

United States Patent

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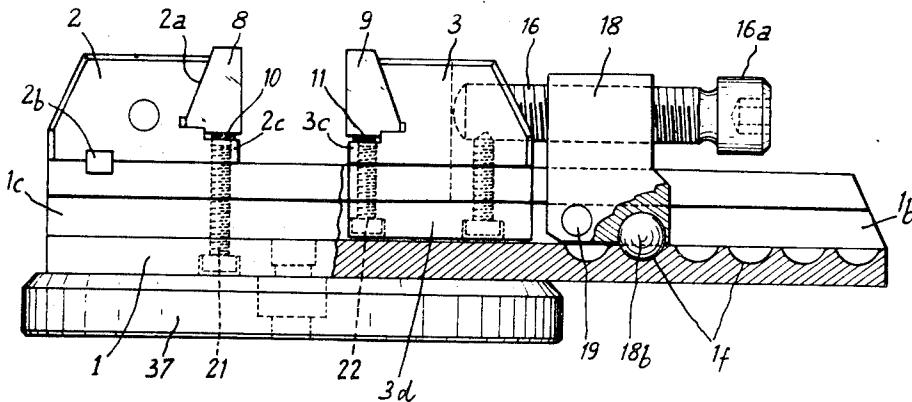
**[54] CLAMPING DEVICE, PARTICULARLY FOR A
MACHINE TOOL**
2 Claims, 1 Drawing Fig.

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[56] **References Cited**
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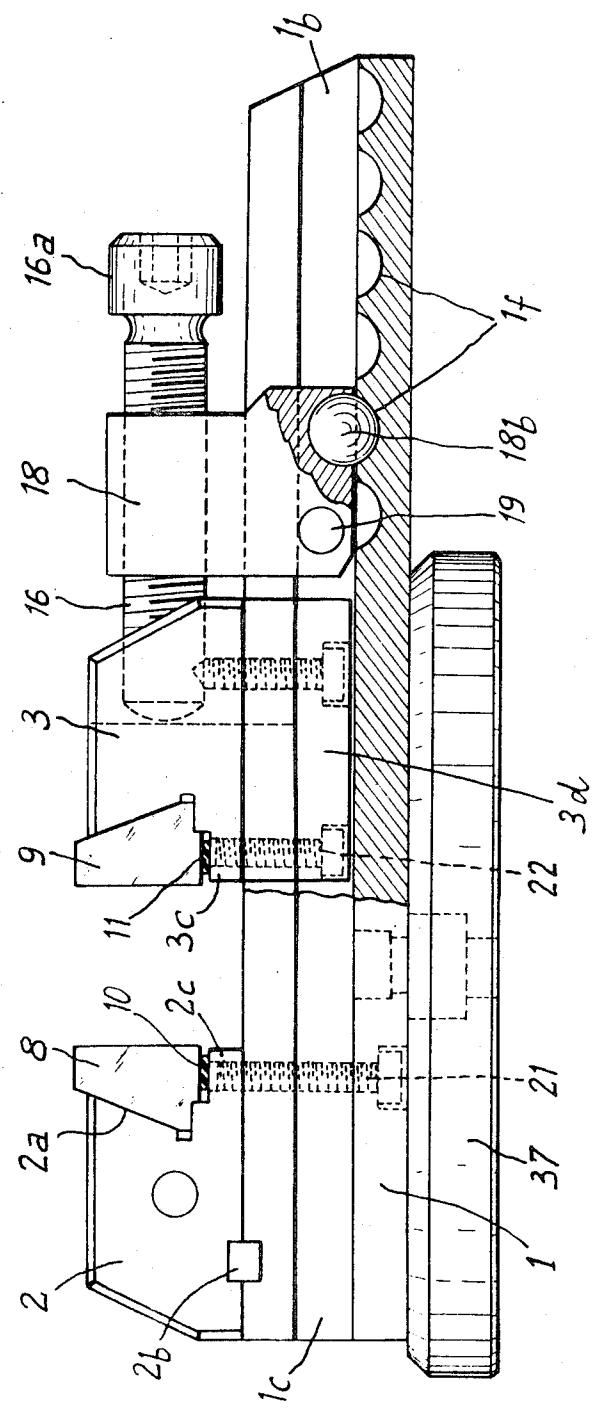
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ABSTRACT: The invention concerns a clamping device, particularly for a machine tool, and is characterized by the relatively fixed and relatively movable jaws of the device having projecting shoulders which are situated below floating faceplates and which support those faceplates. Each shoulder provides a foundation for a resilient element inserted between each faceplate and its associated shoulder and receives at least one fixing element for respectively attaching the relatively fixed jaw to the vise base and the relatively movable jaw to a member movable towards and away from the relatively fixed jaw.



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CLAMPING DEVICE, PARTICULARLY FOR A MACHINE TOOL

This invention relates to a clamping device, particularly for a machine tool.

It is well known that vises for machine tools may have faceplates, known as floating faceplates, inserted between the relatively fixed jaw and the relatively movable jaw. The invention relates more particularly to a clamping device comprising a relatively fixed jaw connected to a vise base and a relatively movable jaw, means for adjusting the vise capacity, and floating faceplates having inclined surfaces cooperating with corresponding inclined surfaces on the jaws so that said faceplates will move downwards when work is clamped between the jaws.

