April 13, 1926. 1,580,197

J. M. HARGRAVE

CLAMP

Filed Sept. 29, 1924

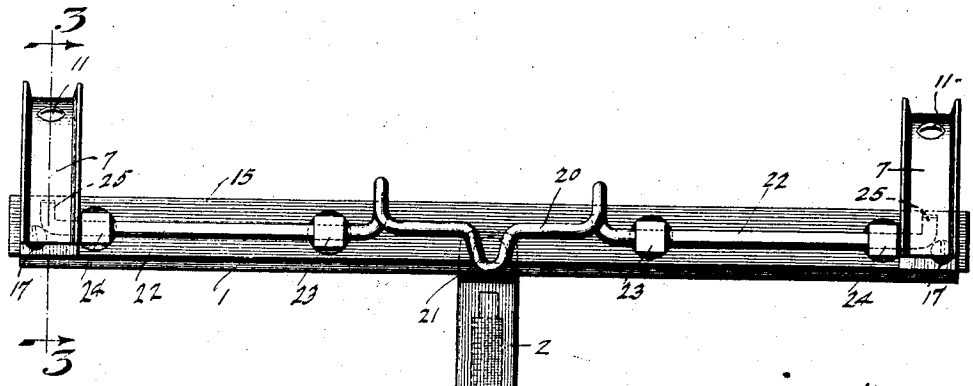


Fig. 1

Fig. 2.

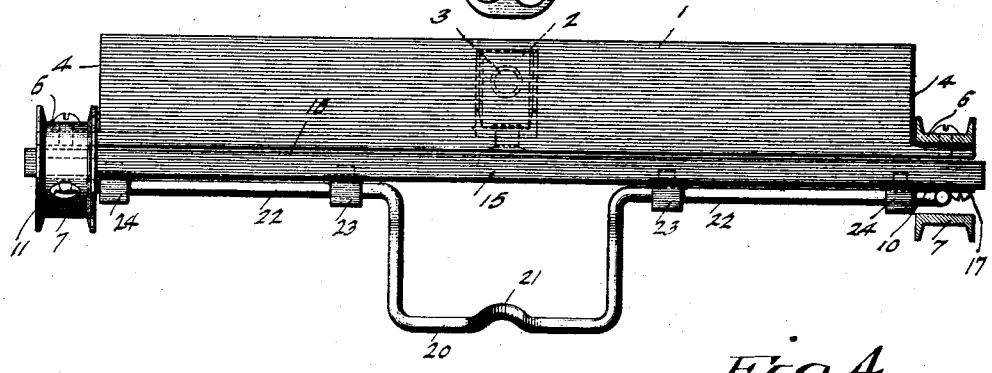


Fig. 4.

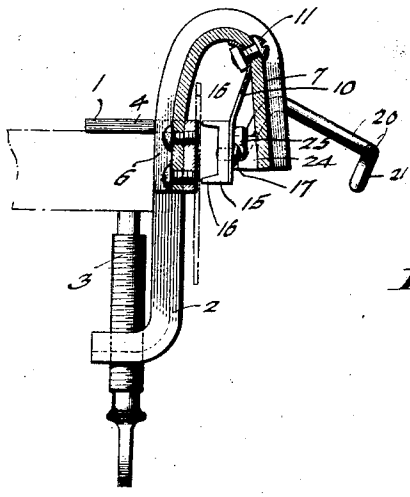
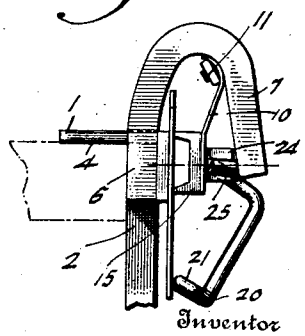


Fig. 3



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UNITED STATES PATENT OFFICE.

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CLAMP.

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To all whom it may concern:

Be it known that I, JOHN M. HARGRAVE, a citizen of the United States, and residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented a new and useful Clamp, of which the following specification is a full disclosure.

This invention relates generally to improvements in clamping devices primarily of the class known as saw clamps, in which the clamping jaws can be separated to a very limited degree with a quick acting control for the movable jaw.

An object of the invention is to provide a device of the above nature which may be conveniently attached to a support, the mounting for the pressure-applying portion of the attaching means being pivotally secured and adapted to be folded within and against the base or support-engaging portion of the apparatus.

Another object is to provide a floating resiliently suspended movable clamping member or jaw normally held in spaced relation to its companion stationary member and movable theretoward against spring action providing for ready insertion of the work, and for retraction of the movable member from engagement with the work upon its release by the clamping means.

