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QUICK ACTING VISE

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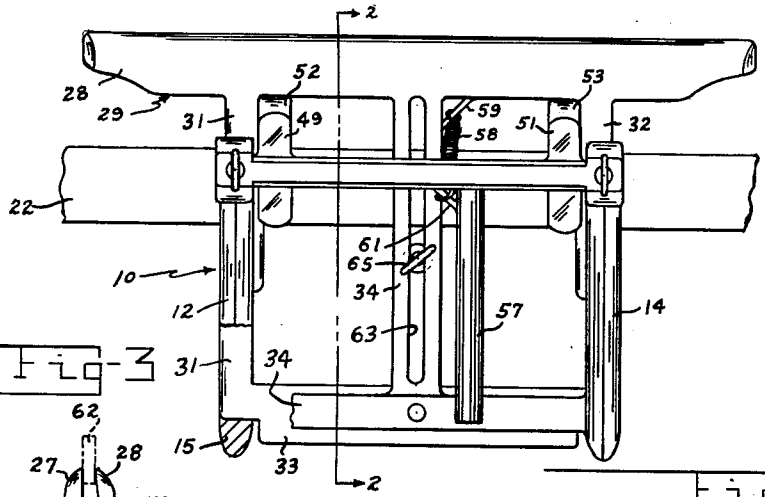


Fig-1

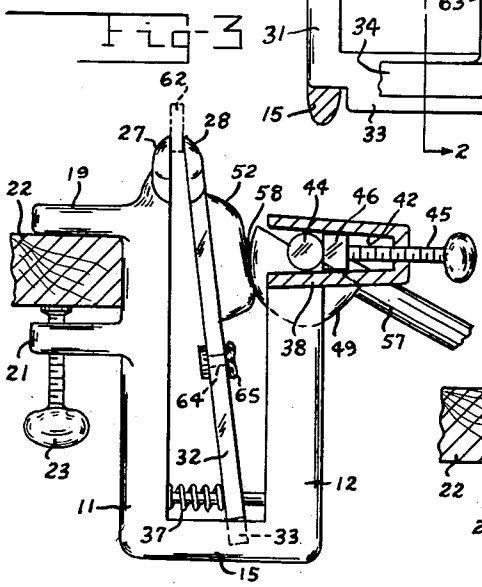


Fig-3

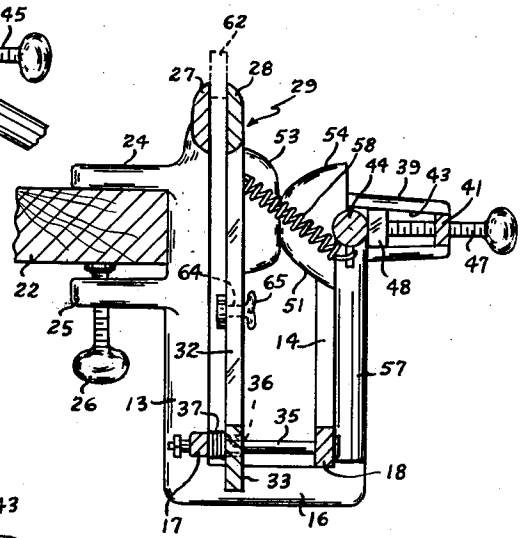


Fig-2

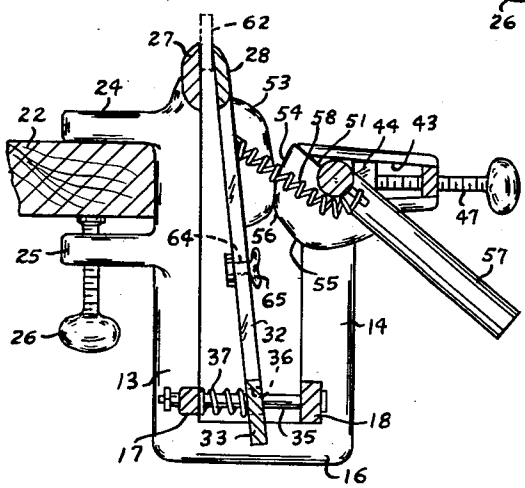


Fig-4

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QUICK ACTING VISE

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This invention relates to work holders, and particularly to quick acting vises.