With this type of clamp, very strong clamping may cause gaps to form between the relatively fixed jaw and the vise base and between the relatively movable jaw and a member attached to the relatively movable jaw and movable towards and away from the relatively fixed jaw and preferably comprising an inverted-T element which is screwed on to the relatively movable jaw and slides in guide grooves in the vise base. Also, the rack used for adjustment of vise capacity is difficult to machine.

An object of the invention is to obviate these disadvantages, since it is easier to machine a spherical hole than an oblong groove, and the invention consists of:

A clamping device, particularly for a machine tool, in which the relatively fixed and relatively movable jaws have projecting shoulders which are situated below the floating faceplates and each of which provides a foundation for a resilient element inserted between each faceplate and its associated shoulder and receives at least one fixing element for respectively attaching the relatively fixed jaw to the vise base and the relatively movable jaw to a member movable towards and away from the relatively fixed jaw.

In a preferred construction incorporating the invention, a clamping nut has on its underside a ball receivable in substantially spherical, e.g. hemispherical, depressions which conform to the ball exterior surface and are provided on the vise base between guide rails, the nut coming to bear during clamping on the ball and on lateral studs engaged in longitudinal grooves of the guide rails.

The advantages of this arrangement are as follows.

When clamping occurs, the jaws are subjected to overturning couples, due both to the fact that the clamping force bears on the faceplates at a certain height relative to the vise base, tending to raise the jaws, and due to the vertical resultant of the reaction in the inclined faces between the jaw and the faceplate, which has the same effect and also tends to separate the support for the resilient element from the corresponding jaw. The provision of a shoulder integral with its jaw completely eliminates the second deformation mentioned since the support for the resilient element is then integral with its jaw and, because the fixing element (screw) is in the shoulder, the overturning couple is reduced as a result of the reduction in the distance of application of this couple.

The invention will be more readily understood from the following description, given by way of example only, with reference to the accompanying single Figure which is a partly cutaway diagrammatic side view.

As this Figure shows, the base 1 of the vise is fixed to a circular pedestal 37 so that it can be rotated through 360°. The

base 1 has two parallel and longitudinal guide rails with external grooves 1c serving to attach the vise to a worktable if used without the rotatable pedestal, and with internal grooves 1b adapted to receive an inverted-T element 3d screwed beneath

the movable jaw 3. The fixed jaw 2 is screwed on to the base 1 by means of one or a plurality of screws 21, and a transverse pin 2b is provided to prevent the jaw 2 from slipping back during clamping. A floating faceplate 8 rests on a shoulder 2c on the fixed jaw 2 by way of a resilient element 10 on to which it is brought to bear when clamping occurs due to the vertical resultant force developed in the inclined surfaces 2a.

The movable jaw 3 has a similar shoulder 3c which serves to support a floating faceplate 9 by way of a resilient element 11. The fixing screw or screws 22 are screwed into the shoulder 3c, as is also the case with the fixed jaw 2.

To clamp the jaws, a screw 16 cooperating with a nut 18 is operated, the screwhead 16a being turned with an appropriate key.

For rapid adjustment of the vise capacity, hemispherical depressions 1f are provided in the base 1. These depressions are aligned along an axis of the vise (not shown) and cooperate with a ball 18b having the same diameter and attached to the nut 18. The second support for the nut 18 is in the form of lateral studs 19, which engage in the internal grooves 1b in the vise base forwardly from the ball or stop element 18b in a direction toward fixed jaw 2. Rapid adjustment of the vise is made by swinging nut 18 around studs 19. Thus, ball bearing 18b is raised and then released from cavity 1f. Jaw 3 and nut 18 can then be moved along the guide rails of base 1.

With this arrangement the vise causes a minimum of deformation during clamping, keeps the clamping surfaces parallel, provides solid and accurate support for the element being clamped on the vise base, and can be rapidly adapted to a wide range of workpiece sizes.

I claim:

1. A clamping device, particularly for a machine tool, comprising; a vise base having two substantially parallel guide rails with internal grooves therein and having a plurality of substantially hemispherical depressions aligned along an axis within the base, a relatively fixed jaw on the vise base, a relatively movable jaw positioned in adjustable relationship with respect to said guide rails and said fixed jaw, means for adjusting the vise capacity including a movable nut, a substantially spherical stop element mounted on the nut and selectively receivable in the vise base depressions, a vise-clamping screw mounted on the nut in abutting relationship with said movable jaw for adjusting the position of the movable jaw, lateral studs extending from the nut forwardly from the stop element in a direction toward said fixed jaw and engaging the internal grooves of the guide rails at locations away from said axis to support the nut at three places in conjunction with said spherical stop element, and an inverted-T element extending from the movable jaw and movable within the guide rail internal grooves toward and away from the relatively fixed jaw.

2. A clamping device as in claim 1 further including; floating faceplates having inclined surfaces cooperating with corresponding inclined surfaces on the jaws so that said faceplates will move downwardly when work is clamped between the jaws, said jaws having projecting shoulders that are situated below the floating faceplates, and a resilient element located between each faceplate and its associated shoulder.

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