

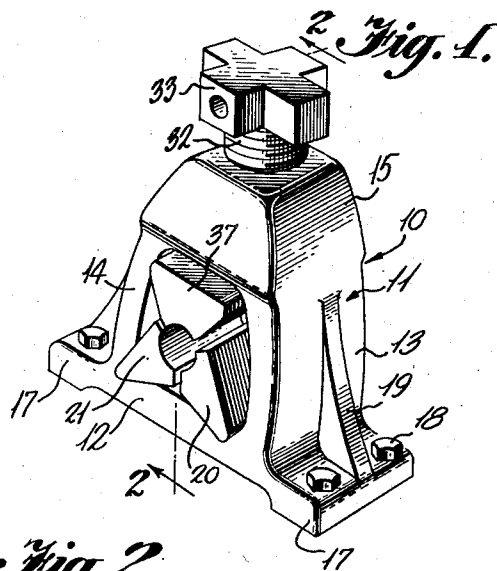
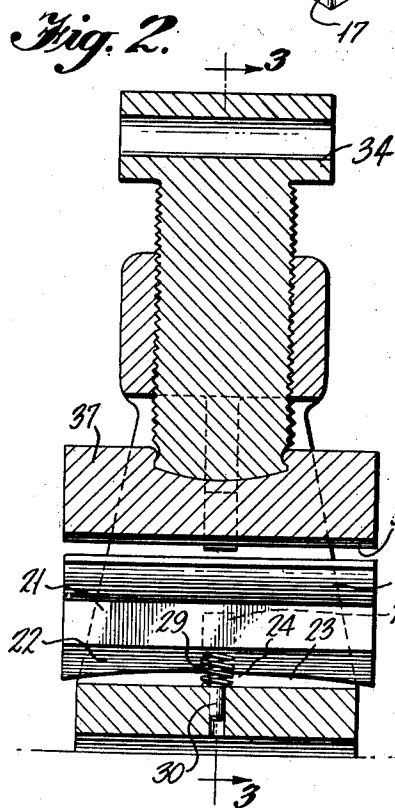
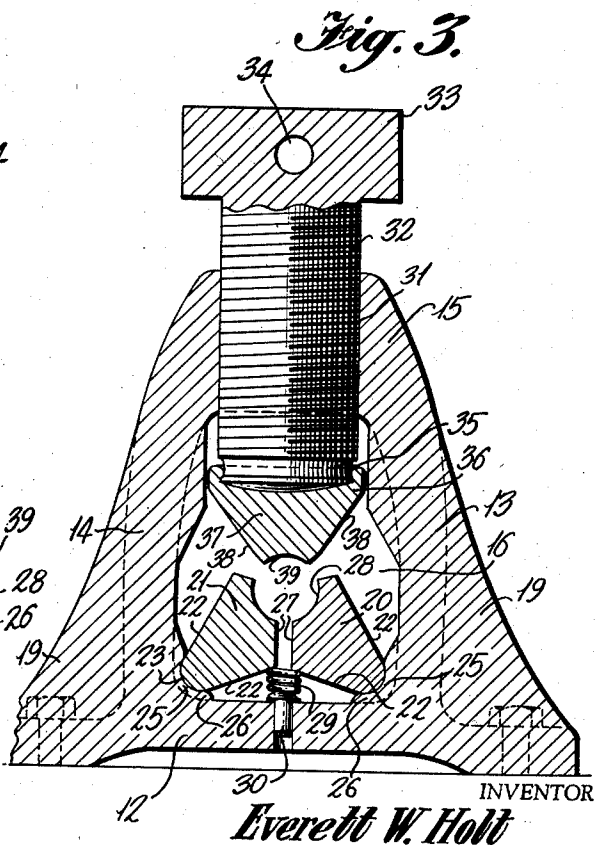
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SELF-CENTERING VISE FOR CYLINDRICAL OR TAPERED WORK PIECES

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1

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SELF-CENTERING VISE FOR CYLINDRICAL OR TAPERED WORK PIECES

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4 Claims. (Cl. 81-19)

The present invention relates in general to work holding devices, and more particularly to a self-centering vise for gripping and holding pieces of work of generally circular cross-section having variations in the outer diameter thereof.

Heretofore, many self-centering chucks and vises have been devised wherein gripping jaws are designed to grip and hold workpieces having cylindrical exterior surfaces. These vises, however, have practical disadvantages, particularly in regard to the holding characteristics thereof, when employed to hold pieces of work having tapering external surfaces such as gun barrels, conical workpieces, and the like. The nonconformity of the jaw-gripping faces with the external surfaces of these shapes produces nonuniform surface contact and frequently gives rise to scoring or marring of the workpiece surface.

An object of the present invention, therefore, is the provision of a novel self-centering vise for use in gripping and holding pieces of work of circular cross-section having noncylindrical external surfaces.

