March 24, 1970 W. P. KAZOLIAS 3,502,319

VISE PARALLEL MEANS

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Fig. 1.

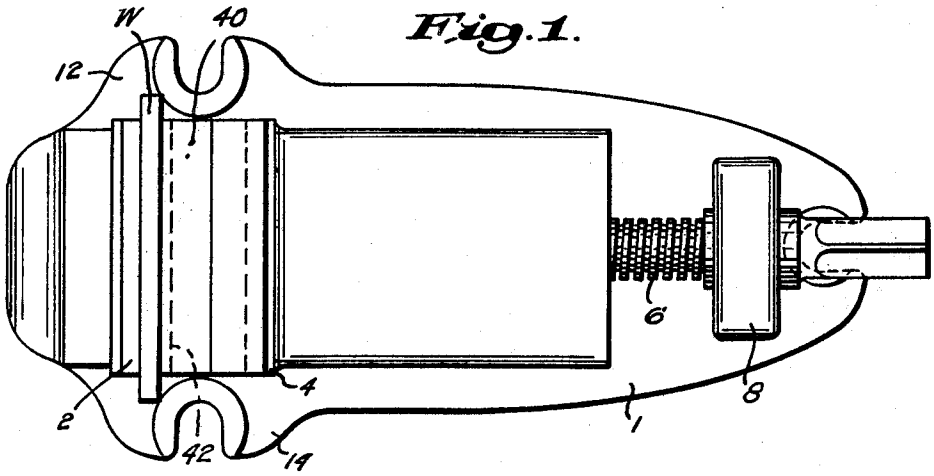


Fig. 2.

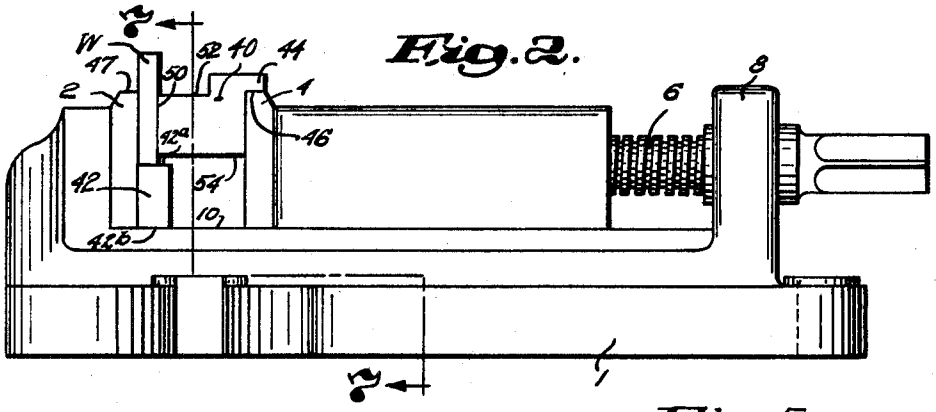


Fig. 3.

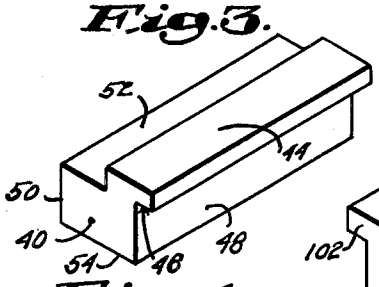


Fig. 4.

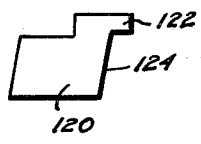


Fig. 6.

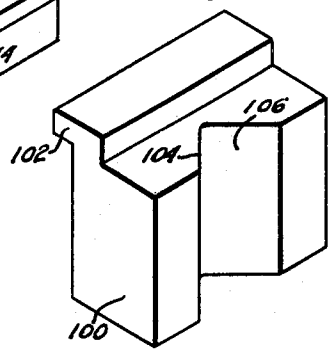
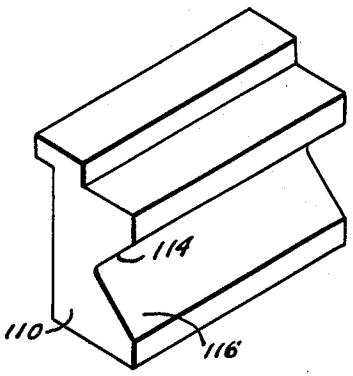


Fig. 5.