The object of the invention is to simplify the construction as well as the means and mode of operation of work holders whereby such holders may not only be economically manufactured, but will be more efficient and satisfactory in use, adaptable to a wide variety of applications, and be unlikely to get out of order.

A further object of the invention is to incorporate features of adjustability in a quick acting vise in a manner readily to accommodate work of differing gripping requirements.

Another object of the invention is to construct a vise as described particularly for use with thin, elongated work pieces, for example saw blades, a feature of the invention residing in an arrangement of vise jaws and locking-up means therefor by which the jaws exert a substantially uniform clamping pressure over their full length.

A further object of the invention is to present a generally new vise characterized structurally by a floating assembly of a movable jaw and cam means for operating the jaw, the assembly being adjustable as a unit to suit the requirements of the work.

Still another object of the invention is to present in a quick acting vise as described cam means having a plural contour surface providing in a closing up of the vise an initial rapid motion of the movable jaw to engage the work and a following slower motion under conditions enabling the application of substantial clamping pressure.

A still further object of the invention is to incorporate in a vise constant stroke means for opening and closing the vise, along with means for adapting the vise to utilize such constant stroke in the clamping of workpieces of differing gripping requirements.

A further object of the invention is to provide a work holder possessing the advantageous structural features, the inherent meritorious characteristics and the mode of operation herein mentioned.

With the above and other incidental objects in view as will more fully appear in the specification, the invention intended to be protected by Letters Patent consists of the features of construction, the parts and combinations thereof, and the mode of operation as hereinafter described or illustrated in the accompanying drawings, or their equivalents.

Referring to the accompanying drawing wherein is shown one but obviously not necessarily the only form of embodiment of the invention,

FIG. 1 is a view in rear elevation of a vise in accordance with the illustrated embodiment of the invention, the vise being shown mounted to a bench with the parts thereof in a closed position;

FIG. 2 is a view in cross-section, taken substantially along the line 2—2 of FIG. 1;

FIG. 3 is a view in side elevation, showing the vise in an open position; and

FIG. 4 is a view like FIG. 2, showing the vise partly actuated to a closed position.

Like parts are indicated by similar characters of reference throughout the several views.

Referring to the drawings, a vise in accordance with the illustrated embodiment of the invention comprises a unitary body in the form of a U-shaped frame 10. The latter is comprised of interconnected leg and base components including laterally spaced apart pairs of legs 11—12 and 13—14 joined together by respective base portions 15 and 16. The spaced apart pairs of legs as described are joined by low transversely extending walls 17 and 18 located near the bottom of the frame structure or at the base portions 15 and 16. The leg 11 is formed with vertically spaced apart feet 19 and 21 projecting at right angles thereto or toward what may be considered the front of the vise. As indicated, the feet 19 and 21 are adapted to receive therebetween the edge of a bench 22 or the like with the vise being clamped to the bench by suitable means, as for example by a screw clamp 23. Similar feet 24 and 25 are formed on the leg 13 and embrace the edge of the bench 22 at a laterally offset position with another clamp 26 being mounted therein. The arrangement accordingly is one to provide relatively widely spaced bearing engagement of the vise with the bench and means for securing the vise at each point of engagement.

