Sept. 11, 1962 F. K. BEYER ETAL 3,053,557

VISE

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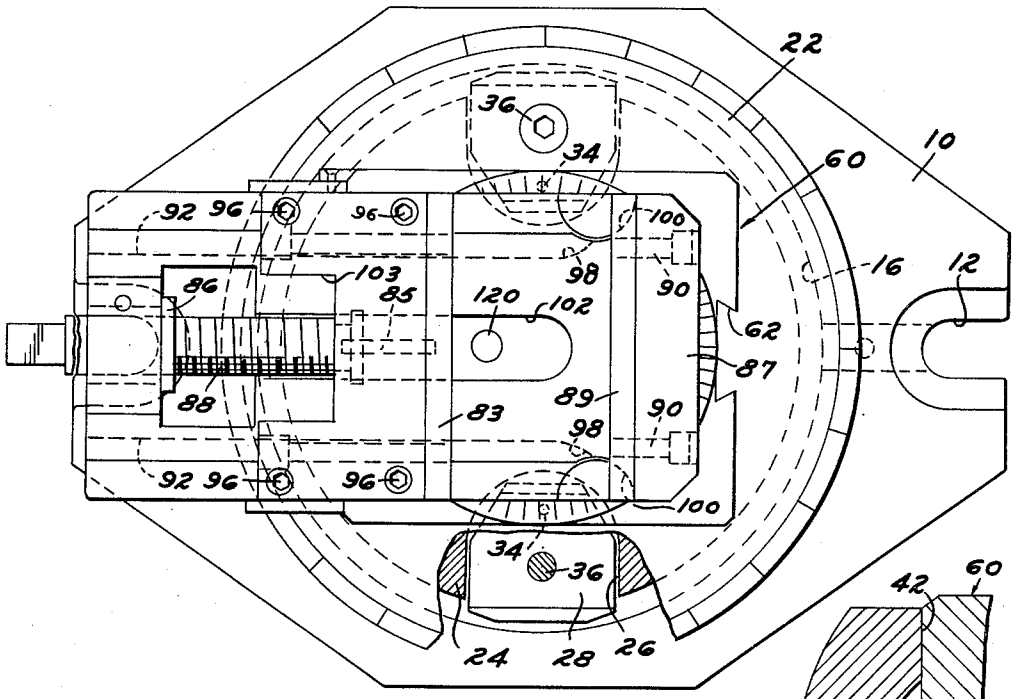