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Fig. 7

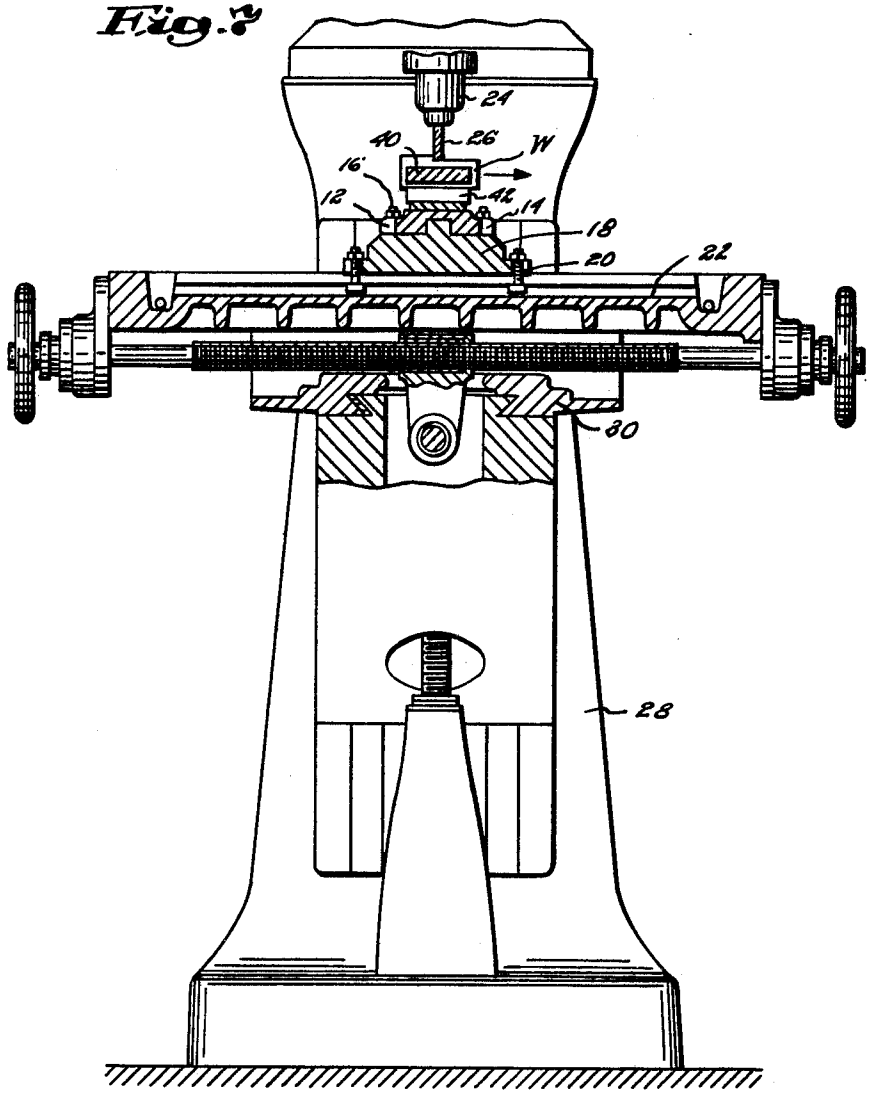


Fig. 9.

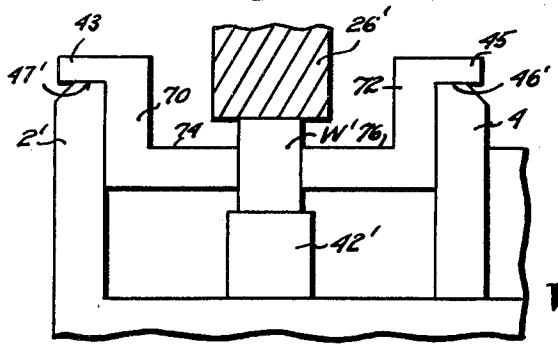
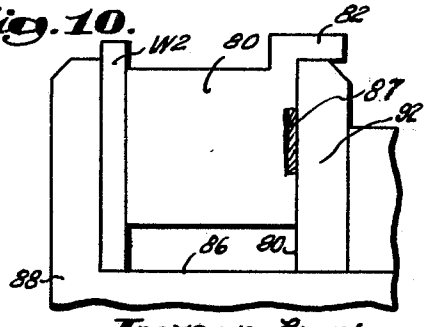


Fig. 10.



