

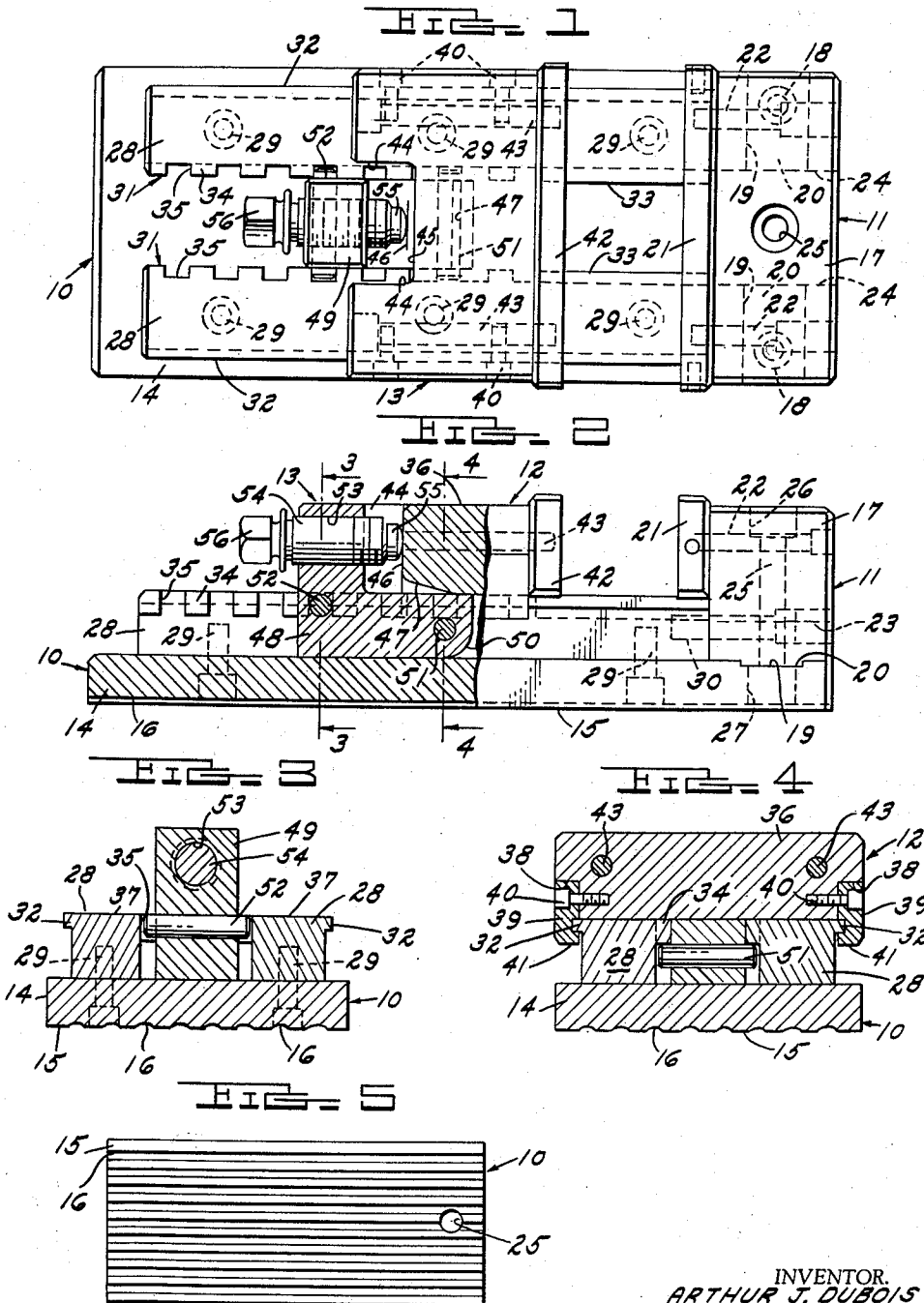
Jan. 13, 1959

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2,868,091

QUICK ACTING PRECISION MILLING AND GRINDING VISE

Filed Oct. 11, 1956



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2,868,091

QUICK ACTING PRECISION MILLING AND GRINDING VISE

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Application October 11, 1956, Serial No. 615,284

1 Claim. (Cl. 90—60)

This invention relates generally to vises, and, more particularly, to a quick acting precision vise for use in holding workpieces during machining operations and especially while performing milling and grinding operations on workpieces.