Another object of the invention is to provide a clamp having cooperative stationary and movable jaw members in which the movable jaw member is swingingly suspended upon bowed supports which are themselves relatively yieldable or springy to compensate for difference in thickness of the articles to be clamped, said support, however, having sufficient rigidity to procure the proper clamping action between the jaws under all conditions.

Other objects are to provide a device which can be manufactured at small cost, which will withstand relatively great clamping strains, which is of relatively small dimensions, and which has a minimum weight.

Another object of the invention is the provision of a cam and cam actuating means formed from a single length of wire and operable for simultaneously engaging the movable member at opposite ends, forcibly moving the same to clamping position and holding the same locked in such position against accidental displacement.

Other objects and certain features and advantages will appear in the description of the drawings forming part of this specification, in which:

Figure 1 is a front elevation of the device.

Figure 2 is a plan view.

Figure 3 is a vertical transverse section on line 3—3 of Figure 1 showing the clamp in released position.

Figure 4 is a fragmentary detail showing the device in clamping position.

The clamp is principally made from angle and channel iron bar stock adapting a simple and durable structure at a minimum cost of manufacture.

The device comprises a stationary jaw member and a movable jaw member cooperable therewith. The stationary jaw or clamping member 1 is adapted to be attached to a support and is formed from a length of angle iron, in this instance, having unequal flanges or limbs, the shortest of which provides the stationary jaw portion against which the work is clamped. The longer flange forms a plate or base portion for bearing upon a support or table to which the clamp is secured. Centrally of the short flange at the inner side is pivoted a length of channel iron 2 having its channel side facing away from the flange. The iron is curved at its free end to provide a right-angularly disposed extension in threaded engagement with which is a clamping screw 3 having a winged finger piece or squared portion by which it can be forcibly rotated. The screw is adapted to engage at the under side of the support in the usual manner (see Figure 3). When not in use this device may be swung to lie flatly against the rear side of the short flange of the iron, which is the preferable position, when being transported.

The long flange of the member 1 at an opposite end is notched as at 4, by removing a rectangular section, leaving a portion of the short leg projecting at each end. To each

of these projecting portions at the rear is fastened one leg 6 of a substantially U-shaped or bowed support. Each support projects upwardly at an angle to the long axis of the member 1, preferably at the right angle, and has its free or unattached leg 7 spaced outwardly from and disposed in opposition to the work face of the angle iron 1, preferably substantially parallel therewith. The spacing is sufficient to permit the introduction and movement of a movable clamping member, between the leg and the working face of the stationary member. Each bowed support is formed from a length of channel iron, the concave or channel side facing outwardly, and thus providing a rib reinforced relatively yieldable support to which the movable member is attached.

Although the preferable shape of the bowed supports is that herein shown, any desired shape may be given them, if a free, relatively yieldable leg is provided, spaced from and disposed in opposition to the work face of the stationary member, and which is sufficiently rigid to procure proper clamping action, but will "give" enough to allow work of greater thickness to be clamped. Attached by one end to and preferably at the apex, inside of and flatly against the plane face of each support is a resilient element 10 having herein the form of a leaf spring.

The upper end of the spring is curved to conform to the curved outline of the support at the point of attachment and is secured thereto by a screw 11. The element is bent inwardly away from the free leg and disposed at an intermediate point and extends downwardly substantially to a point in opposition to the lower edge of the work engaging flange.

The movable clamping member 15 is herein formed from a length of channel iron with its concave or channel side opposing the work face of the stationary member, thus providing two spaced elongated, longitudinally disposed relatively narrow faced ribs 16, the faces of which engage the work and thus have virtually a biting edge contact therewith. The length of the member is substantially the same as that of its companion member and its ends lie between the free legs and the support, and each is attached by a screw 17 to the lower end of a resilient element 10, the elements thus swingingly supporting the member. The member 15 is preferably slightly curved longitudinally with the convex side facing the member 1 so that when engaging the work and pressure is applied at the ends the member is flattened and positively engages the work at every point.

The springs or resilient members are shaped and disposed in such manner that when the member is attached it is yieldably suspended and spaced from the member 1 sufficiently to permit the free insertion of the work. The springs also act to retract the movable member to release the work after the advancing means has been released, the detail of this means being described herebelow.

This construction simplifies the assembly of the device, the springs ordinarily being first attached to the movable bar, inserted in place between the legs and fastened by the screw 11, the springs being thus enclosed and protected.

