Sept. 28, 1943. C. E. RICHARDS 2,330,382

VISE

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FIG. 1

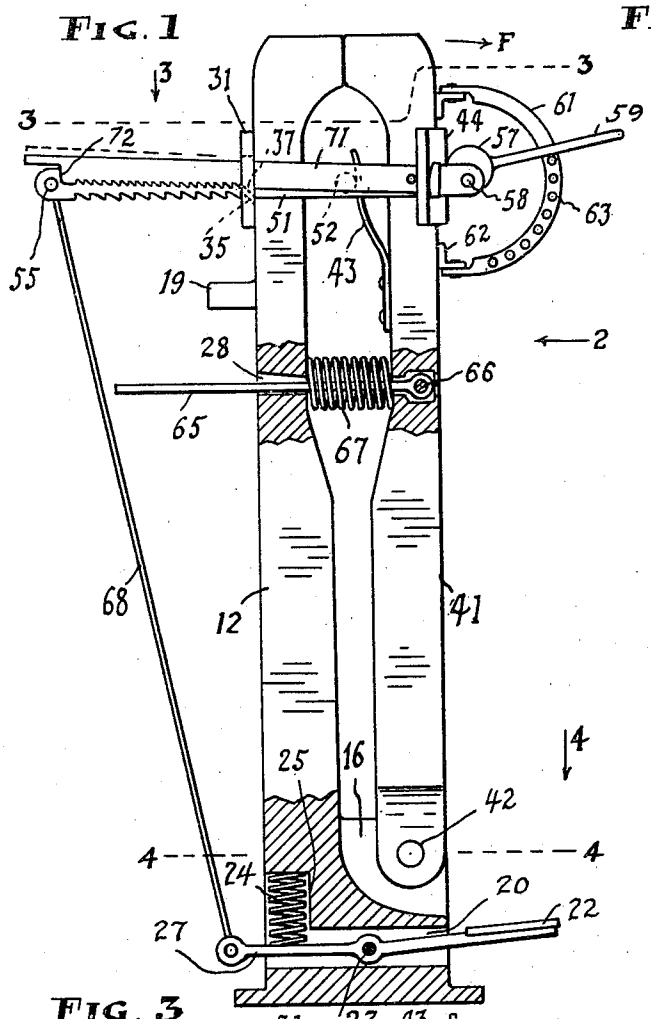


FIG. 2

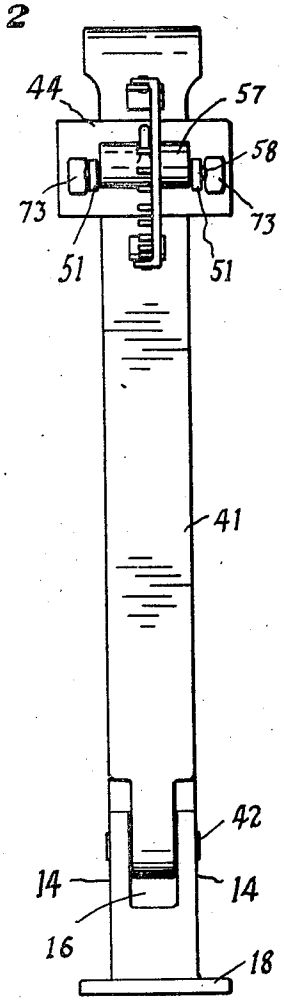
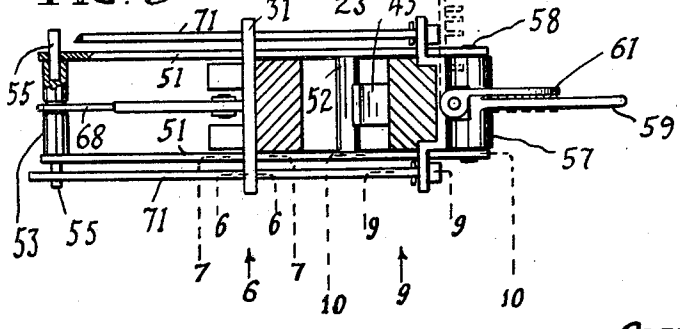