FIG. 1

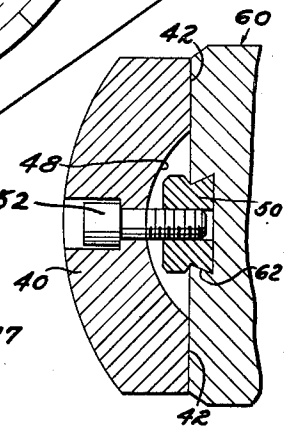


FIG. 5

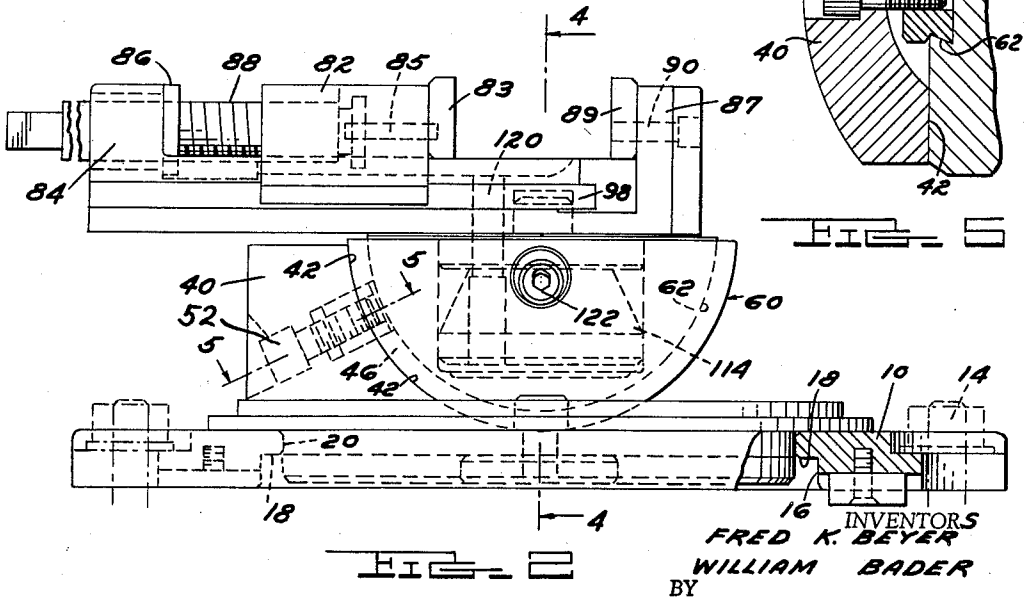


FIG. 2

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FIG. 3

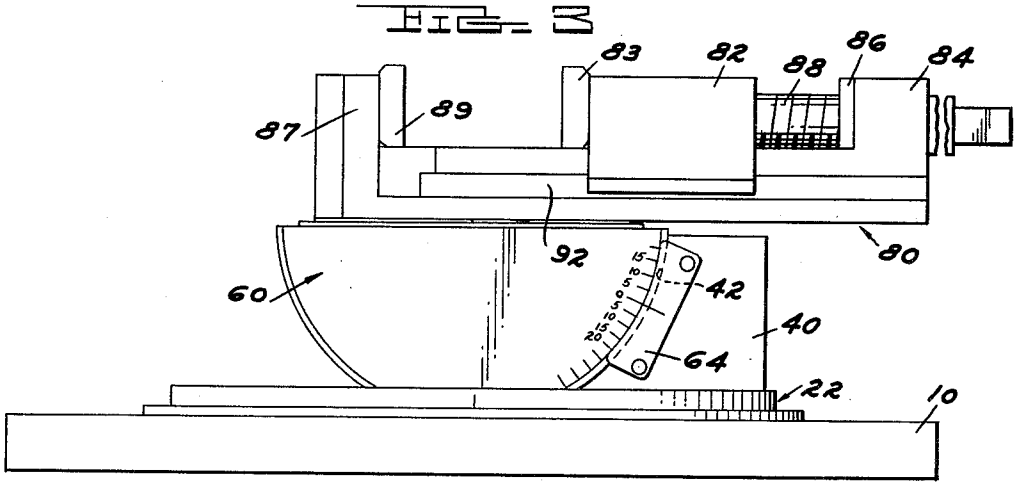


FIG. 4

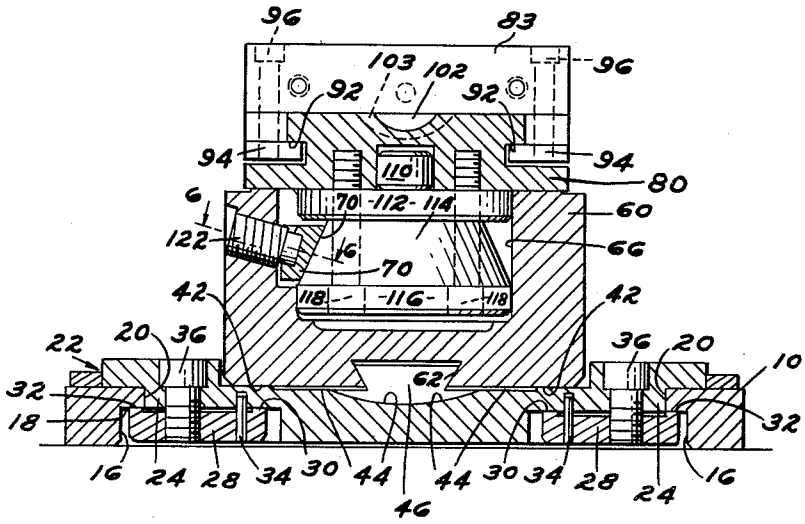
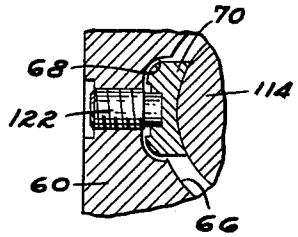


