjustable work supporting member of the unit within its seat, which device functions as retaining, clamping and movement limiting means.

Another feature of the invention is the placing of the table and work holding adjusting devices substantially adjacent one another at the working side of the machine in which position they are readily accessible to the operator.

Other objects and features of the invention will appear as the description of the drawing proceeds, in which:

Figure 1 is a side elevation of the work supporting and adjusting unit a portion of the table being broken away to show a portion of the means for adjusting the work holder.

Figure 2 is an outer end view of the device.

Figure 3 is a vertical section approximately on line 3—3 of Figure 1.

Figure 4 is a fragmentary vertical sectional view on line 4—4 of Figure 1.

Figure 5 is a vertical longitudinal section substantially on line 5—5 of Figure 2, a portion of the trunnion being shown in elevation to illustrate the relation of the gear teeth of the adjustable work holder.

The support or carriage of the work supporting unit comprises a rectangular base section 1 adapted for gibbed attachment to the saddle 2 for horizontal movement thereon, and is provided for this purpose with an upper shelf-like hanger extension grooved in its lower side for gibbed engagement with the upper horizontal cross-way or rail of the saddle, a suitable gib being interposed between the parts and take-up adjusting means being provided for the gib. The base portion is further provided with an obliquely upwardly directed projection in gibbed engagement with the face of the groove forming the cross-way of the saddle. The carriage portion has integral therewith and projecting horizontally therefrom a hollow trunnion 5 as a spindle-like bearing substantially of cylindrical configuration and providing terminal circumferential bearing surfaces 6, 7, with which are engaged the corresponding surfaces of the bore of the substantially rectangular table section of the work supporting unit. The trunnion could, however, be supported in other ways and I do not limit myself to the present manner of attachment.

The table or work supporting section 10 is adapted to be rotatably mounted and adjustable upon the trunnion and has substantially the form of a hollow cube centrally bored, ribbed interiorly to give the proper rigidity thereto and having one corner rounded and further having one lateral plane face 11 suitably machined and provided with parallel longitudinal work attaching grooves. Upon this face of the table the work may be stationarily attached and disposed horizontally or vertically as desired by rotating the cubical work holding section upon its support.

At the inner rear end of the base portion, the carriage is provided with an integral diametrically disposed rib 12 to which is attached a nut 13 having threaded engagement with the cross feed screw 14 for obtaining lateral movements of the unit upon the saddle-ways.

The illustration of the saddle 15 is only fragmentary and any desired form of the same may be used or the base of the work sup-

port herein may be attached non-slidably to any other machine or part of a machine. The saddle is operated by a stationary elevating screw 16 in threaded connection with the bore of the driving sleeve gear 17. The operation of the saddle is well known and the same is only represented herein as illustrative of one manner in which the improved work supporting and adjusting unit can be attached and used.

The table 10 is held from endwise movement upon the trunnion by means of a substantially cup-shaped cylindrical retaining element, ring or clamping head 20 held concentrically upon the outer end of the trunnion 5 by the flange portion and adjustable axially thereon and further held in position by screws 21 traversing the closed end portion of the cap element, and having threaded engagement with the trunnion. The screws may be adjusted and the element translated inwardly to take up for wear between the end faces of the table and its support. The retaining cap element is housed within a socket 22 of the work supporting section or table and the table is revoluble about the cap. The flange portion of the retaining element exteriorly is provided with gear or worm teeth 25 with which are engaged a worm 26 held non-rotatably at the inner end of a shaft 27 eccentrically disposed and rotatable in a bushing 28 suitably held against rotation and translation in an opening of the table (see Figure 3). The shaft 27 is counterturned adjacent its outer end and threaded for the reception of jam nuts 29 to resist the lateral strain on the worm shaft and for taking up end play. The shaft is squared at the outer end for the reception of a suitable socketed tool for rotating the shaft. The outer end face of the table is provided with a mark 30 registerable with graduations 31 marked upon the end face of the trunnion, the graduations representing the degrees and fractions of degrees of a circle.

By rotating the shaft the table may, therefore, be correspondingly rotated about its axis and its work supporting faces placed at any desired angle to the tool. Other forms of gear connection may be used, the worm being preferable since play between the parts is avoided and micrometric adjustment is obtainable.

The table, moreover, has another work supporting surface or face, said surface being provided upon an adjustable work holder or block 35 substantially of a cylindrical segmental configuration mounted for sliding rocking movement in a direction parallel with the trunnion axis and adapted when in mid-position to have its work holding surface strictly related to the other surface as the faces of a cube.

The work holder has its work supporting face provided with work attaching grooves

and said holder may be tilted and locked in adjusted position. The work support 35 is mounted for rotative sliding movement, and against disengagement from the table 10 in a novel manner, within what may be called a socket of the table. The work support is of hollow, preferably cast construction having its curved surface slidably engaged or engageable with the corresponding longitudinally aligned opposingly related transversely disposed segmental curved surfaces 36, in such manner that on applying a thrust longitudinally to the curved surface the work support will rotatably slide about an axis perpendicularly to the trunnion axis. For thus applying power to rotate or slide and adjust the work holder to dispose its upper work holding face at the desired angle to the tool, one portion of its curved periphery is provided with transverse rack teeth 37, sufficient in number to permit the proper degree of rotation, in this case, through angles from zero to 15 degrees in either direction, from a mid-position corresponding to the zero setting, in which the working face is related to the other plane face as the faces of the cube. The relation of the working face of the block to its curved face is herein as that of a cord but it is obvious that this face could have other cord relations, and a diametric relation as well. This manner of mounting the block gives the desired rigidity and furthermore the height under the tool is not reduced, when adjustments are made.