It is an important object of this invention to provide a vise adapted for use on close tolerance work and which is light in weight, compact and rugged in construction, economical of manufacture, and which may be quickly and easily operated.

It is another object of this invention to provide a vise having a stationary jaw adapted to coast with a movable or slidable jaw which may be quickly secured at a desired position on the vise base by means of a separate quickly operable clamping means which is slidable on the base and releasably engageable with a rack means carried on said base.

It is a further object of this invention to provide a vise, of the class described in the aforementioned objects, having an enlarged passage extending through the base and stationary jaw for the reception of chips and coolant and which passage is open at the ends thereof to provide a free-flow escape passage through which the chips may be blown out and coolant pass through.

Other objects, features and advantages of this invention will be apparent from the following detailed description and appended claim, reference being had to the accompanying drawing forming a part of the specification wherein like reference numerals designate corresponding parts of the several views.

In the drawings:

Fig. 1 is a top plan view of a vise made in accordance with the principles of the invention;

Fig. 2 is a side elevational view of the vise illustrated in Fig. 1, partly broken away in central vertical section through the slidable jaw, base and clamping unit;

Fig. 3 is an elevational sectional view of the illustrated vise, taken along the line 3—3 of Fig. 2;

Fig. 4 is an elevational sectional view of the illustrated vise, taken along the line 4—4 of Fig. 2; and,

Fig. 5 is a reduced bottom plan view of the illustrated vise.

Referring now to the drawings, and in particular to Figs. 1 and 2, an illustrative embodiment is shown which comprises generally a base member 10 on which is mounted the fixed or stationary jaw unit 11, the movable or slidable jaw unit 12, and the adjustable clamping means or unit 13. The base member 10 includes the rectangularly shaped bed 14. The lower surface 15 of the bed 14 is provided with a plurality of chip or dirt grooves 16 which extend the entire longitudinal length of the bed.

The stationary jaw unit 11 includes the jaw 17 which is transversely disposed on one end of the bed 14 and is fixedly secured thereto by any suitable means, as by the bolts 18. The bed 14 is provided with a transverse recess as 19 on each side thereof below the fixed jaw 17, in which are received the lips or projections 20

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on the lower side of the jaw 17. The recesses 19 and lips 20 function as stop means to prevent longitudinal movement of the jaw 17 relative to the bed 14. The jaw 17 is provided with the usual jaw insert 21 which is fixedly secured thereto by any suitable means, as by the bolts 22. The jaw 17 is provided with a longitudinally extended opening therethrough for chip and coolant passage there through and this opening is indicated in Figs. 1 and 2, wherein the numeral 23 denotes the upper end of said opening and the numeral 24 indicates the sides of the opening. The jaw 17 is provided with a vertical bore 25 therethrough which is enlarged at the upper and lower ends thereof, as indicated by the numerals 26 and 27, respectively. The bore 25 is adapted to receive a suitable retaining bolt for holding the vise on the worktable of a machine tool to provide a swivel mounting relation therebetween.

As best seen in Figs. 1, 4 and 5, the base member 10 includes a pair of spaced apart longitudinally extending slideways, as the left hand slideway 28 and the right hand slideway 28a. The slideways 28 and 28a are fixedly mounted on the bed 14 by any suitable means, as by means of the vertically disposed bolts 29 and the horizontally disposed bolts 30 which engage the forward end of the slideways and secure them to the stationary jaw 17. The slideways 28 and 28a are each provided with an inner guide bar 31 integrally formed on the inner upper edge thereof, and an outer guide bar 32 integrally formed on the outer upper edge thereof. The inner guide bars 31 are continuous on the forward end thereof, as at 33, for about one quarter of the length thereof, and the rest of the guide bar is provided with a plurality of evenly spaced square teeth, as 34, which are separated by the recesses 35. The teeth 34 and recesses 35 may generally be termed a rack means.