At their upper ends, above the respective pairs of feet 19—21 and 24—25 thereon, the front legs 11 and 13 terminate in a transversely extending bar 27 common to the two legs and facing rearwardly in a manner to define and serve as a stationary jaw member. In generally opposed or confronting relation to the jaw member 27 is another jaw member 28 which is a part of a movable jaw unit 29 disposed vertically in the U-shaped frame 10 between the legs of the spaced apart pairs of frame legs. In addition to jaw member 28, the unit 29 comprises dependent side walls 31 and 32, a transverse interconnecting wall 33 at the bottom of the vise, between base portions 15 and 16, and a central vertical web 34 interconnecting jaw portion 28 and bottom transverse wall 33.

The movable jaw unit 29 rests on the base portions 15 and 16, being formed at its ends with cut outs defining shoulders 34 overlying and resting on respective base portions 15 and 16. The movable jaw unit is supported with freedom of to and fro motion between the opposing legs of the frame and is guided in its motion by a longitudinally extending rod 35 connected at its ends in the front and back transverse walls 17 and 18. The pin 35 passes through the bottom transverse wall 33 of unit 28, the latter being formed with an oversize opening 36 enabling not only longitudinal sliding motion of the jaw unit but bodily tilting motion thereof as well. A compression spring 37 surrounds rod 35, being interposed between the bottom transverse wall 33 of unit 39 and front frame wall 17.

The outwardly facing legs 12 and 14 of the vise frame terminate at their upper ends in respective forwardly projecting guide members 38 and 39 interconnected by a transverse bar 41. Guide member 38 is formed with a slot 42 of longitudinal extent opening through the front of the member or into the U-shaped area of the vise receiving movable jaw unit 29. Guide member 39 is formed with a similar slot 43. A shaft 44 is transversely disposed in the vise and has its ends received in respective slots 42 and 43. A screw 45 enters guide member 38 at the outer end thereof and has a threaded connection therewith. The inner end of the screw 45 is adapted to engage the respective end of shaft 44 through a bearing block 46. By rotation of the screw 45, through a suitable finger piece thereon, the screw may be advanced and retracted relative to the guide member 38 and so caused to effect bodily shifting motions of one end of the shaft 44. A like screw 47 enters the guide member 39, and, through a bearing block 48, engages the other end of shaft 44.

Secured to the shaft 44, in laterally spaced apart relation, are segmental cams 49 and 51 having contoured peripheral edges in engagement with respective bearing surfaces 52 and 53 formed integrally with depending side walls 31 and 32 of the movable jaw unit 29, such surfaces being located intermediate the jaw component 28 and

the bearing rod 35 at the base of the movable jaw unit. The cams 49 and 51 are of identical construction, each having on its periphery an abutment portion 54 and a portion of gradual inclination 55 connected by a more abruptly curved portion or shoulder 56. The cams 49 and 51 move in response to a rotary turning motion of the shaft 44 about its axis. This is accomplished by a handle 57 projecting radially from the shaft 44. Limited rocking motion of the shaft 44 is provided for by defining limits of arcuate movement for the handle 57, the upper limit being defined by bar 41 and the lower limit by base wall 18.

With peripheral edge portion 54 presented to respective contact surfaces 52 and 53, the cams 51 and 52 are engaged over relatively large portions of their periphery and tend to maintain a position as shown in FIG. 3 wherein the handle 57 is rocked to its upper limit of movement against bar 41. A cooperative relationship between the cams 49 and 51 and their engaged surfaces 52 and 53 is maintained by a tensile spring 58 anchored at its one end to a strip 59 integral with the unit 29 and anchored at its other end to a strip 61 joining shaft 44 and handle 57. Movement of the handle 57 upward, to a position as described against bar 41, serves to tension or stress the spring 58, exerting a retracting influence upon unit 29, that is, tending to move it in a direction to separate jaw 28 from stationary jaw 27. Movement of the handle 57 downward, to a lower limit of movement as shown in FIG. 2, serves initially to bring abruptly curved portions 56 of the two cams into contact with their respective surfaces 52 and 53, and, as this motion is continued, the unit 29 is moved in a forward direction causing jaw 28 to approach jaw 27. As part of the continuing downward movement of the handle 57, portions 55 of the cams are brought to bear upon the movable jaw effecting further advance thereof at a lower rate of movement, but under conditions of increased coverage.