FIG. 3



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FIG. 11

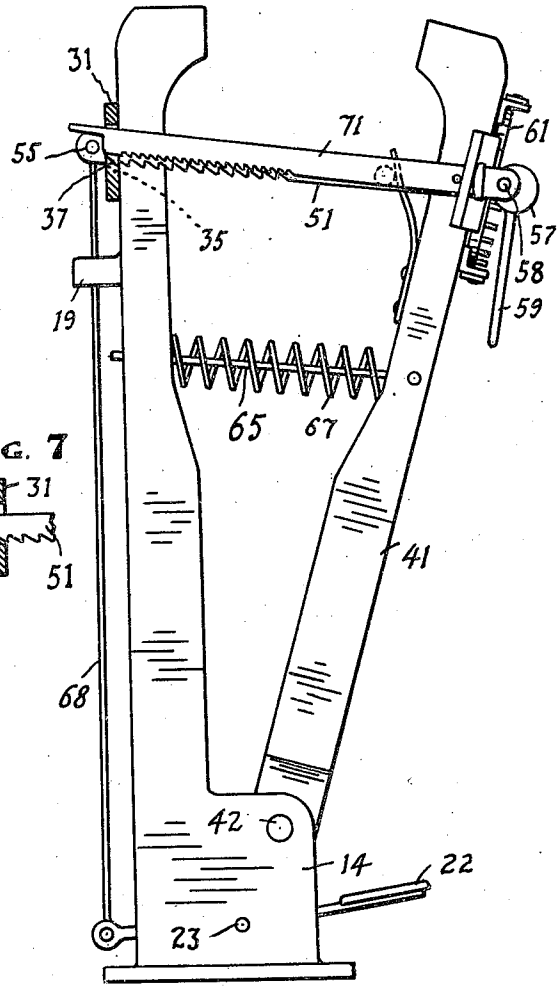


FIG. 4

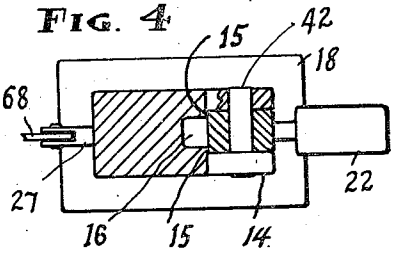


FIG. 5

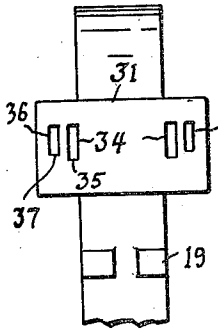


FIG. 6

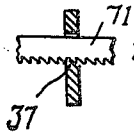


FIG. 7

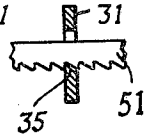


FIG. 8

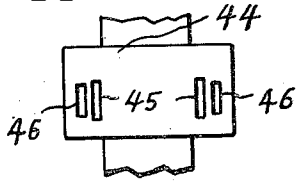


FIG. 9

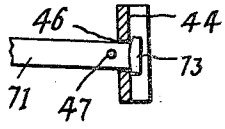
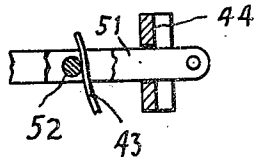


FIG. 10



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Patented Sept. 28, 1943 2,330,382

UNITED STATES PATENT OFFICE

2,330,382

VISE

Clement E. Richards, Muncie, Ind.

Application May 27, 1942, Serial No. 444,621

4 Claims. (Cl. 81—25)

This invention relates to improvements in vises.