The movable jaw unit 12 includes the jaw 36 which is slidably mounted on the upper surface 37 of the slideways 28 and 28a. The jaw 36 is provided on the lower edge of each side with a longitudinal undercut as 38 in which is fixedly mounted a longitudinal guide member 39 by means of the bolts 40. The guide members 39 are each provided with an inwardly extended lip portion 41 which engages the underside of the adjacent guide bar 32. The movable jaw 36 is provided with the usual jaw insert 42 which is fixedly secured thereto by any suitable means, as by the bolts 43. The jaw 36 is provided with a recess in the rear end thereof which is formed by the spaced apart side walls 44 and the forward transverse wall 45. A vertical, centrally disposed, screw abutment surface 46 is integrally formed on the forward recess wall 45. The underside of the movable jaw 36 is tapered or sloped downwardly and forwardly from the lower edge of the recess forward wall 45 as indicated by the numeral 47.

The adjustable clamping means comprises an L-shaped clamp having a lower foot portion 48 and an integral upwardly extending upper or leg portion 49. As shown in Fig. 2, the lower edge of the forward end of the foot portion 48 is rounded off, as at 50. As best seen in Figs. 2 and 4, a dowel pin 51 is fixedly mounted in the forward end of the foot portion 48 and the ends of this pin extend outwardly of the clamp member under the inner guide bars 31. As best seen in Figs. 2 and 5, a second dowel pin 52 is fixedly mounted in the rear end of the foot portion 48 and the ends thereof extend outwardly and are adapted to be meshably engageable in the recesses 35 between the rack teeth 34. The dowel pin 52 is disposed above the level of the dowel pin 51 and serves to prevent longitudinal movement of the clamp relative to the slideways when it is engaged with the rack teeth 34. The upper or leg

portion 49 of the clamp is provided with a longitudinal threaded hole therethrough, as 53, through which is threadably mounted the clamp screw 54 which is disposed parallel to the base member 10. The clamp screw 54 is provided with a nose portion 55 on the forward end thereof and with a square head 56 on the rear end thereof for the reception of a wrench.

It will be understood that the illustrated vise may be made to any desired size. The vise is preferably made from machine steel which is hardened, and all of the surfaces of the various parts of the vise are ground. The jaw inserts 21 and 42 are preferably made from tool steel and are ground all over. The bottom surface 15 of the vise provides full unbroken longitudinal surfaces and, since said bottom surface is ground to a close tolerance, the vise is adapted for use on magnetic grinding chucks for close tolerance work. The chip or dirt grooves 16 function to permit any dirt under the bottom of the vise to be shifted or moved into these grooves so that the longitudinal unbroken surfaces 15 may make true contact with the work table supporting device. Since the instant device is completely made from steel, it is much lighter than the prior art devices, as for example, a five inch prior art vise would weigh approximately 150 pounds and a five inch vise made in accordance with the invention would weigh approximately 35 pounds.

A distinct advantage of the instant vise over the prior art vises is the quick clamping or releasing action provided by this vise, and this can be seen from the following description of the operation of the vise.