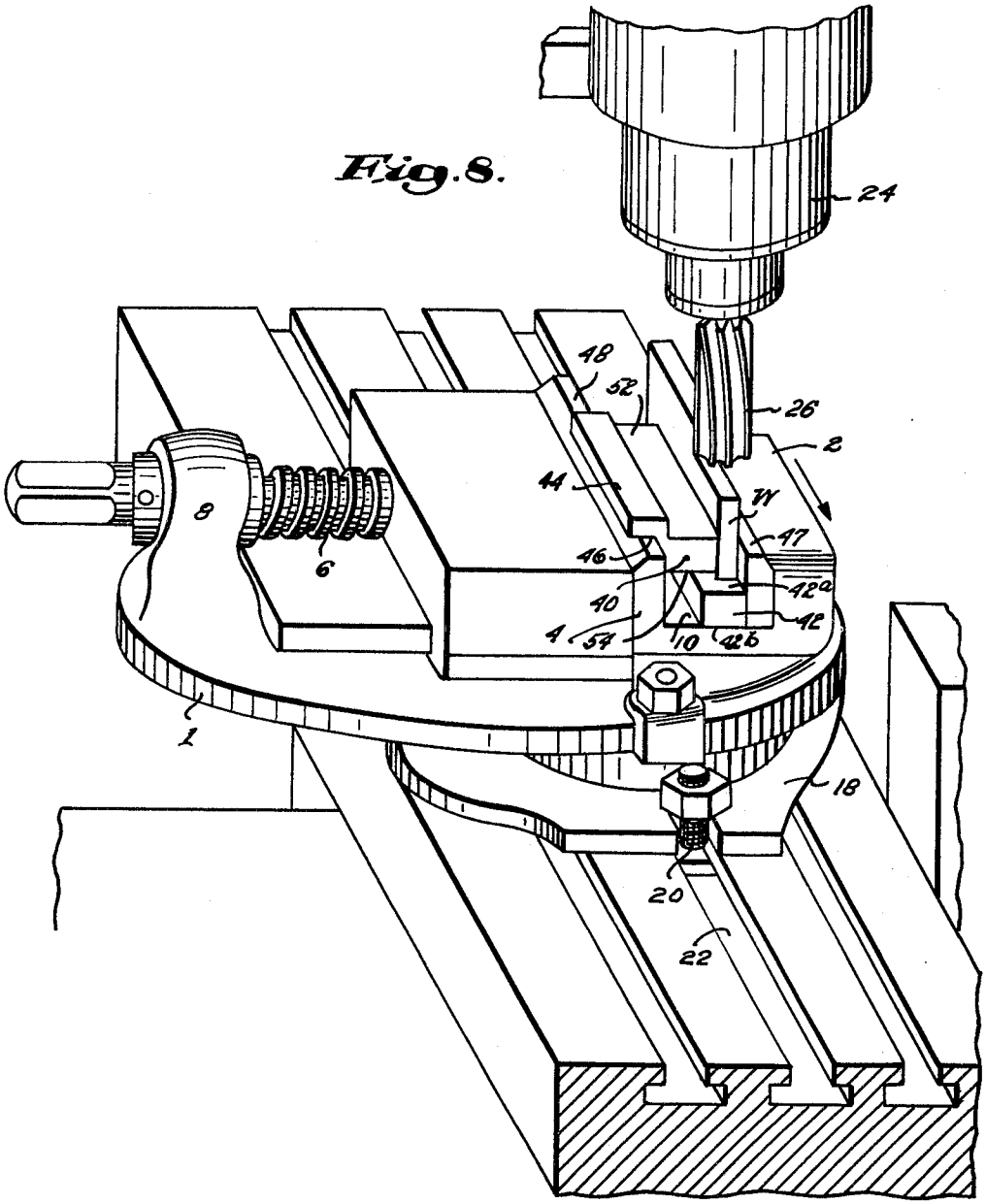
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VISE PARALLEL MEANS

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Fig. 8.



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United States Patent Office 3,502,319
Patented Mar. 24, 1970

3,502,319

VISE PARALLEL MEANS

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Filed Mar. 13, 1967, Ser. No. 622,686
Int. Cl. B25b 1/24, 5/16
U.S. Cl. 269—280 4 Claims

ABSTRACT OF THE DISCLOSURE

A vise and parallel assembly including a vise and a compensating vise parallel formed with a vise jaw engaging part for engaging with the movable jaw of the vise. The compensating parallel has vertically spaced parallel surfaces which enable the vise to handle a range of workpiece sizes any one of which may be based on a horizontal parallel surface in the vise in a position to provide for convenient use of feeler gauges.