As shown in Figure 4, the rack teeth are placed at one side of the adjustable work support to permit of the non-interfering placement of the adjusting shaft and worm relative to the retaining cap which is housed within the socket in the end of the table. This arrangement, moreover, brings both adjusting devices substantially adjacent one another so that the adjustment of each can conveniently be made without undue change of position of the operator.

The shafts 27 and 52 are disposed in eccentric bushings which may be rotated to change the relation of each adjusting shaft and gear thereon, for taking up wear between the meshing gears, providing auxiliary means for preventing play and making for accuracy of adjustment and obtaining rigid relation between the parts after adjustment.

The block surface when in extreme tilted position is adapted to register and to assume a coplanar relation with the respective correspondingly inclined surfaces of the cubical table or work holding section 10 lateral movement of the work support 35 being prevented by the side walls of the table and upward or lateral movement from its seat is prevented and its rotative motion limited by frictional locking devices carried by the cross or tie rod 44 extending transversely of and through the block and loosely through arcu-

ate slots 39 at relatively opposite sides thereof in the side walls of the block or work support. The edge of each slot is chamfered as at 40 for engagement by correspondingly chamfered arcuate projections 41 upon the end faces of cylindrical elements 42, 43 upon the rod 44 and non-rotatively held and slidable in cavities or faces at opposite sides of the table.

One end of the rod 44 has threaded engagement with the clamping element 42 and passes loosely through the clamping element 43, jam nuts being in threaded engagement with the rod at one end and one of said nuts being directly engaged or engageable with clamping element 43 for drawing the chamfered faces of the elements against the chamfered bores of the slots to lock the work holder in adjusted position, and to prevent upward or outward displacements of the same from its socket or seat. This construction is best seen in Figure 4 at the right hand side of which the locking nuts have been shown. The inner nut 45, engaged against the face of the element 43, is for limiting the outer movement of that element, or, in other words, is for limiting the degree of release movements of the elements when the outermost jam nut 46 is loosened. A cupped washer 47 is interposed between the element 43 and the nut 46 and surrounds the nut 45 to form a bridge between the two nuts to allow proper adjustment of the outermost nut. When the outer nut is tightened a thrust is communicated to element 43 and a pull to element 42 by means of the rod for bringing the clamping elements into action.

A second rod 50 is engaged into the opposite check wall portion of the table between which the tilting work holder lies, and through the curved slots 39, one end thereof being threaded into the wall and the opposite end is also threaded and provided with a nut, whereby when the nut is tightened the table is tightly clamped to the rocking work holder.

Micrometric adjustment of the work holder is obtained through the worm 51 mounted at the end of the shaft 52 in a manner similar to that of the adjusting shaft of the universal table 10 shown in Figure 3. Any fine degree of adjustment may be obtained for the tilting work support or block, by properly manipulating the screw shaft.

The work supporting unit provides means whereby the work may be tipped or rocked in small degree either longitudinally or transversely. Moreover, the device is only designed to obtain a relatively small range of adjustment and provides means by which the work is held with greater firmness than in other devices now in use. Thus the work table is movable about a horizontal axis which

is perpendicular to the axis of the tilting workholder whereby in combination with the vertical adjustment of the saddle, universal adjustment of the work may be obtained without changing the relative positions of the work and support.

The device provides in addition two work supporting surfaces or tables, either one of which may be placed in any desired relation to the tool, and in which by use of the adjustable block two pieces of work may be simultaneously supported, and one may be additionally angularly adjusted.

The thrust upon the adjustable work support are received by the curved bottom surfaces of the cavity and the clamping devices have only an end-wise engagement at the vertical sides of the support to retain and prevent accidental rotation of the same after setting. The provision of hand operable worm controlled adjusting devices makes for convenience of operation and accuracy of setting.

Having described my invention, I claim:

1. In a device of the class described, a work table adapted for rotatable adjustment having a socket therein, a work supporting member slidably fitted and adjustable within said socket longitudinally thereof and axially at right angles to the axis of rotation of the table, for tilting the working face of the member, said member having aligned arcuate slots at opposite sides, each chamfered at one edge, clamping and retaining elements having portions projecting into said slots and engaged with the chamfered portions for retaining the work supporting member within the table, and a rod connecting the elements for forcing the same to clamping and retaining position.

2. In a device of the class described, a work supporting table, a work holder recessed within a face of the table and mounted to swing about a horizontal axis, gearing mounted within the table cooperating with said work holder for adjusting the holder to sustain the work thereon in different planes, and clamping means extending transversely of the holder and table for rigidly clamping the holder to the frame.

3. In a device of the class described, a work supporting table, a work holder having a curved base recessed within a face of said table to slide the holder within the table about a horizontal axis for angular adjustment of the holder, the recessed portion of the table providing opposing side surfaces adapted to engage the work holder, and a clamping rod extending transversely of the holder for clamping the table and work holder together.

In witness whereof, I hereunto subscribe my name.

ROBERT T. HAZELTON.