In the operation of the device, a workpiece such as a part 62 is placed between the jaws 27 and 28 while the vise is in an open position as shown in FIG. 3. The handle 57 is then rocked downward to the position shown in FIG. 2, moving cams 49 and 51 over surfaces 52 and 53 and advancing movable jaw unit 29 toward stationary jaw 27 in the manner described. In the early part of such motion the unit 29 moves rapidly under the influence of the pressure applied by shoulder 56 for quick close up of the jaws 27 and 28 upon the work. The latter part of the stroke of the handle brings edge portions 55 of the cams to bear on the movable jaw unit with the result that the cams apply through the jaw 28 a gradual, increasing clamping pressure upon the work. The contour of each portion 55 is such as to achieve substantial mechanical advantage in the operation of the vise so that relatively light pressure upon the handle 57 in moving it to its lowermost position applies appreciable clamping pressure to the work. Excess movement of the cams, beyond that required to clamp the work, is accommodated in a tilting motion of the unit 29 against the urging of spring 37, the unit moving from a generally inclined position as shown in FIG. 4 wherein it has engaged the work in response to a partial actuation of handle 57, toward an erect position as shown in FIG. 2, wherein the handle 57 has completed its stroke.

The lock up mechanism of the vise operates on a constant stroke principle, the handle 57 being moved to its opposite extremes of motion, in the one sense to open the vise and in the other sense to close it. Shaft 44 has a floating mounting in the guide members 38 and 39 and takes up a position therein as defined by the longitudinal positions of adjustment of the screws 45 and 47. Adjustment of the screws 45 and 47 serves to vary the initial or normal spacing between the jaws 27 and 28 and the vise may in this manner be set to accommodate or accept work of differing thickness or gripping requirements. The structure of the device lends itself particularly to repeated gripping of successive workpieces of like description. Thus, the screws 45 and 47 are set to define an initial spacing of the jaws 27 and 28 which will accept the work and which will achieve a desired clamping pressure upon a full stroke of the handle 57. As successive workpieces are removed, and replaced by other like pieces, it is merely necessary to raise and lower the handle 57 whereby to accomplish quick acting opening and closing of the vise upon the work and a secure gripping thereof.

The vise of the ilustrated embodiment of the invention is especially adapted for the holding of saw blades, the jaws 27 and 28 being elongated in a lateral sense. The structure lends itself to a satisfactory and secure mounting of narrow, polished sheet material of this kind. The spaced apart cams 49 and 51 apply pressure to the jaws adjacent opposite ends thereof so that the clamping pressure applied to the work is substantially uniform. Screws 45 and 47, being also provided in plural number and in laterally spaced relation, make possible a precise and secure positioning of the shaft 44 whereby to achieve an accurate, uniform initial spacing of the vise jaws.

The central web 34, in the movable jaw unit 29, is formed with a vertical slot 63 in which is mounted a stud 64. The stud 64 is vertically adjustable in the slot 63, by sliding therein, and is suitably held, as through a wing nut 65 in a selected position of adjustment. The stud 64 provides a variable position of rest for workpieces, such as saw blades, received between the jaws of the vise, holding the work properly located while the handle 57 is manipulated to close up the vise jaws.

From the above description it will be apparent that there is thus provided a device of the character described possessing the particular features of advantage before enumerated as desirable, but which obviously is susceptible of modification in its form, proportions, detail construction and arrangement of parts without departing from the principle involved or sacrificing any of its advantages.

While in order to comply with the statute the invention has been described in language more or less specific as to structural features, it is to be understood that the invention is not limited to the specific features shown, but that the means and construction herein disclosed comprise but one of several modes of putting the invention into effect, and the invention is therefore claimed in any of its forms or modifications, within the legitimate and valid scope of the appended claims.