From the foregoing abstract it will be seen that the invention relates to holding means for securing a workpiece in a position to be machined to a desired size or shape and, more particularly, the invention is concerned with an improved vise grip and parallel assembly by means of which a workpiece may be more conveniently and accurately positioned in a desired working position so that it may be engaged by a machine tool as, for example, a milling cutter or the like.

In a great many machine operations, it is frequently necessary to deal with a range of workpiece sizes and shapes and these workpieces must be supported on a horizontally extending parallel surface in a true parallel position. For this purpose standard vise parallels are ordinarily employed in the bottom of the vise. In such case the width of the workpiece must obviously be greater than the width of the parallel in order for the movable jaw to engage a vertical surface of the workpiece. This may necessitate the selection and positioning of a number of parallels for different workpiece thicknesses and a range of sizes of parallels may be required to be kept on hand.

A further even more important consideration is the need for locating the workpiece on the horizontal parallel surface in a solidly based position. This is usually made certain by means of feeler gauges and the operator customarily taps or drives the workpiece lightly down onto the parallel surface to eliminate any space which the feeler gauge detects. Here a problem arises with many relatively narrow workpieces where the workpiece is of a width less than the width of standard feeler gauges. In such case there may be insufficient room to insert the feeler gauge while the movable jaw is engaging the workpiece.

The present invention seeks to deal with the problems indicated and to provide means for positioning and holding workpieces more conveniently and quickly. A specific object is to devise a vise parallel arrangement by means of which a feeler gauge may always be readily inserted for a range of relatively narrow workpiece thicknesses.

Another object of the invention is the combination with a vise of a standard vise parallel and compensating parallel means capable of being instantly engaged over a movable vise jaw in vertically spaced relationship to the standard vise parallel. With this arrangement rapid holding may be accomplished for any one of the wide range of workpiece sizes and shapes.

A further objective of the invention is to devise a vise parallel which may have a range of angularly formed surfaces and shapes to deal with clamping requirements for many different shapes and forms of workpieces.

Still another object of the invention is to provide a

compensating parallel for use with vise jaws in a position to allow a cutter such as a milling cutter to form a cut of a depth which may approach and extend below the level of the top surfaces of the vise jaws.

With the foregoing considerations and objectives in mind, I have conceived of an improved compensating parallel holding principle which is one preferred embodiment comprises a compensating parallel structure formed along one side with vise jaw engaging means for overlying and conveniently engaging an upper surface of a movable vise jaw.

The compensating parallel by means of the engaging part may be superimposed on the movable jaw and easily held by an operator while he advances the movable jaw into a clamping position with a workpiece to be machined. An important feature of this compensating parallel is that it may be utilized for a wide range of workpiece thicknesses.

By reason of the depending relationship of this compensating parallel between the vise jaws, the bottom of the compensating parallel may be located in spaced relation to either the bottom of the vise or an upper surface of a standard parallel located in the bottom of the vise. Therefore, it will be readily seen that room or space may in all cases be maintained for inserting a feeler gauge between the bottom of the workpiece and its supporting surface. When used with a standard parallel the depending parallel functions to provide a compensating means for holding the movable jaw against workpieces of various thicknesses and shapes.

The nature of the invention and its other objects and novel features will be more fully understood and appreciated from the following description of a preferred embodiment of the invention selected for purposes of illustration and disclosed in the accompanying drawings, in which:

FIGURE 1 is a plan view illustrating a vise structure of the class employed in machine tools such as milling machines and the like;

FIGURE 2 is a side elevational view of the structure shown in FIGURE 1;

FIGURE 3 is a detail perspective view of the compensating parallel of the invention;

FIGURES 4, 5 and 6 are perspective views illustrating different forms of compensating parallels;

FIGURE 7 is a side elevational view partly in cross section illustrating a vise mounted in a milling machine and equipped with both a standard vise parallel and the compensating parallel of the invention;

FIGURE 8 is an enlarged fragmentary perspective view of the vise assembly of FIGURE 7 further illustrating the use of the compensating vise parallel of the invention in one operative position;

FIGURE 9 is a fragmentary elevational view of a vise and parallel assembly in which a pair of compensating parallels are combined with a standard parallel; and

FIGURE 10 is another elevational view of a vise and compensating parallel used independently of a standard parallel.

