

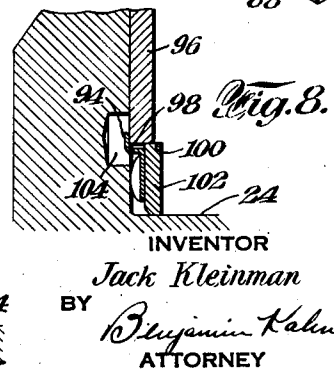
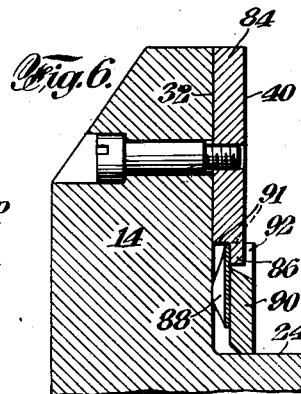
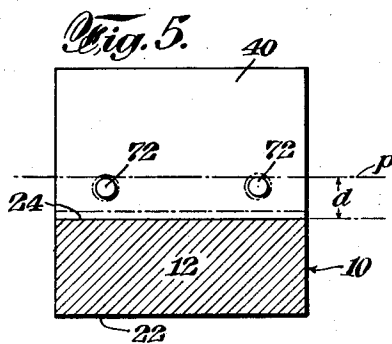
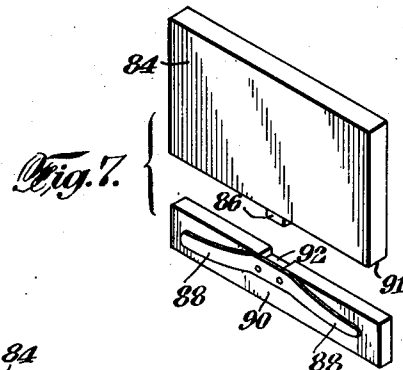
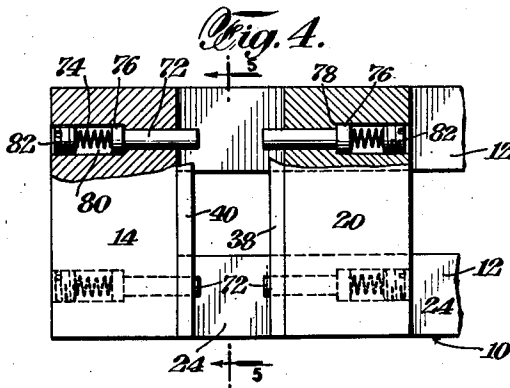
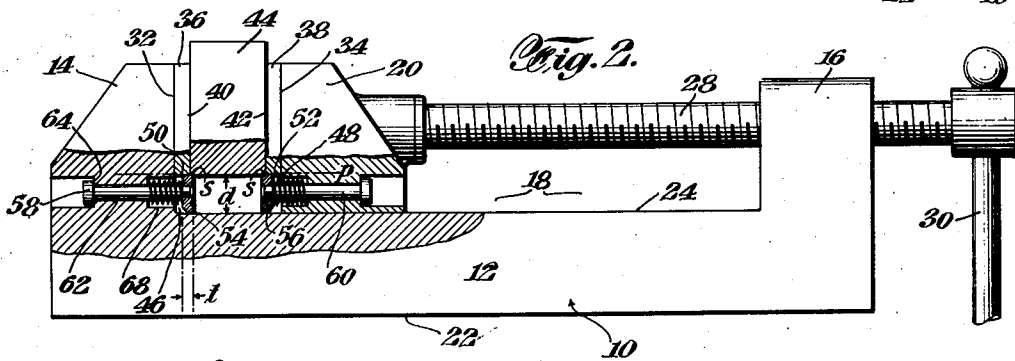
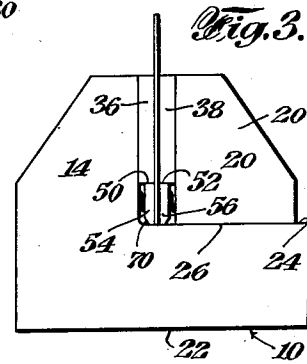
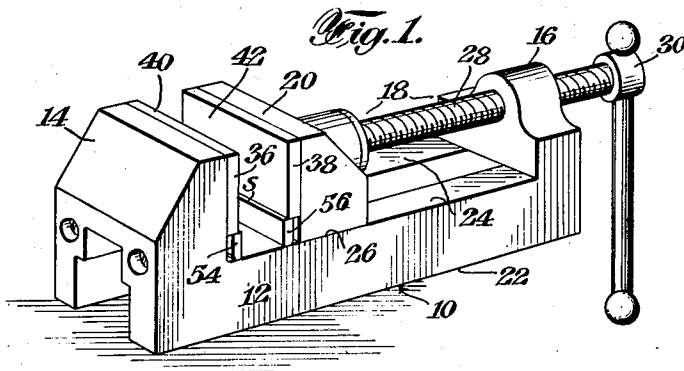
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VICE CLAMP