The means for applying clamping pressure simultaneously to and at both ends of the movable clamping member comprises a single length of heavy wire bent to provide a handle or grip portion 20 and an intermediate rightangularly related stop projection 21 formed by bowing the wire. At each side of the grip portion the wire is twice rightangularly bent and after the second bend providing coaxial bearing engaging portions 22, each of which is rotative in two bearings or lugs 23, 24, attached to and extending outwardly from the movable member, a bearing 24 being adjacent each free leg of the supports. The terminals of the wire are bent at right angles to provide relatively short cam portions 25 and the tips of these bent portions are rounded concentrically with the rotative axis of the device for engagement with the inner wall of the leg 7 against which they impinge when the shaft is appropriately rotated, and forcibly swing the clamping member toward and into contact with the work. The grip portion and projection 21, and the cam portions are angularly related in such manner that when in clamping position the projection 21 engages the work, the iron 2, or the support to which the apparatus is attached, stopping the cams in a position to prevent accidental release while the work is being operated upon (see Figure 4). This is accomplished by having the cams pass slightly over or beyond a line intersecting the rotative axis of the device, and substantially perpendicular to the outer face of the movable member, which position I designate over-the-center-lock for cam operating lever.

Although the locking device herein shown and described is preferable, other equivalent means could be used, providing that pressure be applied at a point between the free leg and the movable member, for example, the locking device could extend between the free legs and be pivoted thereon, or separate clamping devices independently operable could be placed upon each leg. Moreover, the over-the-center-lock is preferable but any equivalent means can be provided for forcing the yieldably mounted movable member to clamping position.

With the movable member thus yieldably

suspended in spaced relation to the stationary member the work can be easily introduced and when the work is of greater thickness than the distance of the spacing, the yieldability permits the member to be easily forced away to permit its introduction. As ordinarily used, however, the work is generally of less thickness than the spacing and the work can be freely introduced and when the clamp bar 15 is released the work is also released.

Having described the invention, I claim:

1. In a device of the class described, a first clamping member having a work face, bowed supporting members attached, in spaced relation, to said clamping member, each having a leg spaced from the work face of the member, a resilient element for each bowed supporting member secured at one end to the bowed supporting member, having its free end intermediate the leg and work face, a second clamp member connected at opposite ends to said respective resilient elements and having a work face cooperable with that of the first mentioned member, by swinging against the spring action, and means cooperable with the legs and movable member for forcibly advancing the member to clamping position and holding the same thereat.

2. In a device of the class described, a first clamping member, bowed members attached at opposite ends thereof, each having an unattached leg spaced therefrom, a spring attached one at the inner side of each of said bowed members, a second clamping member cooperable with the first having portions thereof lying between the unattached leg and the first member and attached to and suspended by said spring, and means cooperable with the legs and second member, for forcing said member toward the first.

3. In a device of the class described, a first clamping member, bowed members attached at opposite ends thereof, each having an unattached leg spaced therefrom, a spring attached one at the inner side of each of said bowed members, a second clamping member cooperable with the first having portions thereof lying between the unattached leg and the first member and attached to and suspended by said spring, and means cooperable with the legs and second member for forcing said member toward the first, and holding the same in advanced position.

4. In a device of the class described, an angle iron adapted to be fitted over the corner of a support and having a work engaging face, a yieldable bowed support attached at each end of the iron, each support having a free leg spaced from the work face of the iron, a resilient element attached to and depending from each support at the inner side thereof, a channel iron having the end faces of its flanges cooperable with the work face of the angle iron, and attached to the resilient elements, means cooperable with the channel iron and free legs for forcibly advancing that iron toward the other, for clamping work between the two, and means for locking the advancing means when advanced.

5. In a device of the class described, a stationary clamping member having a work engaging face, substantially U-shaped supports one attached by one leg adjacent each end of the member with the unattached leg of each spaced from and in opposition to the work face of the member, resilient elements one for each support terminally attached thereto between the legs, a movable clamping member having its opposite ends attached respectively to the free ends of said resilient elements, and cam means upon the movable member simultaneously cooperable with the unattached legs for forcibly moving the clamping member toward and against the stationary member, and automatically locking said cam means as then disposed.

6. In a device of the class described, a stationary member having a plane face for engagement by the work, substantially U-shaped supports, each attached by one leg adjacent opposite ends of said member, with the free leg spaced from and in opposition to the work face, a resilient element attached to each support at one end, between the legs, a movable clamping member with each end attached to the corresponding resilient element, and means mounted upon the movable clamping member cooperable with the unattached legs simultaneously operable for forcibly moving the movable member against the stationary member.