Considering the structure shown in the drawings in greater detail, FIGURE 1 illustrates a conventional travelling vise structure of the type used in milling machines and the like. The vise structure includes a base **1**, a fixed vise jaw part **2** and an adjustable jaw part **4**. The jaw part **4** is actuated by a screw **6** rotatably mounted at one end in a bearing **8**. The vise jaw **4** is thus adjustable over a horizontal bottom surface **10** formed in the base **1**. The vise structure described, as further shown in FIGURE **8**, is formed with clamping lugs **12** and **14** which receive bolts **16** engageable in a slide member **18** which is in turn guided by guide posts **20** in ways as **22**.

As further illustrated in FIGURE 7, the slide **18** is travelled in the well-known manner beneath a stationary milling head **24** in which is rotatably supported a milling cutter **26**. Also shown in FIGURE 7 are a base or stand **28** and a supporting table section **30**.

In accordance with the invention, I provide a work holding compensating parallel which may be constructed in any one of several different forms and which may be utilized with the vise and milling cutter arrangement above described.

In one preferred form the compensating parallel of the invention may be constructed as shown in FIGURES 1 to 3 inclusive and FIGURES 7 and 8. As shown therein this preferred embodiment of compensating parallel is denoted generally by the numeral **40** and may be used in combination with a standard parallel **42**.

As is well known the standard type of parallel as **42** usually comprises an elongated bar member of generally rectangular cross section and this bar member is formed with true parallel top and bottom surfaces **42***a* and **42***b* so that when the bottom surface **42***b* is solidly based on the vise bottom **10**, the top surface **42***a* will lie in a true horizontal plane on which surface a bottom side of a workpiece may be supported in a correct parallel relationship.

The compensating parallel member **40** is also constructed as a solid elongated bar of rectangular cross section and of a length generally corresponding to and slightly less than the length of the vice jaws **2** and **4**. Along one side the compensating parallel is formed with a raised jaw engaging part **44** which is constructed with a relieved undersurface **46**. The surface **46** is made parallel with and adapted to overlie a top surface **48** (FIGURE 8) of movable vise jaw **4**. The compensating parallel **40** is also constructed with vertically disposed parallel surfaces **48** and **50** of which surface **50** is a work engaging surface for engaging a workpiece W as shown in FIGURES 1 and 2 and of which surface **48** is a movable jaw engaging surface.

As will be readily understood from an inspection of FIGURE 2, the compensating parallel is conveniently made of a thickness which exceeds the thickness of the standard parallel **42** appreciably.

Thus it will be apparent that a relatively narrow workpiece W substantially less in thickness than the standard parallel **42** may be solidly based on parallel **42** and readily clamped and held by engaging the compensating parallel **40** and jaw **4** against one side of the workpiece. Therefore, a range of workpiece thicknesses may be conveniently accommodated without changing the standard parallel.

It is also pointed out that the compensating parallel of the invention is made with a bottom surface **54** and a top surface **52** which is so constructed as to be at a level below the level of the top surfaces **46** and **47** of jaws **4** and **2** respectively. In addition the vertical depth of the compensating parallel as measured between the surfaces **52** and **54** is chosen of a dimension such that the bottom surface **54** may occur with any desired spacing relative to a standard parallel top surface. This dimensional relationship provides several other novel features of a desirable and important nature. Thus in the case of a vertical dimension providing for the compensating parallel being spaced from the top of the standard parallel, there is achieved adequate clearance for a thin feeler gauge of relatively narrow standard width to be readily inserted into a space resulting from the entire bottom surface of workpiece W not being fully in contact with the bottom parallel **42**, and the narrow feeler gauge may be inserted into such a clearance without obstruction by jaw **4** or parallel **40**.

Therefore, the workpiece may be more quickly driven down into a solidly based parallel position if a feeler gauge detects a slight clearance. In the case of the recessed relationship of surface **52** relative to jaw top surface **47**, several advantages may be realized. First, the compensating parallel may be used with standard parallel of a number of thicknesses. Secondly, the arrangement of the surface **52** at a level below the top **47** of jaw **2** provides for a cutting tool being worked to remove an upper section of workpiece W down to and below the level of jaw surface **47** without danger of contacting the top of hardened steel jaw **47** and thus impairing the cutting edges of the tool **26**.