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VISE CLAMP

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7 Claims. (Cl. 77—63)

This invention relates to improvements in vise clamps and more particularly relates to drill vise clamps or the like and parallel aligning attachments therefor.

One of the objects of the invention is to provide a unitary device of the character described having novel means adapted to support work clamped therein in paralleled aligned relationship to supporting surfaces of the device and consequently presenting the work in proper normal alignment.

Another object of the invention is to provide a unitary mechanism that is not easily gouged by drills or by tools operating on the work; offers a maximum of protection against lodging of chips and consequently no interference thereby; and is easily cleanable.

Other objects and advantages will appear from the hereinafter detailed description of the invention having references to the accompanying drawing illustrating several forms of the invention, wherein:

Figure 1 is a perspective view of one form of the invention as embodied in a drill vise.

Figure 2 is a side elevation partly in section of the form shown in Figure 1.

Figure 3 is a fragmentary side elevational view of the form shown in Figure 1 and as employed in clamping a piece of thin stock.

Figure 4 is a fragmentary plan view of a modified form of the invention.

Figure 5 is a section taken substantially along the line 5—5 of Figure 4.

Figure 6 is a view similar to Figure 3 showing another form of the invention.

Figure 7 is a perspective view of certain cooperating parts of the form shown in Figure 6.

Figure 8 is a fragmentary sectional view of still another form of the invention.

Referring to Figures 1, 2, and 3 of the drawing there is illustrated a vise, commonly known as a drill vise, which includes a body 10 having a base portion 12 and a preferably integral upwardly projecting jaw 14 at one end; a screw boss 16 at the other end, preferably formed integrally with the base portion 12 and providing a recess 18. Adapted to slide within this recess is a movable jaw member 20. The lower surface 22 is a precisely and accurately finished plane surface to provide accurate disposition of the vise upon a bed plate of a drill or machine having other similar cooperating finished surfaces normal or parallelly disposed with the axis of the tool of the machine.

A similar accurately and precisely finished up-

per surface 24 parallel to the surface 22 is provided at the base of the recess, that is, the upper horizontal surface of the body 10, and an accurately finished surface 26 is provided at the base of the movable jaw member 20. The upper surface 28 is freely exposed between the jaws, that is, there is no interference to the insertion of stock between the jaws and upon said upper surface by any screw or other jaw moving means. The jaw member is adapted to slide on the base. A screw 28 is threadedly engaged in the boss 16 and is provided with means for operating the screw as indicated at 30. The screw is secured to the movable jaw 20 in any well known manner so that upon rotation of the screw the movable jaw 20 is advanced toward or drawn away from the stationary jaw 14. The jaws provide inwardly directed surfaces 32 and 34 against which are secured hardened work clamping plates 36 and 38 respectively. These plates are finished so as to provide accurately parallel surfaces 40 and 42 adapted to engage work pieces.

A piece of work 44 is illustrated in Figure 2. The plates 36 and 38 are adapted to be spaced from the finished surface 24 previously described, thereby providing recesses 46 and 48.