Another object of the present invention is the provision of a novel self-centering vise for gripping and holding pieces of work such as gun barrels and the like having conical tapered external surfaces.

Another object of the present invention is the provision of a novel self-centering vise for gripping and holding in centered relation between the gripping faces thereof gun barrels and like tapered conical objects, wherein the gripping surfaces of the jaws conform themselves to the inclinations of the tapered surfaces to provide uniform gripping contact throughout the area of the jaw-gripping surfaces and minimize scoring or marring of the external surface of the workpiece.

Other objects, advantages and capabilities of the present invention will become apparent from the following detail description, taken in conjunction with the accompanying drawing, illustrating one preferred embodiment of the invention.

In the drawing:

Figure 1 is a perspective view of a self-centering vise embodying the present invention;

Figure 2 is a vertical section of the self-centering vise, taken along the line 2-2 of Figure 1; and,

Figure 3 is a vertical section of the self-centering vise taken along the line 3-3 of Figure 2.

Referring to the drawing, wherein like reference characters designate corresponding parts throughout the several figures, the barrel vise of the present invention, generally indicated by the reference character 10, employs a centrally open cast frame 11 having a base 12, a pair of laterally spaced, erect leg portions 13, 14 rising therefrom, and a cap portion 15 forming with the base 12 and the upright legs 13 and 14 a frame for a central opening 16.

The base 12 is provided with oppositely extending integral mounting flanges 17 adapted to receive bolts 18 therethrough for securing the base of the barrel vise 10 to a suitable supporting surface, and reinforcing webs 19

2

project outwardly from the medial vertical plane of the upright legs 13 and 14 and join the base flanges 17 to reinforce the legs 13, 14. A pair of toggle-like jaws 20, 21 of wedge-shaped configuration having inclined walls 22 converging toward a rounded apex 23 are provided in the lower portion of the opening 16 adjacent the corners thereof. The downwardly and outwardly disposed apices 23 of the jaws 20, 21 are of concave configuration in elevation so as to provide a central region 24 thereof which is recessed inwardly of the jaws 20, 21 relative to the depending terminal portions of the apices 23. The inwardly recessed medial regions 24 of the apices 23 of the lower jaws 20 and 21 are seated in concave sockets 25 formed in ribs 26 projecting into the opening 16 from the lower corners of the opening 16 in such a manner that the jaws 20 and 21 are free to be rocked slightly about the medial longitudinal axes of the jaws 20, 21 when occupying the position illustrated in Figure 2. The walls 27 of the jaws 20, 21 disposed oppositely of the apices 23 thereof are provided with cylindrical segment recesses 28 forming clamping faces adapted to engage the external surface of the workpiece. A coil spring 29 whose lower turn is supported at a central position on the base 12 by the pin 30 engages the inwardly projected extremities of the lowermost inclined walls 22 of the jaws 20 and 21 to exert a resilient biasing force upon the jaws 20 and 21 urging them upwardly and away from each other.

The cap portion 15 of the frame 11 is provided with a centrally threaded aperture 31 in which is threaded a drive screw 32 aligned with the central vertical axis of the frame 11 and having a hand wheel 33 integrally formed at the upper end thereof projecting from the cap portion 15 apertured, as indicated at 34, for the reception of a rod or other tool for increasing the moment arm applied to the screw 32, if desired. The lower end of the screw 32 is provided with a swivel head formation 35 of greater cross-section at the lower end of the screw 32 than the portion immediately above the lower end to be seated in a socket 36 in an uppermost jaw member 37 of triangular cross-section. The uppermost jaw member 37 is provided with downwardly converging side walls 38 extending to a cylindrical segment recess 39 forming the clamping face of the upper jaw 37.

When no workpiece is applied to the device, the drive screw 32 is normally backed off to position the upper jaw member 37 at the upper limit of the opening 16 in the frame 11, and the lowermost jaws 20 and 21 are supported by the coil spring 29 in an uppermost or unloaded position where the jaws are inclined upwardly and outwardly somewhat above the positions illustrated in Figure 3 to provide maximum spacing between the clamping faces 28 and 39 of the jaw members 20, 21 and 37.

In the use of the above device, the gun barrel or like tapered cylindrical workpiece is projected through the opening 16 of the frame 11 and within the cylindrical space defined by the cylindrical segment clamping faces 28 and 39 of the jaw members 20, 21 and 37, and the workpiece is lowered into surface contact with the cylindrical segment clamping faces 28. The weight of the workpiece on the clamping faces of the jaw members 20 and 21 pivots the jaw members downwardly and toward each other about the apices 23 and against the resilient biasing force of the coil spring 29, and the jaw members 20 and 21 tilt longitudinally about the fulcrums formed by the sockets 25 in the corner ribs 26 to conform the cylindrical segment clamping faces 28 to the taper of the external surface of the workpiece so as to provide substantially uniform contact therebetween throughout the area of the clamping faces 28. The drive screw 32 is then rotated to shift the drive screw 32 axially downwardly within the threaded aperture 31 of the frame 11