With the movable jaw 12 in the position shown in Figs. 1 and 2, the jaw 12 may be moved backwardly to permit a large workpiece to be inserted between the jaws 12 and 17 by first backing the screws 54 so as to break contact between the nose 55 of the screw and the abutment 46 on the movable jaw 12. The clamping means 13 may then be pivoted upwardly about the nose 50 on the forward end of the foot portion 48 so as to have the rear pin 52 clear the rack means 31. The entire clamping means 13 may then be slid rearwardly or to the left, as viewed in Figs. 1 and 2. The movable jaw 12 may then be quickly moved to any desired position with the workpiece positioned between and in engagement with the jaw inserts 21 and 42. The movable jaw 12 may then be clamped in such adjusted position by sliding the clamping means 13 forwardly or to the right, as viewed in Figs. 1 and 2, and with the clamping means still in the upwardly pivoted position so that the pin 52 is above and clears the rack means 31. The clamping means 13 is moved forwardly until the nose 55 approaches the abutment 46 on the movable jaw 12 and the clamping means 13 is then pivoted downwardly or counter-clockwise, as viewed in Fig. 2, so as to engage the pin 52 in the nearest recess 35 of the rack means 31. The clamp screw 54 is then threaded inwardly until the screw nose 55 abuts the abutment 46 on the movable jaw 12. A wrench may be applied to the screw head 56 to securely tighten the screw 54 against the movable jaw 12, and the workpiece will be then securely held in place between the jaws 12 and 17. The workpiece may be quickly removed from the vise by reversing the aforesaid described clamping procedure.

It will be seen that the instant device is well adapted for milling and grinding operations since the clamping screw 54 is horizontally disposed below the upper edge of the jaw inserts 21 and 42, and accordingly, will not interfere with any grinding wheel or milling cutter which is moved over the vise and into working contact with a workpiece held between said jaw inserts.

A further advantage of the instant novel structure is that the clamping pressure exerted by the clamping

screws 54 is used to the best advantage since it is applied against the workpiece in a direction parallel to the movement of the movable jaw. An advantage of the rack means and the pin 52 which coacts therewith is that the clamp can not slip out of the rack teeth 34 and, accordingly, a positive non-slip position is assumed by the clamping means 13 in any adjusted position on the base member 10. The instant structure also provides a vise wherein the screw motion is made as short as possible as compared to the prior art vises wherein it is necessary to operate an elongated screw rod which takes much time for clamping or releasing the workpiece in the vise. The spacing of the teeth 34 on the rack means 31 may be spaced apart any desirable distance, but it has been found preferable to space such teeth approximately three quarters of an inch apart, measured from centerline to centerline thereof. It is also possible to provide a vise of the instant type to have a much wider opening action as compared to the prior art type vises using an elongated clamping screw. For example, in a five inch vise of the instant type, it is possible to obtain a five inch opening between the jaws with a vise wherein the base member is approximately 12 inches long. Accordingly, it is seen that a vise made in accordance with the invention is adapted to receive larger workpieces than comparable similar size prior art vises.

While it will be apparent that the preferred embodiment of the invention herein disclosed is well calculated to fulfill the objects above stated, it will be appreciated that the invention is susceptible to modification, variation and change without departing from the proper scope or fair meaning of the subjoined claim.

I claim:

A vise comprising, a horizontal bed; a stationary jaw fixedly mounted on one end of said bed; a pair of spaced apart longitudinal slideways fixedly mounted on the uppermost side of said bed and extending from said stationary jaw to the other end of the bed; a guide bar mounted on the outer side of each of said slideways; a movable jaw slidably mounted on said slideways for travel along said bed; a guide member fixedly mounted on each side of said movable jaw and being provided with an inwardly extended lip portion which engages the underside of one of said guide bars; a rack means formed on the inner side of each of said slideways; a clamp slidably mounted on said bed between said slideways; a first pin carried on said clamp adjacent the forward end thereof and adapted to extend outwardly from the sides of said clamp below said rack means; a second pin carried on said clamp adjacent the rear end thereof and adapted to extend outwardly from the sides of said clamp and to releasably mesh with said rack means for retaining the clamp in a selected position on said bed against longitudinal movement thereon; and, a horizontal clamping screw threadably mounted on said clamp and adapted for engagement with said movable jaw for clamping the movable jaw in place against a workpiece held between said jaws.

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