The lower edges of these clamping plates provide accurately finished plane nether surfaces 50 and 52 so as to be parallel with the surface 24 and lie in a common plane p at a distance d from the plane of the surface 24, as indicated by the reference character in Fig. 2.

A pair of parallel members 54 and 56 each comprising a strip of metal finished to such size along dimension d as to fit very accurately and closely but still slidable between the spaces provided between the nether surfaces 50 and 52, and the upper surface 24. It is desirable to provide a minimum of sliding clearance between said surfaces in the planes defined by the dimension d . These parallel members are also preferably of hard material and thinner in their dimension t than their respective overlying hardened plates, and are adapted to extend inwardly from the respective clamping surfaces 40 and 42 of the clamping plates 36 and 38 respectively, as illustrated in Figure 2; and are adapted to wholly underlie their respective plates when urged into their respective recesses 46 and 48, so that their opposed faces are back of the clamping surfaces 40 and 42 as illustrated by their positions as shown in Figure 3.

While clamping plates are employed, it is to be understood that the recesses partially provided thereby may be had by cutting and grinding into

the solid stock of the jaw. The cut in the rigid jaw being in the form of an undercut channel and in the slidable jaw as a corner undercut. In the case of the slidable jaw, in the solid or plate recessed jaw, the upper surface 24 cooperates in forming a channel-shaped recess. In the recess of the solid jaw, this recess may be cooperative with a coplanal extension of the surface 24 to underlie its nether surface or such channel-type recess may be cut and ground independent of (above or below) the surface 24. In any event, the nether surface of the recess and the facing or underlying surface thereof are essentially precisely-finished planal surfaces accurately ground to confine work supporting pieces precisely parallel and cooperative therewith.

These parallel work supporting members are preferably provided with yielding means for urging them inwardly into the position shown in full lines in Figure 1 and in this position their inner limit is determined by engagement of heads 58, of screw 60 secured to respective parallel members. Each of the screws 60 is adapted to slide loosely in a compound bore 62, each providing a shoulder 64 for engagement with a head 58 and an oppositely facing shoulder adapted to form a seat for a spring 68. These springs are preferably but not essentially adapted to surround the screws 60 and are adapted to urge the parallel members inwardly toward each other. One or more screws and/or springs may be employed, with the springs and screws operating in independent bores.

At the upper surface 24 of the base 10 and at the juncture of the surface 24 with the surface 32 there is preferably provided a fillet for preventing a fracture at this point.

A corresponding corner 70 of the parallel member is bevelled-off in order to accommodate the said fillet in the depressed position of the parallel member. The other parallel member 56 is similarly bevelled for production reasons and this bevel is not essential.

In normal position of the parallel members in the device, it is preferable that their inner limits are so arranged that they project slightly inward of the clamping surfaces 40 and 42.

Parallel shelves *s-s* are thus provided upon which the work may rest prior to clamping. This is for the purpose of providing a parallel seat or positioning means in a plane parallel to the base surface of the vise which is adapted to rest upon the surface of the machine such as a bed plate of a drill press and thus presents the work piece parallel and normal to the disposition of the machine.

In employing the device in a drill press for instance, the hole drilled will be normal to the plane of the supporting shelves or surfaces *s* and this supporting plane is spaced from the upper surface of the base so that in drilling through the work the tip of the drill, or other tool employed such as a ream, does not gouge the upper surface upon which the movable jaw slides and against which the movable jaw is positioned.

In performing operations on the work piece the tool chips gathered in clamps of this character lodge in corners and upon surfaces which must be removed before aligning a subsequent work piece. With the construction of the parallel members as described, any chips or even dust upon the aligning surfaces *s* and in the corners are easily removed therefrom.

During a drilling operation close to the clamp-

ing surfaces and within the projecting plane of the parallel members, the drill may strike a parallel member without injury, as this piece is hardened so as to resist the cutting of the drill; and upon contact of the drill with the parallel member it is adapted to recede into the recess and permit the drill to pass. Any chips remaining upon the aligning surfaces *s-s* from the previous work pieces are easily removed by manually pressing the parallel members outwardly and completely into their recesses thus wiping the surfaces *s-s* clean of any chips which would ordinarily interfere with the proper alignment of subsequent work pieces.