The object of the invention, broadly stated, is to provide an apparatus of the above description operable by a foot pedal to permit the vise to be quickly opened, and which is capable of being expeditiously moved to and tightened in closed position by hand. This said general object, as well as other and more specific aims having to do with improvements in construction effecting economy of manufacture, are accomplished by, and my invention is embodied in, the new construction, combination and arrangement of parts illustrated in the accompanying drawings and described in the following specification.

The invention is defined in the claims, and in the drawings the different parts of the invention are identified in the several views, by suitable reference characters applied to them.

In the drawings—

Figure 1 is a side view of my improved vise as it appears when the jaws are in the closed and tightened position.

Figure 2 is a front view taken in the direction of arrow 2 in Figure 1.

Figure 3 is a horizontal cross section top plan view taken on the broken line 3—3 in Figure 1 in the direction of arrow 3.

Figure 4 is a horizontal cross section top plan view taken on the broken line 4—4, in the direction of arrow 4 in Figure 1.

Figure 5 is a broken away upper portion of the fixed jaw member, this view showing in detail the back plate of said jaw and in which are embodied the guideway slots for the yoke structure and link bars.

Figure 6 is a vertical cross section view taken on the broken line 6—6 in the direction of arrow 6 in Figure 3, in this view there being shown a broken away portion of the link bar.

Figure 7 is a vertical cross section view taken on the broken line 7—7 in Figure 3, in this view there being shown a broken away portion of the yoke bar.

Figure 8 is a broken away upper portion of the movable jaw member, this view showing in detail the face plate of said jaw and in which are embodied openings for the forward ends of the link bars, and for the forward ends of the bars of the yoke structure.

Figure 9 is a vertical cross section view taken on the broken line 9—9, and the direction of arrow 9 in Figure 3.

Figure 10 is a vertical cross section view taken on the broken line 10—10, and in the direction of arrow 9 in Figure 3.

Figure 11 is a side view showing the appearance of the vise when the jaws are in the completely open position.

The jaws, which may be made of wood, or of metal, may be of the general conformation and proportions as shown in the typical embodiment illustrated in the drawings.

The rear jaw 12 embodies a base of formation in cross section as shown in Figure 4, providing the side walls 14, interior transverse abutment faces 15, and channel 16 which will presently be referred to. A foot flange 18, and suitably located body lugs 19 on the rear side of jaw 12 enable the said jaw to be fixedly secured to the floor and to a convenient portion of the bench (not shown) respectively. In a suitable cavity 20 in said base, a foot lever 22 is fulcrumed on a cross pin 23. It is urged by a protractile spring 24 which is retained in a suitable recess 25 therefor in said base, to position with its weight arm 27 lowered, as indicated in Figure 1. 28 designates a hole extending through the median portion of said jaw 12 and to which further reference will be made.

Integrated with the rear side of the upper portion of the said jaw 12 is a transverse back plate 31 (see Figure 5) having oppositely positioned pairs of vertical guideway slots whose upper ends are in a common horizontal plane. The bottom of the inner slots 34 is lower than the bottom of outer slots 36 of each pair. The bottom of each of said inner slots is of formation to constitute a detent 35 (see Figure 7), and the bottom of each of the said outer slots is of formation to constitute a detent 37.

The frontal jaw 41 has its lower end journaled between the side walls 14 of the base of said fixed jaw, on cross pin 42, the rear surfaces of its bottom portion having bearing, when in the upright position, against the said abutment faces 15 therefor, as indicated in Figure 4.

Integrated with the frontal side of the upper portion of the said forward jaw 41 is a transverse plate 44 provided with oppositely positioned pairs of aligned openings, the inner opening and the outer opening of each pair, being designated 45 and 46, respectively. These openings are of slot like formation, as shown in Figure 8, and will be later referred to.

A yoke structure consists of similar bars 51 toothed at their lower edges, retained in opposed spaced relation by a medial cross member 52, and by a rear cross member 53, the latter embodying axial extensions 55. These yoke bars rest upon the detents 35 of the slots 34 of the said back

plate 31. Their frontal ends are loose in the inner openings 45 of the face plate 44 of the said forward or movable jaw 41.

