

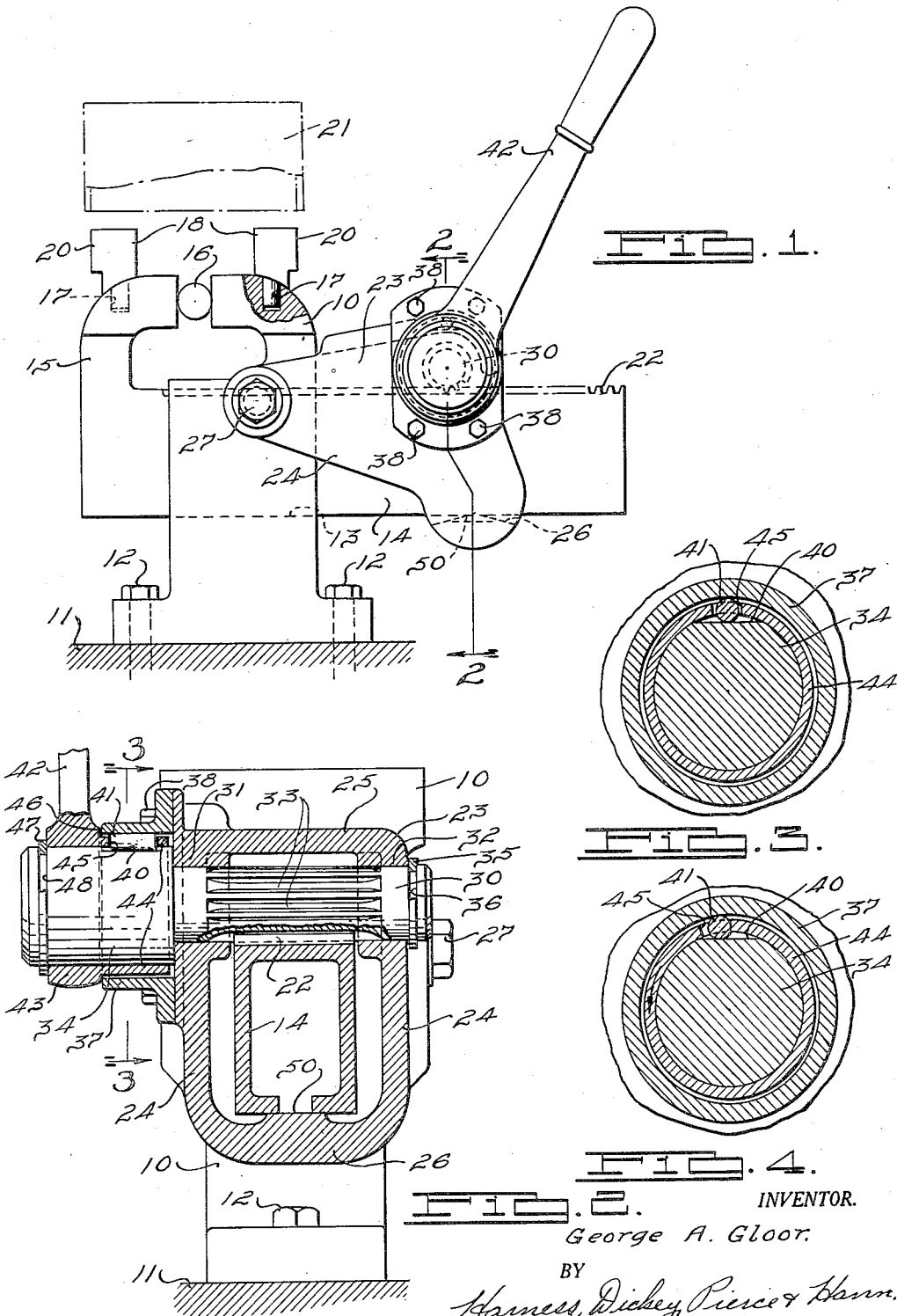
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QUICK ACTING VISE

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QUICK ACTING VISE

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This invention relates to quick acting vises and to means for converting a more or less conventional type of bench vise to a quick acting and self-locking type of vise.