It has also been found that if dust collects upon the aligning surfaces especially in the corners, and if not removed, the work piece will be positioned out of line. The dust can however be easily removed by blowing through the recesses in order to insure reception of the parallel members without interference; and any chips may become lodged in the recesses and on the parallel members may also be easily removed by blowing through the recesses.

Referring to Figure 2 it will be seen that the device as constructed according to the above description is capable of clamping thin stock wherein the seats provided by the parallel members is not essentially employed in alignment of such thin stock but may be employed if desired.

In some forms of the invention particularly as illustrated in Figure 4, it is not essential that uninterrupted surfaces *s* be presented to support the work above the upper surface of the base, and devices defining a parallel plane but presenting only small area or lines of contact with the work are preferred in some cases; an example of this construction is here shown.

This device comprises pins 72 urged inwardly toward each other by springs 74 and limited in their inward movement by engagement of flanges 76 on the pins 72 and shoulders 78 provided by the compound bore 80.

Plugs 82 may be employed to close off the bores and provide a reacting seat for the springs. Although in this form shown in Figures 4 and 5, the pins are illustrated as lying under the surfaces 50 and 52 of the clamping plates 34 and 36, it will be seen that the clamping plates may extend down to the upper surface 24 of the base and the pins may project through holes in these clamping plates.

Referring to the modification shown in Figures 6 and 7 the clamping plates 84 may be provided with a downward projection 86 adapted to engage the upper central portion of a leaf spring 88 secured to the parallel member 90. This construction permits the parallel members to recede at either end, in response to being in the path of a drill, and is not confined to parallel recession as in the previous forms, when so fixed to a leaf spring as shown.

It has been found that by confining the clearance to the lowest possible slide tolerances, the parallel members cannot be displaced from their recesses by longitudinal rotation since no such rotation is permitted by such close confinement of the parallel member between finished surfaces 24 and the finished surfaces 91.

A suitable cut-out 92 is provided in the upper portion of the members 90 in order to expose the upper central portion of the leaf spring for engagement with the downwardly directed projection 86.

Referring to Figure 8, another modification of 78

the form shown in Figures 6 and 7 is here illustrated and includes a bent projection 94 at the upper central portion of the leaf spring which is adapted to limit the inward movement of its associated parallel member by the engagement of the projection 94 with the rear face of the associated clamping plate 96. It will be particularly noted that, in this instance, the lower surface 98 of this plate 96 and the upper coating surface 100 of the parallel member 102 are finished in a simpler manner in comparison to the construction shown in Figures 6 and 7.

In order to permit the full recession of the member 102, a recess 104, which may be in the form of a drilled hole, is provided to freely receive the projection 94 and thereby permit the complete recession of the member 102.

It will be noted that the heads 58 in the modification shown in Figures 1-3 limit the movement of the work supporting means in the direction where the said means intersects the plane defined by its associated clamping surface. This construction also prevents the disengagement of the work supporting means from the vise clamps and produces a unitary structure.

Likewise, the heads 76 in the construction shown in Figures 4 and 5 prevent the displacement or disengagement of the work supporting means from the parts with which they are operatively associated. The members 88 and 94 in the respective modifications shown in Figures 6 and 8 serve the same purpose as the heads 58 and 76 above described.

Having thus described my invention particularly in connection with the preferred embodiments illustrating the principle involved, it can be seen from the foregoing description of the device that other forms may be had without departing from the principle of the invention as defined in its broader aspects in the following claims.

What I claim as new and desire to secure by Letters Patent, is:

1. In a vise clamp of the character described including a base member having a precisely finished base plane surface and a fully exposed precisely finished upper plane surface precisely parallel with said base surface, a rigid clamping jaw extending upwardly from and at right angles to said base member, a movable jaw slidable on said upper surface, one of said jaws having an open-ended recess extending completely thereacross, said recess including a precisely finished nether plane surface precisely parallel to and facing said upper surface, and a single movable work supporting means having a precisely finished surface adapted to move in said recess within highly confined limits, said supporting means having an upper surface slidably cooperative against said nether surface of said recess.