A cylindrical cam 57 has its axle 58 journaled in suitable bores therefor provided in the front ends of the said yoke bars 51, and it is provided with a handle 59. The free end of a leaf spring 43 that is secured, as by cap screws, to the inner side of the said movable jaw 41, bears rearwardly against the cross member 52 of the said yoke structure, the cam 57 thereby being held firmly against the said face plate 44.

A segment 61 whose ends are pivotally-retained by brackets 62 provided therefor on the front face of jaw 41, is provided with a succession of studs 63 adapted to be engaged by the cam handle and to hold the latter against dislodgment from the position to which it is moved when the vise is operated to the closed position. When not in use, this segment is in the folded aside position indicated by the broken lines in Figure 3.

On a rod 65 which is pivotally retained at its forward end on a cross pin 66 provided in the forward jaw 41, and which said rod is received in the hole 28 of the said fixed jaw 12, is a protractile spring 67 which urges the jaw 41 away from jaw 12.

Power transmitting rod 68 pivotally interconnects the weight arm 27 of the foot lever 22, with the rear cross member 53 of the said yoke structure.

Similar link bars 71 toothed on their lower edges, the teeth being more closely spaced than are the teeth of the yoke bars, rest upon the detents 37 of the back plate 31 of the said fixed jaw. These link bars are of length so that their rearward ends are in close proximity with the rearward ends of the said yoke bars. The detents 37 being at a plane higher than the plane of the detents 35 whereby the rearward ends of the link bars are in raised position with relation to the yoke structure, and the said link bars being provided with offsets 72, there is provided suitable clearance of the extensions 55 of the rear cross member of the yoke structure. The frontal ends of these link bars are retained loosely in the outer openings 46 of the face plate 44 of the frontal jaw member 41 (see Figure 9) as by cotter pins 47, the heads 73 of said bars being suitably rounded on their inner surfaces to afford proper bearing against said face plate.

The relative positions of the several parts of my improved vise, when the jaws are in completely opened status, (the movement of the jaw 41 forwardly, or in the direction of the arrow F in Figure 1 being limited by the rear cross member 53 of the yoke structure having come into engagement with the back plate 31) are as indicated in Figure 11.

Yoke bars 51 and link bars 71 are resting on the detents 35 and 37 respectively, the rearward portions of the link bars being clear of the axial extensions of the rear cross member of the yoke structure. Upon pushing the jaw 41 toward fixed jaw 12 the said yoke bars and link bars are carried rearwardly and as the jaw 41 comes to engagement with the jaw 12 (or to the work that is to be held therein, not shown) it is anchored against reverse movement by the teeth of the said yoke bars (by the downward pull of connecting rod 68) which will have become engaged with the detents 35.

Operator now swings the segment 61 from the broken line position (see Figure 3) to position against the cam handle 69 (see Figure 1). Now upon lifting the cam handle, the cam 57, fulcrumed as it is, on the forward ends of the said yoke bars, and acting as a lever, moves the jaw 41 further toward jaw 12. The teeth of the link bars now having become engaged with the detents 37 of said back plate 31, the said link bars are anchored against reverse movement, and the jaws accordingly, are held in tightened closed position. The yoke bars, link bars, and cam are now in the positions as indicated in Figure 1. The handle of the cam will have been brought to engagement with a lug stud 63 of the sector, and by which the said handle is held against reverse movement. In this status of the jaws, the abutment faces 15 function to afford suitable bearing for the rear faces of the bottom of the frontal jaw 41 thereby preventing over-strain against the pivot pin 42. The channel 6 provides for escapement of any small object which might fall between the jaws.

