WORK HOLDING CLAMP

Filed Sept. 15, 1950

INVENTOR.

Albert O. Mathison

BY

Les C. Kuzinski

ATTORNEY
The present invention relates to clamping devices, and, more particularly, relates to such devices which are adapted to be utilized for holding work pieces on the bed or work supporting station of a drill press, lathe, milling machine, boring machine, planer, band saw, grinder and the like machine tools.

Accordingly, an object of the present invention is to provide such a clamping device which is simple in construction and is readily applied and removed.

Another object is to provide such a device which holds the work pieces on the machine bed in a manner to facilitate access thereto for performing a desired operation with the tool of the machine.

Another object is to provide such a device which is adjustable and has self-aligning elements, whereby its use is feasible in connection with work pieces of a large variety of sizes and shapes.

A further object is to provide such a device which is compact in construction and is sufficiently rugged to withstand the rough usage to which it may normally be subjected.

Other and further objects will be obvious upon an understanding of the illustrative embodiment about to be described, or will be indicated in the appended claims, and various advantages not referred to herein will occur to one skilled in the art upon employment of the invention in practice.

A preferred embodiment of the invention has been chosen for purposes of illustration and description and is shown in the accompanying drawings, forming a part of the specification, wherein:

Fig. 1 is a plan view of a clamping device in accordance with the invention, illustrating the same positioned to hold a work piece on the bed of a machine tool.

Fig. 2 is a sectional view taken along the line 2—2 on Fig. 1.

Fig. 3 is an enlarged plan view illustrating the strap element of the device.

Fig. 4 is a fragmentary sectional view of the portion of the device shown in Fig. 2 at the right side thereof, illustrating a modified arrangement for linking a gripping member to the strap.

Fig. 5 is a fragmentary plan view, illustrating a modified arrangement for adjusting the device with respect to the work piece.

Fig. 6 is a side view of a portion of the device shown in Fig. 5, partly in section and partly in elevation.

Fig. 7 is a sectional view taken along the line 7—7 on Fig. 5.

Referring now to the drawing in detail and more particularly to Figs. 1, 2, and 3 thereof, there is shown a bed 35 of a machine tool having T-shaped grooves 36 formed therein, and a work piece 30 held on the bed by a clamping device 40 in accordance with the invention.

Generally described, the device 40 comprises an elongate strap 41, a pair of gripping members 12 linked to the strap by pins 14, a bolt 15 having a head adapted to be disposed in one of the grooves 36, and a nut 16 for retaining an element 17 on the bolt which provides a pivotal connection between the bolt and the strap in the manner described hereinafter.

The strap is a rigid plate-like member having apertures 19 (Fig. 3) extending therethrough with one aperture adjacent each end thereof. Each of the apertures has a counter-sunk upper portion providing a shoulder 24, a generally hemispherical lower surface providing a socket 21, and an intermediate downwardly and outwardly flared portion 22 (Fig. 2). A longitudinally extending slot 24 is formed in the strap between the apertures 19, which slot, in this embodiment, has a generally hemispherical surface 25 at each end thereof adjacent the upper surface of the strap for reception of the element 17. Preferably, as illustrated and for the purpose which will become apparent hereinafter, one end portion of the strap is offset vertically at 26 with respect to the horizontal axis thereof.

The gripping members 12 are generally hemispherical in shape (Fig. 2). Each member 12 has a substantially flat underside or gripping surface 27 and a generally hemispherical upper surface 29 providing a ball-like element for reception in the socket formation 21. An aperture extends centrally through each gripping member from the upper to the lower surface, and is formed with a lower recess 30, a constricted portion providing a shoulder 31, and an upper, upwardly and outwardly flared portion 32.

Each of the pins 14 has a head 34 at each end thereof for respectively engaging the shoulders 20 and 31 to link the gripping members and the strap for universal movement. The lower head of the pin is disposed in the recess 30 and the shank of the pin is in the flared portions 22 and 32, thus facilitating rotative movement of the gripping member about and transversely of the axis of the pin. This arrangement makes the gripping members free floating and self-aligning with respect to the strap, and enables the device to hold work pieces which have inclined upper surfaces on the bed.
It will of course be understood that the above ball joint could be provided by forming the strap with the ball elements and the gripping members with the socket formations, although the foregoing arrangement is preferred from a viewpoint of simplicity of manufacture.

The element 17 is substantially hemi-spherical in form, and has a central aperture 35 extending therethrough for reception of the bolt 15. The underside of this element has a generally hemi-spherical surface 38 adapted to be received by the surface 3 of the strap, whereby, as shown, the strap is pivotally connected with the bolt for universal movement and is self adjusting.

The surface 25 in which the element 17 is to be seated is selected by the operator depending upon the height or thickness of the work piece and the angle at which the strap member is most effective to hold the work piece. Also, as shown, if the work piece has considerable height or thickness, the member 12 at the offset strap end is utilized to engage the work piece and a shim S is used to prevent the gripping member at the other end of the strap, so that the angle at which the strap is inclined is not too extreme, the thickness of the compensating shim being selected in accordance with the height of the work. Similarly, a thin work piece, such as a disc or plate may be engaged by the gripping member at the end of the strap opposite the offset end, and a compensating shim of a desired thickness may be placed under the gripping member at the offset end of the strap.