2. In a vise clamp of the character described including a base member having a precisely finished base plane surface and a fully exposed precisely finished upper plane surface precisely parallel with said base surface, a rigid clamping jaw extending upwardly from and at right angles to said base member, a movable jaw slidable on said upper surface, one of said jaws having an open-ended recess extending completely thereacross, said recess including a precisely finished nether plane surface precisely parallel to and facing said upper surface, and a single movable work supporting means having precisely finished opposite surfaces parallel to each other, said means adapted to move within highly confined

limits of said recess and between said nether and said upper surface.

3. In a vise clamp of the character described including a base member having a precisely finished base plane surface and a freely exposed precisely finished upper plane surface precisely parallel to said base surface, a rigid clamping jaw extending upwardly from and at right angles to said base member, a movable jaw slidable on said upper surface, a clamping plate contacting one of said jaws and presenting a nether surface spaced from said upper supporting surface whereby a recess is provided between said nether surface of said clamping plate and said upper finished surface, said surfaces comprising said recess being precisely parallel, and a single movable work supporting means workable in said recess and closely confined between said nether surface of said clamping plate and said upper finished surface.

4. In a vise clamp of the character described including a base member having a precisely finished base plane surface and an exposed precisely finished upper plane surface precisely parallel to said base surface, a rigid clamping jaw extending upwardly from and at right angles to said base member, a movable jaw slidable on said upper surface, clamping plates on each of said jaws presenting facing clamping surfaces, said clamping plates being spaced at precisely identical distance from and precisely parallel to said upper plane surface whereby open-ended recesses are provided thereunder, a single work supporting means movable in each of said recesses and closely confined between said clamping plate and said base, said means adapted to project from said recesses beyond their respective clamping surface, said recesses being of such depth to receive entirely therewithin their respective work supporting means in retracted position thereof.

5. In a vise clamp of the character described including a base member having a precisely finished base plane surface and an exposed precisely finished upper plane surface precisely parallel to said base surface, a rigid clamping jaw extending upwardly from and at right angles to said base member, a movable jaw slidable on said upper surface, clamping plates on each of said jaws presenting opposed clamping surfaces, the lower ends of said clamping plates being equally spaced from and precisely parallel to said upper supporting surface whereby open-ended recesses are formed thereunder, a movable work supporting means in each of said recesses and closely confined between said clamping plate and said base and adapted to project from said recesses beyond their said respective clamping surface, said recesses being of such depth as to receive entirely therewithin their respective work supporting means in retracted position, and means captively engaging said work supporting means to their respective clamping jaws and for limiting the said projection thereof.

6. In a vise clamp of the character described including a base member having a finished base plane surface and a freely exposed precisely finished upper plane surface precisely parallel to said base surface, a rigid clamping jaw extending upwardly from and at right angles to said base member, a movable jaw slidably supported on said upper surface and adapted for clamping opposition with said rigid jaw, said rigid jaw having an open-ended recess extending completely thereacross and overlying said upper sur-

face, and a single movable work supporting means in said recess and having precisely finished opposite and parallel upper and nether surfaces, said nether surface adapted to slidably rest upon said upper surface of the base member.

7. In a vise clamp of the character described including a base member having a precisely finished base plane surface and a freely exposed precisely finished upper plane surface precisely parallel to said base surface, a rigid clamping jaw extending upwardly from and at right angles to said upper surface, a movable jaw slidably sup-

ported on said upper surface and adapted for clamping opposition with said rigid jaw, said movable jaw having an open-ended recess extending completely thereacross and overlying said finished upper surface, and a single movable work supporting means in said recess and having precisely finished opposite upper and nether surfaces, said work supporting means adapted to slidably rest upon said upper surface of the base member.

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