3

to project the cylindrical segment clamping face 39 of the uppermost jaw member into contact with the external surface of the workpiece. The swivel coupling between the uppermost jaw member 37 and the swivel head 35 on the drive screw 32 permits the uppermost jaw member 37 to be also tilted into conformity with the taper of the workpiece surface. Forcing of the drive screws 32 to a preselected extent thereby clamps the workpiece between the clamping faces 28 of the two jaw members 20 and 21 and the clamping face 39 of the jaw member 37 to provide intimate three-area contact with the external surface of the workpiece which is substantially uniform over the area of the clamping faces. Because of the particular way in which the lowermost jaw members are supported to permit them to readily accommodate the spacing of the clamping faces 28 to various workpiece diameters and tapers a simple and expeditious clamping of the workpiece may be achieved in a manner wherein the workpiece is rigidly held in position notwithstanding its tapered conical external surface configuration, and uniform gripping contact is provided which minimizes scoring or marring of the external workpiece surface.

While but one particular embodiment of the invention has been particularly shown and described, it is apparent that other modifications may be made in the invention without departing from the function and scope thereof, and it is desired, therefore, that only such limitations shall be placed thereon as are imposed by the prior art and are set forth in the appended claims.

I claim:

1. A self-centering work-holding vise for tapered tubular work and the like comprising a frame, an upper jaw member centrally disposed within said frame, screw means having a swivel connection with said upper jaw member and threadedly supported in said frame for shifting said upper jaw member along a vertical medial axis of said frame, a pair of laterally spaced lower jaw members symmetrically positioned below said upper jaw member and extending along upwardly converging axes, a pair of upwardly facing fulcrum seats on said frame rockably supporting said lower jaw members to fulcrum about said seats in perpendicular directions, one of which extends along a vertical plane intersecting said seats, means resiliently urging said lower jaw members upwardly about their fulcrum seats, and each of said jaw members having concave clamping faces disposed opposite said swivel connection and said seats to provide three-area gripping contact with the external surface of the work.

2. A self-centering work-holding vise for tapered tubular work and the like comprising a frame, an upper elongated jaw member centrally disposed within said frame, and having a downwardly disposed clamping face, screw means threadedly supported in said frame for movement along a vertical medial axis of said frame, swivel means interconnecting said upper jaw member with said screw means intermediate the ends of said jaw member for tilting movement about an axis perpendicular to the axis of said screw means, a pair of upwardly facing fulcrum seats on said frame disposed below said upper jaw member, a pair of laterally spaced elongated

4

lower jaw members symmetrically positioned below said upper jaw member and extending along axes converging upwardly from said seats, said lower jaw members each being fulcrumed about said seats at a point intermediate the ends of said lower jaw members for rotary movement in a direction extending along a vertical plane intersecting said seats and for longitudinal tilting movement, and means resiliently biasing said lower jaw members upwardly about their fulcrum seats, said lower jaw members having clamping faces disposed opposite said seats for providing, with said clamping face of said upper jaw member, a three-area gripping contact with the work.

3. A self-centering work-holding vise for tapered tubular work and the like comprising a frame, an upper elongated jaw member centrally disposed within said frame, screw means having a swivel connection with said upper jaw member and threadedly supported in said frame for shifting said upper jaw member along a vertical medial axis of said frame, a pair of laterally spaced lower jaw members symmetrically positioned below said upper jaw member and extending along upwardly converging axes, a pair of upwardly facing concave arcuate fulcrum seats on said frame rockably supporting said lower jaw members to fulcrum about said seats in perpendicular directions one of which extends circumferentially of said seats, means resiliently urging said lower jaw members upwardly about their fulcrum seats, and each of said jaw members having concave clamping faces disposed opposite said swivel connection and said seats for engaging the work.

4. A self-centering work-holding vise for tapered tubular work and the like comprising a frame, a pair of laterally spaced fulcrum means on said frame, a pair of wedge-shaped jaw members having depending apices respectively rockably supported on said fulcrum means with said jaw members extending upwardly along converging axes from said fulcrum means, said jaw members having clamping faces oppositely disposed relative to the apices of said jaw members, means resiliently urging said jaw members upwardly about their respective fulcrums, said fulcrums supporting said jaw members intermediate their ends for tilting movement relative to their longitudinal axes to permit the clamping faces thereof to accommodate their clamping faces to the taper of the work, an upper wedge-shaped jaw member disposed above said first-mentioned pair of jaw members, and drive-screw means threadedly supported in said frame for movement along an axis projecting between said first-mentioned pair of jaw members, said drive-screw having swivel means pendantly supporting said third jaw member intermediate its ends for tilting movement to accommodate the clamping face of the same to the taper of the workpiece.

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