Having thus described my invention, I claim:

1. A vise, including a body defining a generally U-shaped frame, the upper end of one leg of said frame being formed with a stationary jaw, movable jaw means received between the legs of said frame and having a jaw formation at its upper end confronting said stationary jaw, a rod extending between the legs of said frame at the base thereof on which said movable jaw means is slidably mounted, a compression spring on said rod between said one leg and said movable jaw means, cam means mounted for oscillatory motion in the other leg of said frame in transverse plane intermediate the jaw forration on said movable jaw means and said rod, said cam means having a floating mounting in said frame for freedom of bodily motion in said transverse plane, follower surface means on said movable jaw means for engagement with said cam means, the latter being formed to advance the movable jaw means toward said one leg in response to rocking motion of said cam means in one direction and to control retracting motion thereof in response to return rocking motion of said cam means, a tensile spring retracting said movable jaw means and maintaining said follower surface means in contact with said cam means, stop means adjustable in said other leg of said frame limiting bodily shifting movement of said cam means outward or away from said movable jaw means, and swingable means for rocking said cam means, said swingable means providing an anchor for one end

of said tensile spring and tensioning said spring by movement in a direction to retract said movable jaw means.

2. A vise according to claim 1, characterized by rest means adjustably mounted in said movable jaw means beneath the jaw formation thereon acting to position work received between said stationary jaw and said movable jaw means.

3. A vise according to claim 1, characterized in that said cam means includes a shaft having a floating mounting in said frame and plurality of spaced apart cam elements thereon, said stop means further comprising individually adjustable stop elements for effecting an equal bodily shifting of said shaft.

4. A vise comprising a body, a pair of relatively opposed vise jaws on said body, one having a floating mount for bodily shifting and tilting movements relative the other, oscillatory cam means on said body maintained in contact with and operative, on movement in one direction, to induce the bodily sliding and tilting movement of said one jaw relative the other to accommodate and clamp an article therebetween, means to oscillate said cam means, said cam means being operative, on movement to an opposite direction, to accommodate a retraction of said one jaw relative the other and means forming a yielding connection between said one jaw and said cam means stressed on movement of said cam means in said opposite direction to effect a retraction of said one jaw relative the other.

5. The structure as set forth in claim 4 characterized by said cam means having a floating mount on said body and means maintaining said cam means in contact with said one jaw and operative to provide a simultaneous displacement thereof referenced to said other jaw.

6. A vise comprising a body providing a stationary jaw, a movable jaw having a floating mount on said body disposing it in opposed relation to said stationary jaw, cam means oscillatory on said body to effect and control the position of said movable jaw, means maintaining said cam means in continuous engagement with said movable jaw, means connected to rock said cam means to advance said movable jaw to a closed position referenced to said stationary jaw, said floating mount for said movable jaw including means resiliently accommodating overtravel of said movable jaw referenced to its closed position relative said stationary jaw.

7. The structure as characterized in claim 6 including support means providing a floating mount of said cam means on said body and means for shifting said cam means and said movable jaw therewith independent of said support means.

8. A vise comprising a body, rod means thereon, supports on said body spaced longitudinally with reference to said rod means, a stationary jaw on one of said supports, oscillatory cam means on another of said supports, means defining a movable jaw in confronting relation to said stationary jaw slidably mounted to said rod means and positioned thereby intermediate said stationary jaw and said cam means, means forming a yieldable connection between said cam means and said movable jaw maintaining a contact therebetween, means to rock said cam means, said cam means being formed to advance said movable jaw on said rod means to a closing position referenced to said stationary jaw on rocking thereof in one direction and said cam means having a contour to accommodate displacement of said movable jaw from the stationary jaw on being rocked to the opposite direction.

9. The structure as set forth in claim 8 characterized by spring means on said rod means interposed between said support for said stationary jaw and said movable jaw and arranged to compensate for overtravel of said movable jaw referenced to said stationary jaw.

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