Among the objects of the invention are to provide an improved vise construction adapted to clamp objects to the vise by engaging such objects either externally or internally so as to clamp the object to the vise; to provide a novel locking mechanism for securing the jaws of a vise in engagement with an object adapted to be secured to the vise; to secure increased locking effect of the jaws with respect to the object in addition to that effected by said locking mechanism; and to provide means for quickly bringing the movable jaws of a vise in position to clamp an object to said vise.

Other objects, features and advantages will become apparent from the following description and appended claims.

For the purpose of illustrating the genus of the invention, a typical concrete embodiment thereof is shown in the accompanying drawing, in which:

Figure 1 is an elevation, parts being broken away and in section, of a vise constructed in accordance with the principles of this invention and illustrating applications thereof;

Fig. 2 is a section, on an enlarged scale, taken on the line 2-2 of Fig. 1;

Fig. 3 is a section, on a still more enlarged scale, taken on the line 3-3 of Fig. 2; and

Fig. 4 is a view similar to Fig. 3 and showing the parts thereof in a different operative position.

Referring to the drawing, the numeral 10 designates a fixed jaw adapted to be secured to a bench 11 or other desired support by means of bolts 12. The fixed jaw 10 is provided with an opening 13 in which is reciprocally received a slide bar portion 14 of a jaw 15, hereinafter referred to as the movable jaw and adapted to cooperate with the fixed jaw 10 for clamping an object to the vise. In Fig. 1 the vise is illustrated as externally clamping an object 16 within the fixed and movable jaws thereof. The vise may be provided with openings 17 in the upper surfaces of the fixed and movable jaws 10 and 15 for the reception of auxiliary jaw members 18 provided with outwardly directed gripping faces 20 and adapted to engage internally an object 21, depicted in dot-and-dash lines. The screw operating means for actuating the movable jaw 15 of a bench vise is removed or omitted in the present construction and teeth 22 are cut in the

upper surface of the slide bar portion 15 of the movable jaw. A frame 23 comprising side plate portions 24 and top and bottom cross members 25 and 26 has the forward ends of the side plate portions 24 pivoted to the fixed jaw 10 by a pair of axially aligned stud bolts 27.

The frame 23 surrounds the slide bar portion 14 of the movable jaw 15 in generally spaced relation therefrom except for the bottom cross member 26 thereof. A shaft 30 is journaled in aligned bearings 31 and 32 provided in the upper portion of the side plate portions 24 of frame 23. Gear teeth 33 are cut on the pinion shaft 30 intermediate the bearings 31 and 32 and cooperate with the teeth 22 to reciprocate the slide bar portion 14 of the movable jaw 15 upon rotation of the pinion shaft 30. The pinion shaft 30 is provided with an enlarged cylindrical portion 34 adapted to shoulder against the left hand side plate portion 24 of frame 23 to limit inward axial movement of the pinion shaft 30 and a snap ring 35 fits in a groove 36 at the opposite end of the pinion shaft for limiting axial movement thereof in an outward direction with respect to the frame 23. A sleeve member 37 is bolted to the left hand side plate 24 of the frame 23 in concentric relation with respect to the pinion shaft 30 and enlarged portions 34 thereof in spaced relation with respect to the inner part of the enlarged cylindrical portion 34 of the pinion shaft. The sleeve member 37 may be made integral with the frame 23 but is preferably a separate element bolted to the left hand side plate 24, as viewed in Fig. 2, by bolts 38. A flat 40 is provided on the inwardly directed half of the enlarged cylindrical portion 34 of pinion shaft 30 and a locking roller 41 is disposed between the flat 40 and the sleeve member 37. An operating handle 42 is provided with a sleeve portion 43 adapted to be journaled upon the outer part of the enlarged portion 34 of pinion shaft 30 for free rotation thereon. The sleeve 43 has an inwardly directed cylindrical sleeve portion 44 extending within the sleeve member 37 and provided with a longitudinally directed slot 45 therein for the reception of the locking roller 41. A shoulder 46 upon the sleeve member 43 of the operating handle 42 limits inward axial movement of the operating handle on the pinion shaft 30 and a snap ring 47 adapted to be received in a groove 48 limits outward movement of the sleeve 43 relative to the enlarged portion 34 of the pinion shaft. The cross member 26 is provided with an upwardly directed boss portion 50 adapted to engage the bottom surface of the slide bar por-

tion 14 of the movable jaw 15. It will be noted that any desired number of locking rollers 41 may be provided with a corresponding number of slots cut in the periphery of the enlarged cylindrical portion 34 of the pinion shaft 30.