FIG. 6



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VISE

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Filed Nov. 5, 1958, Ser. No. 771,977
2 Claims. (Cl. 287—91)

This invention relates to a universal vise and work holder and has particularly to do with a vise used as a toolroom accessory for holding work pieces for milling machines and grinders at various angles and positions. This general type of vise is disclosed in detail in a patent to J. Hugo Smith, No. 2,207,881, dated July 16, 1940. The vise, as described in the aforesaid patent, has been in commercial use for a number of years; and as a result of such use, certain problems and certain disadvantages have been noted in the particular design.

It is an object of the present invention to provide a vise design which is an improvement over the patented design in numerous respects. Accuracy, of course, is an important factor as well as solidity of locking and the various parts which are moved pivotally with respect to each other should remain on center.

It is an object of the present invention to provide a locking device for the unit which clamps the parts together to keep out dirt and which maintains positive centering of the parts.

It is another object of this invention to provide such a design in a manner which prevents the accumulation of chips at any part of the vise to block movement or destroy the accuracy thereof.

Various other features of the invention will be apparent in the following description and claims.

Drawings accompany the disclosure and the various views thereof may be briefly described as:

FIGURE 1, a plan view of the assembled vise.

FIGURE 2, a plan view of one side of the vise.

FIGURE 3, a plan view of the other side of the vise.

FIGURE 4, a sectional view on line 4—4 of FIGURE 2.

FIGURE 5, a sectional view on line 5—5 of FIGURE 2.

FIGURE 6, a sectional view on line 6—6 of FIGURE 4.

Referring to the drawings, the base plate 10 of the vise has notched ends 12 for holding bolts 14, and the plate has a circular opening 16 in the bottom surface terminating at a shoulder 18 below a top surface opening 20 leaving a flange at the edge of the opening.

A flanged cradle plate 22 has a circular base 24 recessed into opening 20 of plate 10, the base 24 being recessed radially at 26 to receive clamp plates 28, FIGURES 1 and 4. Clamp plates 28 are provided with toe and heel portions 30 and 32, a pin 34 holding the plates in position and a clamp bolt 36 serving to clamp the heel portions 32 against the shoulder 18 to clamp the cradle plate in any rotated position relative to the plate 10.

The cradle plate 22 also has an end 40 provided with cradle tracks 42 on each side of a relieved area 44. Between the tracks 42 is a raised dovetail 46 which extends upwardly along the raised end 40 interrupted by a segmental slot 48, FIGURE 5, which receives a dovetail clamp block 50 controlled by a bolt 52.

Resting in the cradle plate 22 is a cradle block 60 having a semi-circular bottom surface with a central dovetail groove 62 to engage the raised dovetail 46 on the cradle plate 22. The groove is also engaged with the clamp block 50 which locks the cradle solidly on the cradle plate in any of desired angled positions. A small marker plate 64 is provided with a mark to register with graduation on the side surface of the cradle plate.

The cradle block 60 is provided with a central circular recess 66 provided with an axial side groove 68 for a

wedge lock block 70 formed with a surface to complement a portion of the vise block pivot to be described.

The vise block for the assembly is formed of a base block 80 and a slide jaw block 82. The base block 80 has a raised end 84 provided with a bronze nut bushing 86 to receive a screw actuator 88. The bushing and screw preferably have an acme thread for accuracy and strength. The screw is rotatably anchored in the slide block 82 which has a suitable contact plate 83. The other end of the base block has a raised jaw end 87 with a contact plate 89 held in place by bolts 90, FIGURE 1. A pin 85 serves to center the end of screw 88.

The slide engagement between block 82 and base block 80 is by re-entrant grooves 92 on the base block and slide plate 94 on the U-shaped block 82 held by bolts 96. The grooves 92 are not only open at the sides but also are open at one end of the base block 80 below end 84, and at the other end these grooves are rounded to the outside walls at 98 and 100 to leave no corner pockets which might jam with chips. The grooves are thus self-clearing. Clearance grooves 102 and 103 are also rounded to prevent any accumulation of chips.