I may also wish to utilize two compensating parallels with a standard bottom parallel where it may be desired to maintain both vise jaws out of contact with the workpiece, as well as the bottom standard parallel. FIGURE 9 illustrates the combination of two compensating parallels **70** and **72** having jaw engaging parts **43** and **45** which are engaged over vise jaws **2'** and **4'** to hold a workpiece W' on a standard parallel **42'** in position to be engaged by a cutter **26'**.

In this case the recessed relation of the surfaces **74** and **76** provide clearance space for the relatively large diameter tool **26'** to remove a section of metal from the workpiece W' well below the tops **46'** and **47'** of the vise jaws **2'** and **4'**. This arrangement provides still further versatility in that the machine operator may readily apply a feeler gauge between the standard parallel **42'** and the bottom of the workpiece W' from either side of the vise.

I may also desire to employ the parallel member of the invention in some instances independently of a standard parallel and one such arrangement has been illustrated in FIGURE 10. As noted therein the parallel member **80** is provided with a jaw engaging part **82** and is made of a vertical depth such that it may extend well down into the vise in the manner indicated and in this case the bottom **86** of the vise **88** is used as a reference surface to properly support the workpiece W2.

FIGURE 10 also illustrates the use of other holding means incorporated in the parallel for attachment to a vise jaw. For example, numeral **87** denotes a magnet insert recessed in the parallel in a position to engage against and lock with the ferrous metal surface **90** of the jaw **92**. Various other holding means may be employed for any of the forms of parallels disclosed in this invention.

In connection with using a compensating parallel either combined with or independently of a standard parallel there may occur certain types of tool working operations involving irregularly or angularly shaped surfaces and in such case I may provide the compensating parallel of the invention with angular holding surfaces as shown in FIGURES 5 and 6.

Numeral **100** denotes a parallel with jaw engaging part **102** and angular holding surfaces **104** and **106** which extend in vertical planes. FIGURE 5 indicates a parallel **100** with jaw engaging part **112** having angular surfaces **114** and **116** which extend horizontally. These surfaces are adapted to engage and hold workpieces of the irregular, round or angled shape. FIGURE 4 illustrates a parallel **120** having a jaw engaging part **122** and in an angularly recessed surface **124**.

Various other modifications may be resorted to in keeping with the scope of the appended claims.

I claim:

1. An apparatus for holding a work piece which is to be machined, and which has a vertical surface, said appartus including a machine vise for use on a machine tool having a vise supporting surface which lies in a horizontal plane, said machine vise being formed with a fixed vise jaw having a fixed vertical work engaging surface, a base surface which extends at right angles to the fixed vise jaw in a plane parallel to the said vise supporting surface and an adjustable vise jaw movable along the said base surface and having a vertical work engag-

ing surface which is parallel to the said fixed vise jaw, a bottom vise parallel mounted on the said base surface in a position to support the workpiece in a raised position above the jaws and a compensating vise parallel suspended from the adjustable jaw in spaced relationship above the bottom vise parallel and movable with the adjustable jaw to engage and hold the vertical surface of the workpiece against the fixed vertical work-engaging surface of the said fixed jaw while supported on the bottom vise parallel in right angular relationship to the said vise supporting surface of the machine tool.

2. A structure according to claim 1 in which the compensating vise parallel comprises an elongated member formed at one side with a vertical jaw engaging parallel surface and at the opposite side with a second vertical surface parallel to the jaw engaging surface and a jaw engaging part which extends outwardly from the top of one of the vertical surfaces at right angles thereto.

3. A structure according to claim 2 in which the elongated member is formed with a top surface which occurs at a level below the level of the top of the said fixed jaw.

4. An apparatus for holding a workpiece to be machined said apparatus including a machine vise for use on a machine tool having a vise supporting surface which lies in a horizontal plane, said machine vise being formed with a fixed vise jaw having a vertical work engaging surface, a horizontal base surface which extends at right angles to the work engaging face of the fixed vise jaw in a plane parallel to the said vise supporting surface of the machine tool and an adjustable vise jaw adjustable along the base surface and having vertical work engaging surface which is parallel to the work engaging surface of the

fixed vise jaw, a bottom vise parallel located on the said base surface for receiving the said workpiece, said bottom vise parallel having a vertical dimension which provides for supporting a workpiece in a raised position above the said jaws a desired distance, and said bottom vise parallel having a width which exceeds the thickness of the said workpiece, and a compensating parallel supported on the movable vise jaw in spaced relation to the bottom vise parallel and movable into engagement with the workpiece and said compensating parallel being of a width greater than the width of the bottom parallel.

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U.S. Cl. X.R.

269—315