In the operation of the vise, rotation of the operating handle 42 and sleeve portions 43 and 44 integral therewith causes a side wall of the slot 45 to engage the locking roller 41 and forces the locking roller against one side of the flat 40. Where no material resistance to movement of the slide bar portion 14 of the movable jaw 15 is encountered, the engagement of the sleeve 44 with the locking roller 41 causes rotation of the pinion shaft 30 and sliding movement of the slide bar portion 14 and the movable jaw 15. Upon engagement of the jaws 10 and 15 of the vise with an object the increased resistance to movement of the slide bar 14 will cause the locking roller 41 to be wedged tightly between the sleeve member 37 and the flat 40. The increased resistance encountered upon the engagement of the jaws 10 and 15 or auxiliary jaws 18 with an object such as 16 or 21, tightly wedges the locking roller 41 between the flat 40 and the sleeve member 37 to lock the pinion shaft 30 against rotation relative to the frame 23. When the operating handle 42 is rotated in a counter-clockwise direction, as viewed in Fig. 1, to bring the fixed and movable jaws 10 and 15 into engagement with an externally clamped object, such as 16, the movement of the operating handle 42 causes a slight counter-clockwise rotation of the frame 23 about the stud bolts 27 as a center causing the boss 50 on the cross member 26 of the frame to exert an upwardly directed force upon the bottom surface of the slide bar 14 and urges the teeth 22 of the slide bar more tightly into engagement, and into closer mesh with, the teeth 33 of the pinion shaft 30. This causes an increased clamping action upon the object 16 secured between the fixed and movable jaws of the vise to increase the locking effect over and above that afforded by the locking roller 41. While the pinion shaft 30 is also moved in an upward direction during the counter-clockwise rotation of the frame 23, it is noted that this upward movement is less than that of the projection 50 upon the cross member 26 of this frame since the pinion shaft 30 is disposed a shorter distance from the stud bolts 27 than is the projection 50. The projection 50 will therefore cause closer mesh of the teeth 22 and 33 and increase both the locking and clamping effect of the vise upon the object 16. When the vise is clamping an object 16 within the fixed and movable jaws 10 the parts of the locking mechanism of the vise will assume the positions illustrated in Fig. 4. The object 16 may be released from the jaws 10 and 15 by rotating the operating handle 42 in a clockwise direction causing the opposite side of the slot 45 of the sleeve portion 44 to engage the locking roller 41 and move the latter from wedged engagement with the flat 40 and sleeve member 37 and then rotate the pinion shaft 30 to bring the movable jaw clear of the object 16.

The operating handle 42 is rotated in a clockwise direction to bring the auxiliary jaws 18 into internal clamping engagement with an object such as 21. This counterclockwise rotation of the operating handle 42 causes the locking roller 41 to be moved to the opposite half of the flat 40 from that illustrated in Fig. 4 thus causing rotation of the pinion shaft 30 to bring the jaws 18 into engagement with the object 21 and upon encountering increased resistance to the move-

ment of the slide bar 14 again wedges the locking roller 41 between the flat 40 and the sleeve member 37 to lock the pinion shaft 30 with respect to the frame 23. This clockwise rotation of the operating handle 42 causes a slight corresponding rotation of the frame 23 about the stud bolts 27 as a pivot and again wedges the pinion shaft 30 toward the slide bar 14 bringing the teeth 33 into closer mesh with the teeth 22 on the slide bar and increasing the locking effect of the device as well as increasing the clamping of the auxiliary jaws 18 to the object 21.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be effected without departing from the spirit thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. A vise comprising a fixed jaw, a movable jaw slidably mounted with respect to the fixed jaw and provided with a toothed slide bar portion, a pinion shaft provided with teeth engageable with the teeth of said slide bar portion for operating said movable jaw, means pivotally connected to said fixed jaw for journaling said pinion shaft therein, and means engageable with said pinion shaft and said last named means for rotating the pinion shaft and for locking said movable jaw in fixed position with respect to the fixed jaw upon engagement of said jaws with an object to be secured to the vise.