The rotatable attachment of the base block 80 to the cradle block 60 is accomplished by an assembly consisting of a pilot stud 110 on a cylindrical plate 112 together with a truncated cone 114 having a cylindrical base 116 of the same diameter as plate 112. This assembly may be, and preferably is, formed as a unit. Base block 80 is recessed to receive pilot 110 and the assembly is held in place by bolts 118. A dowel pin 120 serves also to locate these parts accurately.

The sectional views of FIGURES 4 and 6 show the lock block 70, which has a conical surface to complement cone 114, engaging the cone 114, the pressure being exerted by screw 122. The cone 114 has about a 50° included angle and the angle of the cone to the end of the screw 122 is about 10°. Thus the screw axis lies at about 80° to the cone surface at the area of contact. This is a non-locking wedge relationship which insures positive locking and a down thrust on the cone without undue wear or distortion of the screw.

Thus the base block of the vise is accurately located with respect to the cradle block and the cradle block is accurately located relative to the cradle plate and so on down to the base. The vise base block 80 has a 360° unlimited rotation and adjustment location relative to the cradle block. The cradle block has over 90° adjustment relative to the cradle plate which in turn has unlimited rotative relation to the base plate. The result is a low-set universal vise capable of quick adjustment yet designed for extremely rigid control of a work part.

If desired, the vise base block 80 can be mounted directly on the base plate 10 by using a simple round adapter plate (not shown) similar to plate 22 but without the cradle end 40. All chip pockets are avoided in the construction and the cradle block has an inside dovetail which is protected from accidental nicking and damage. It will be noted also that the contact surfaces for accurate relative location of the parts are all designed for simple machining operations. The locking action on the pivot is a pull down action which takes up any tolerance between the parts and compensates for any wear on the cone. The base parts are all closed to keep chips out.

We claim:

1. A locking joint for solid rotary connection of massive parts such as vise parts which comprises one part having a relatively deep cylindrical recess and an annular contact and bearing surface at the outer end of said recess extending outwardly from the walls of said recess, a second part having an annular contact wall to lie in complement bearing relation to the annular contact and bearing surface of said first part, an extension on said second

part within and concentric with said annular surface having two axially spaced cylindrical surfaces to lie in rotatable bearing contact with the walls of said recess, said extension having a truncated conical surface between said cylindrical surfaces with an included angle of about 50°, a locking screw in the wall of said first part accessible from the outside of said part and projecting into the space between said cylindrical surfaces the axis of said screw lying at about 80° to said conical surface, said screw having a blunt end normal to the axis thereof, and a wedge interposed between the end of said screw and said conical surface, said wedge having one surface complemental to said conical surface and a socket on the opposed side to receive the blunt end of said screw wherein a tightening of said screw causes a non-locking down-thrust on said conical surface without distortion of said screw.

2. A locking joint for solid rotary connection of massive parts such as vise parts comprising metal blocks to be associated for relative rotation having matching surfaces in face to face contact, said surfaces having, respectively, a relatively large cylindrical recess in one block and a relatively small concentric recess in the other, a pivot means having a pilot plug to fit snugly in said small recess, means comprising pins and screws to locate and fix said pivot means on said block containing the small

recess, and a large cylindrical portion concentric with said pilot plug as another part of said pivot means, said large portion having between its ends, a truncated conical portion converging inwardly and toward the plug, said large cylindrical portion fitting rotatively in said large recess, and means in the block having the large recess for exerting a direct non-rotative locking force on said conical portion over a relatively large complemental area, said force having a component inwardly and toward the base of said conical portion.

References Cited in the file of this patent

UNITED STATES PATENTS

164,934	Taft	June 29, 1875
999,978	Fisher	Aug. 8, 1911
1,371,617	Germanow	Mar. 15, 1921
2,364,599	Burrus	Dec. 12, 1944
2,371,435	Galorneau	Mar. 13, 1945
2,521,231	Larson	Sept. 5, 1950
2,676,414	Derry	Apr. 27, 1954
2,764,380	Gumphrey	Sept. 25, 1956

OTHER REFERENCES

Publication—Master Tool Co., Boston, Mass., Multi-Swivel Vise, copy placed in Patent Office files in 1944.