To release the grip of the jaws, the sector is moved aside and the cam handle thus released, is moved by the operator to lowered position, thereby the tension of the link bars being relaxed. Now, pressure is applied to the foot lever 22, the upward movement of its weight arm and of the connecting rod 68 causing the rear portion of the yoke structure and the rear portions of the link bars to be lifted. The extent of this lifting movement (and which is limited by the slots 34 and 35) is such, that the said yoke structure and link bars will have been elevated to and supported at position disengaged from the aforesaid detents 35 and 37 respectively (see broken lines in Figure 1); whereupon, by the action of protractile spring 67, the jaw 41 is automatically urged away from the fixed jaw, same being permitted to move to such degree of opening as the operator may desire. The said jaw 41 at its completely open position appears as in Figure 11 and wherein the cross member 53 of the yoke structure will have come to engagement at rest against the said back plate 31.

Until the pressure is removed from the foot lever, the yoke bars and link bars continue to be supported at positions raised in the guideway slots 34 and 36, and clear of the detents 35 and 37 respectively. Now upon removing the pressure from the foot lever the yoke bars and link bars again become lowered and are at rest on said detents. The apparatus is returned to closed position, simply by the operator applying hand pressure against the face of the movable jaw, the yoke bars and the link bars riding the detents 35 and 37 respectively, and the teeth of the yoke bars becoming engaged with the detents 35 at the moment the hand pressure at the jaw is removed.

By my invention, the several parts of the apparatus are of construction and design that expensive processing operations involved in manufacture, are avoided. Any and or all of the parts may be provided with ordinary manufacturing equipment, and the apparatus may be supplied to the user, either in the set up form as shown, or in knocked down status. By reason of the operator being enabled to quickly operate the jaws to closed position, and to as quickly open them, considerable time is saved, and at the same time the worker is enabled to handle his work more conveniently, more speedily, and more effectively.

It will be understood that modifications may be made in the details of construction of the several parts, and of their arrangement, provided

they come within the scope of the claims, without departing from the spirit and principles of the invention or sacrificing any of its advantages.

What I claim as my invention, is:

1. Apparatus of the kind described comprising a fixed jaw, a movable jaw pivotally joined thereto at the lower portions of said jaws, said fixed jaw being provided at its upper portion with oppositely positioned pairs of guideway slots whose upper ends are in the same horizontal plane, one slot of each pair being longer than the other slot of that pair and its bottom being lower than the bottom of the other slot of that pair, a detent at the bottom of each of said guideway slots, oppositely positioned pairs of openings in the upper portion of the movable jaw, a yoke structure consisting of toothed bars retained in opposed spaced relation by a medial cross member and by a rear cross member, the said bars being loose in the longer guideway slots of said fixed jaw, and which rest on the detents therefor, and their forward ends being loose in opposite openings of the movable jaw, toothed link bars loose in the shorter guideway slots of the said fixed jaw and which rest on the detents therefor, and in the path of and above the rear cross member of said yoke structure, their forward ends being loosely connected to the upper portion of the movable jaw, a manually operable cam having its axles journaled in the forward ends of said yoke bars, means to retain the cam in coengaged relation with the frontal face of said movable jaw, and whereby when the jaws are brought together, the yoke bars become anchored, thereby constituting a fulcrum for said cam, means to urge the movable jaw away from the fixed jaw, a foot lever, means to urge the foot lever to position with its weight arm lowered, and a power transmitting member pivotally connecting the weight arm of the foot lever with the rearward portion of the said yoke structure, whereby the said yoke bars and link bars may be raised and lowered.