In Fig. 4, a modified arrangement is illustrated which facilitates universal movement between the upper head 34a of the pin and its supporting shoulder 20a. To accomplish this, this head has a hemi-spherical surface and this shoulder has a corresponding hemi-spherical surface.

In Figs. 5, 6, and 7, a modified arrangement is shown which provides adjustment of the bolt lengthwise with respect to the strap. In this arrangement, the upper surface of the strap 11 has a plurality of pairs of arcuate transversely aligned recesses 48 (three being shown, for example), a recess of each pair being located at one side of the slot 24. The element 17 has a pair of diametrically opposite arms 41 formed with arcuate surfaces for cooperation with the recesses 48. The arms may be selectively positioned in a pair of recesses to pivotally connect the bolt 15 to the strap and to facilitate adjustment of the angle of the strap.

In use, the devices in accordance with any of the embodiments illustrated and described herein are positioned with respect to the bed B and the work piece W and the shim S (if required), for example, as shown in Figs. 2 and 5, the nut 16 is threaded on the bolt 15 to cause the element 17 to bear downwardly on the strap 11, whereby the work piece is securely held on the bed for performing the desired tool operation thereon. While the work piece is being so secured, the gripping members, the strap and the bolt are self aligned by reason of the universal or pivotal connections, whereby the flat underside 27 of the gripping member is in the plane of the surface of the work piece engaged by it and damage to the work piece is prevented by such engagement.

From the foregoing description it will be seen that the present invention provides novel and useful clamping devices of the character indicated herein which devices are extremely simple and economical in construction and are adapted for a wide variety of uses. The devices are readily applied and removed, and are practically indestructible.

From the foregoing it will be apparent that the device of this invention has many advantages over the prior art devices, as far as applicant is aware. To enumerate a few of these advantages, by the employment of applicant's French type device, it is no longer necessary that the top surface of the work piece be horizontal but may be at an angle in any direction, thereby saving labor, time, and the various sized shims required in shimming the work piece to a true horizontal level for the prior art clamp. A saving in time and labor also results particularly where the face plate is vertical. In this instance one hand is required for the wrench and the other hand for holding the device, so that it is necessary to have assistance of another person for holding the blocking or shim in place.

Another advantage resides in the use of a shorter bolt with the instant device in view of the slant or inclination at which applicant's strap may be placed. In addition, injury to the workman is substantially minimized by the projecting bolt of the prior art devices, which bolt end is generally well above the surface of the work clamp. In applicant's device the offset portion of the strap causes the end of the bolt to fall substantially even with the uppermost portion of the strap, as is evident from Fig. 2.

As various changes may be made in the form, construction and arrangement of the parts hereinafter, without departing from the spirit and scope of the invention and without sacrificing any of its advantages, it is to be understood that all matters are to be interpreted as illustrative and not in any limiting sense.

What I claim is:

1. A clamping device comprising an elongate strap having an aperture extending therethrough adjacent each end thereof, said apertures each having a shoulder at the upper end, a generally hemi-spherical surface at the lower end and a downwardly and outwardly flared intermediate portion; a pair of gripping members each having a generally flat, lower surface, a generally hemi-spherical upper surface and an aperture extending from said upper surface to said lower surface, said last mentioned aperture having a constricted intermediate portion providing a shoulder and having an upwardly and outwardly flared upper portion; said members each having its hemi-spherical surface facing one of the hemi-spherical surfaces of said strap; and a pair of pins each extending through one of said strap apertures and one of said member apertures, said pins each having a head at each end thereof for engaging said shoulder portions.

2. A clamping device comprising an elongate strap having an aperture extending therethrough adjacent each end thereof, said apertures each having a shoulder at the upper end, a generally hemi-spherical surface at the lower end and a downwardly and outwardly flared intermediate portion; a pair of gripping members each having a generally flat, lower surface, a generally hemi-spherical upper surface and an aperture extending from said upper surface to said lower surface, said last mentioned aperture having a constricted intermediate portion providing a shoulder and having an upwardly and outwardly flared upper portion; said members each having its hemi-spherical surface facing one of the hemi-spherical surfaces of said strap; and a pair of pins each extending through one of said strap apertures and one of said member apertures, said pins each having a head at each end thereof for engaging said shoulder portions.
tures and one of said member apertures, said pins each having a head at each end thereof for engaging said shoulder portions; said strap having a longitudinal slot intermediate the apertures thereof and having a plurality of recesses adjacent the upper end thereof and said slot; a bolt extending through said slot; and a member on said bolt having a surface cooperating with said recesses to pivotally interconnect said bolt and strap.

3. A device according to claim 2, wherein said recesses extend transversely with respect to said slot and complementary recesses are formed at each side of said slot having an arcuate surface, and said member on said bolt has a pair of arms each formed with an arcuate surface adapted to cooperate with an arcuate surface of one of said recesses.

ALBERT O. MATHISON.