7. In a device of the class described, a stationary member having means thereon to clamp the same to a support, and having a plane face for engagement by work, U-shaped supporting elements each attached by one leg at relatively opposite ends of the member in inverted position, each having a leg spaced from and opposingly related to the member, a leaf spring attached dependingly between the legs of each supporting element, a movable clamping member adapted for cooperation with the stationary member for clamping work between the members, the respective ends of the clamping member attached to said leaf springs, the springs supporting the member for movement against spring action toward the stationary member, and means for forcing the movable member against the stationary member.

8. In a device of the class described, a stationary member having means thereon to clamp the same to a support and having a plane face against which work is adapted

to lie, U-shaped supporting elements each attached by one leg at relatively opposite ends of the member, in inverted position, each having a leg spaced from and opposingly related to a plane face of the member, a leaf spring attached dependingly between the legs of each supporting element, a movable clamping member adapted for cooperation with the stationary member for clamping work thereagainst, the ends of the clamping member attached respectively to said leaf spring, the leaf spring supporting the member for movement against spring action toward the stationary member, and means rotatably pivoted upon the movable member for forcing the same against the stationary member, said means comprising a single length of heavy wire bent to provide an intermediate grip or handle portion, oppositely extending coaxial bearing engaging portions, and terminal angular cam portions engageable with a free leg, the grip portion and cam portions angularly related for obtaining over-the-center locking position of the cams when the grip portion engages the work or stationary support.

9. In a device of the class described, a stationary member having means thereon to clamp the same to a support and having a plane face for engagement by the work, bowed supporting elements each attached by one leg at relatively opposite ends of the member in inverted position, each having a leg spaced from and opposingly related to the member, a leaf spring attached by one extremity dependingly between the legs of each supporting element, a movable clamping member adapted for cooperation with the stationary member for clamping work between the members, the ends thereof extending between the stationary member and free legs, each end attached respectively to the corresponding leaf spring, the spring supporting the movable member spaced from the stationary member and for movement against spring action toward the stationary member, and means for forcing the movable member against the stationary member, said means comprising a shaft rotatably mounted upon the movable member having cams at opposite extremities cooperable with the free leg of the supporting element for forcing the member to clamping position when the shaft is rotated.

10. In a device of the class described, a first clamping member having a plane work engaging face, U-shaped elements each attached in inverted position by one leg to opposite ends of said stationary member, each having a free leg spaced from and opposingly related to said work face, a leaf spring attached at one end within and to each U-shaped element, and extending downwardly between the legs and work face of the stationary member, a movable clamping member convexly curved toward and adapted to cooperate with the stationary member for clamping work thereagainst having opposite ends respectively attached to the lower end of the leaf spring, the leaf spring normally holding the movable member spaced away from the stationary member to permit insertion of the work, and means mounted upon the movable member cooperable with the free leg of each U-shaped element for forcibly moving that member toward the stationary member and locking the same in clamping position.

11. In a device of the class described, a stationary clamping member having a work engaging face, and means for clamping the member to a support, bowed supports one attached by an extremity adjacent each end of the member, with the unattached portion spaced from and in opposition to the work face of the member, resilient elements one for each support terminally attached within the supports, a movable clamping member having respective opposite ends attached to the corresponding free ends of the respective resilient element, and cam means simultaneously cooperable with the unattached portions of the supports for forcibly moving that member toward and against the stationary member or work.

12. In a device of the class described, a stationary clamping member having a work engaging face, and means for clamping the member to a support, bowed supports one attached by an extremity adjacent each end of the member, with the unattached portion spaced from and in opposition to the work face of the member, resilient elements one for each support terminally attached within the supports, a movable clamping member having respective opposite ends attached to the corresponding free ends of the resilient element, and cam means upon the movable member simultaneously cooperable with the unattached portions of the supports for forcibly moving that member toward and against the stationary member or work, and automatically locking the same in advanced position.

13. In a clamp of the class disclosed, a stationary jaw member having support extensions reaching forward of the jaw surface of said member, for supporting a movable jaw member, a movable jaw member yieldingly dependingly secured to said support extension between the support extension and stationary jaw member to be automatically retractable from said stationary jaw member, and a crank member mounted upon said movable jaw member cooperating with said support extensions for forcibly moving said movable jaw member toward said stationary jaw member.

14. In a clamp of the class described, a stationary jaw member having relatively

yieldable support extensions reaching forwardly of the jaw surface of said member for supporting a movable jaw member, a movable jaw member dependingly secured to said support extension, retractable from said stationary jaw member, and a clamping member mounted upon said movable jaw member cooperating with said support extensions for forcibly moving said movable jaw member toward said stationary jaw member.

In witness whereof, I hereunto subscribe my name.

JOHN M. HARGRAVE.