2. A vise consisting of a pair of jaws pivotally joined at their lower portions, one being adapted to be fixed in position and having at its upper portion oppositely positioned pairs of guideway slots whose upper ends are in the same horizontal plane, the bottom of the inner slot of each pair being lower than the bottom of the outer slot of said pair, a detent at the bottom of each of said slots, the other jaw being movable about the pivot, oppositely positioned pairs of openings in the upper portion of the movable jaw, a yoke structure consisting of toothed bars retained in opposed spaced relation by a medial cross member and by a rear cross member, the latter having axial pintles, the frontal ends of said yoke bars being loose in the inner openings of said movable jaw and the said bars resting in engagement with the detents of the inner guideway slots of the said fixed jaw, a cam having its axle journaled in the forward ends of the said yoke bars, a handle for said cam, toothed link bars loose in the outer guideway slots of the said fixed jaw, their rearward ends being poised above said pintles, their forward ends being loosely connected in the outer openings of said movable jaw, means interacting between said yoke structure and said movable jaw, to hold the cam in coengaged relation with the latter, means to urge the movable jaw away from the fixed jaw, a foot lever, means to urge the foot lever to position with its weight arm lowered, and a connecting rod pivotally interconnecting the rearward cross member of the yoke structure and the weight arm of said lever.

3. A vise consisting of a pair of jaws pivotally joined at their lower portions, one being fixed in position and provided with a transverse back plate at the rear side of its upper portion, said back plate having oppositely positioned pairs of guideway openings whose upper ends are in a common plane, the bottom of the inner slot of each pair being lower than the bottom of the outer slot of that pair, a detent at the bottom of each of said slots, the other jaw being movable about the pivot, a transverse face plate integrated with the upper portion of the frontal face of the movable jaw and which is provided with oppositely positioned pairs of openings, a yoke structure consisting of toothed bars retained in opposed spaced relation by a medial cross member and by a rear cross member the latter having axial extensions, the frontal ends of said toothed yoke bars being loose in the inner openings of said face plate, and which said yoke bars by gravity rest upon the detents of the guideway slots of the said back plate, a cam having its axle journaled in the forward ends of the said yoke bars, a handle for said cam, means interacting between the movable jaw and said yoke structure to hold the cam against the face plate of the movable jaw, a segment carried by said jaw and swingable to position in alignment with said cam handle and having prongs thereon to hold the cam handle against dislodgment from the position to which it is moved, toothed link bars loose in the outer guideway slots of said back plate, their forward ends being loose, but which are held attached in the outer openings of said face plate of the movable jaw, their rearward portions resting normally on the detents therefor at the bottoms of the outer slots of said back plate, means to urge the movable jaw to open position, a foot lever, means to urge the foot lever to position with its weight arm lowered, and a connecting rod pivotally connecting the weight arm of the said lever to the rear cross member of said yoke structure.

4. A vise consisting of a fixed jaw, and a movable jaw pivotally joined thereto, the meeting faces of the joined portions being in abutting relation, elongated toothed yoke bars retained loosely in the upper portion of the fixed jaw, their forward ends being loose in the upper portion of the movable jaw, and projected beyond the face thereof, detents on the fixed jaw and which are engageable by said yoke bars, an arcuate manually operable cam having its axle journaled in the forward ends of said yoke bars, means interacting between the yoke bars and the said cam to hold the latter in coengaged relation with the face of the said movable jaw, means thrusting the movable jaw away from the fixed jaw, elongated toothed link bars retained loosely in the upper portion of the fixed jaw, their forward ends being connected to the upper portion of the movable jaw, detents on the fixed jaw engageable by said link bars, urger means to urge the yoke bars and link bars to engagement with their respective detents, a device manually operable to lock said cam after the operating thereof, and a lever device manually operable to resist said urger means, and to move said yoke bars and link bars to, and to hold them in position disengaged from, said detents, whereby when the movable jaw is swung to engagement with the fixed jaw, the yoke bags and the link bars become engaged with the said detents, the movable jaw thereby being

held against reverse movement, and the yoke bars being caused to function as a fulcrum for said cam, and, whereby, upon operating the cam and locking same, the movable jaw will have been moved into and held at tightened engagement with the fixed jaw, and, when the lever devise is again operated to resist said urger means, the said yoke bars and link bars are moved to and are held in position disengaged from said detents, and the movable jaw, being thereby released, swings automatically to open position, away from the fixed jaw.

CLEMENT E. RICHARDS.