2. A vise comprising a fixed jaw, a movable jaw slidably mounted with respect to the fixed jaw and provided with a toothed slide bar portion, a pinion shaft provided with teeth engageable with the teeth of said slide bar for operating said movable jaw, a frame pivotally connected to said fixed jaw for journaling said pinion shaft therein, and means engageable with said pinion shaft and said frame for rotating said pinion shaft in either direction and for locking said movable jaw in fixed positions with respect to said fixed jaw as the movable jaw is moved in either direction and said jaws engaged either internally or externally with an object to be secured to the vise.

3. A vise comprising a fixed jaw, a movable jaw, a slide bar portion on said movable jaw reciprocally received in said fixed jaw, said slide bar portion being provided with teeth on one surface thereof, a frame pivoted to said fixed jaw, a pinion shaft journaled for rotation in said frame and provided with teeth engageable with the teeth of the slide bar portion for operating said movable jaw, means engageable with said pinion shaft and said frame for locking the pinion shaft against rotation relative to said frame, means for rotating said pinion shaft and for actuating said locking means, said last named means being also adapted to rotate said frame to bring the teeth on said pinion shaft into closer mesh with the teeth on said slide bar portion.

4. A vise comprising a fixed jaw, a movable jaw, a slide bar portion on said movable jaw reciprocally received in said fixed jaw, said slide bar portion being provided with teeth on one surface thereof, a frame pivoted to said fixed jaw, a pinion shaft journaled in said frame and provided with teeth engageable with the teeth of the slide bar portion for operating said movable jaw, means engageable with said pinion shaft and said frame for locking said pinion shaft against rota-

- tion relative to said frame, means journaled on said pinion shaft and acting through said locking means for rotating the pinion shaft to bring the movable jaw into clamping engagement with respect to an object adapted to be secured to the vise, said last named means being adapted upon engagement of said jaws with the object to lock the pinion shaft against rotation relative to the said frame and to rotate the frame to bring the teeth on said pinion shaft into closer mesh with the teeth on said slide bar portion to increase the clamping action of said jaws upon the object secured to the vise.
5. A vise comprising a fixed jaw, a movable jaw, a slide bar portion on said movable jaw reciprocally received in said fixed jaw, said slide bar portion being provided with teeth on one surface thereof, a frame pivoted to said fixed jaw and extending around said slide bar portion, a pinion shaft journaled in said frame and provided with teeth engageable with the teeth of the slide bar portion for operating said movable jaw, means engageable with said pinion shaft and said frame for locking the pinion shaft against rotation relative to the frame, means for rotating said pinion shaft relative to said frame and said frame relative to said fixed jaw, and means on said frame for wedging the teeth on said pinion and on said slide bar into closer mesh to increase the clamping force exerted by said jaws on an object secured thereto.
6. A vise comprising a fixed jaw, a movable jaw, a slide bar portion on said movable jaw reciprocally received in said fixed jaw, said slide bar portion being provided with teeth, a frame pivoted to said fixed jaw and extending around said slide bar portion, a pinion shaft journaled in said frame and provided with teeth engageable with the teeth of said slide bar portion for operating said movable jaw, said pinion shaft being provided with a flat in a portion of the periphery thereof, a sleeve fixed to said frame and arranged in concentric spaced relation about said pinion shaft and over said flat, a locking roller disposed between said flat and said sleeve, and means engageable with said locking roller for rotating said pinion shaft to operate said movable jaw and for wedging said roller between said flat and sleeve to lock said pinion shaft against rotation relative to said frame.
7. A vise comprising a fixed jaw, a movable jaw, a slide bar portion on said movable jaw reciprocally received in said fixed jaw, said slide bar portion being provided with teeth, a frame pivoted to said fixed jaw and extending around said slide bar portion, a pinion shaft journaled in said frame and provided with teeth engageable with the teeth of said slide bar portion for operating said movable jaw, said pinion shaft being provided with a flat in a portion of the periphery thereof, a sleeve fixed to said frame and arranged in concentric spaced relation about said pinion shaft and over said flat, a locking roller disposed between said flat and said sleeve, and means engageable with said locking roller for rotating said pinion shaft to operate said movable jaw and for rotating said frame relative to said fixed jaw to wedge the teeth on said pinion shaft and slide bar into closer mesh to increase the clamping action exerted upon an object secured to the jaws of the vise.
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