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QUICK ACTING C-CLAMP

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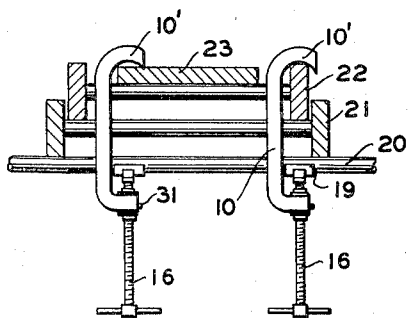


Fig. 4

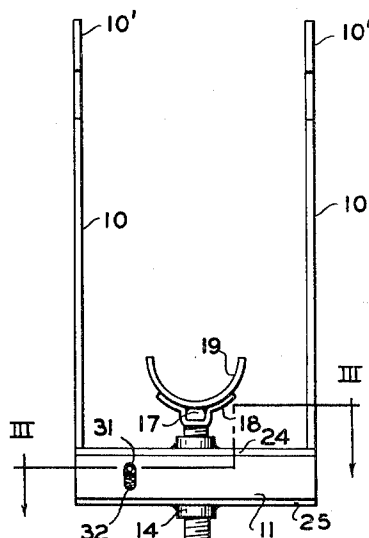


Fig. 1

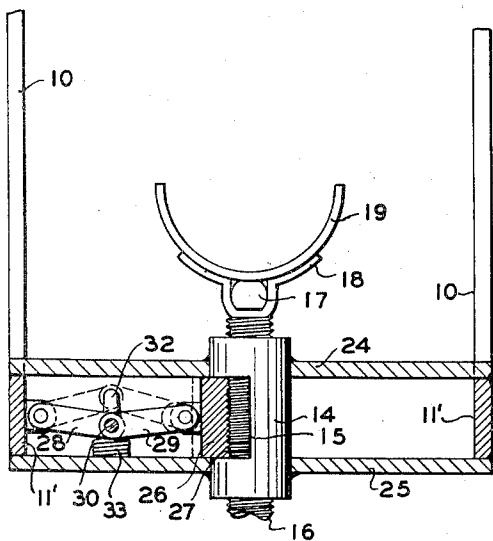


Fig. 2

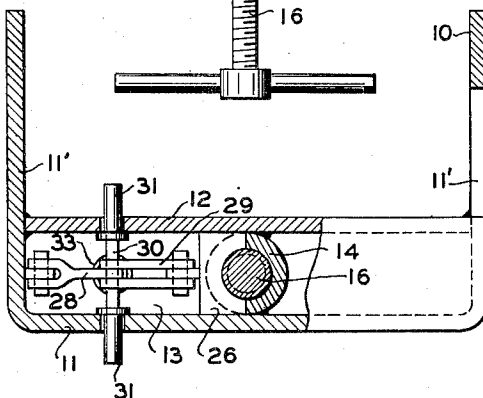


Fig. 3

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QUICK ACTING C-CLAMP

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1 Claim. (Cl. 144—305)

This invention relates to improvements in clamps and more particularly to an improved arrangement for effectively securing rapid traverse in opening and closing the clamp for application to different uses, and also to an improved structural arrangement of the bights of the clamp whereby the range of usefulness of the clamp in securing together widely varying shapes is materially enhanced. The flexibility of application of the clamp itself together with the feature enabling rapid opening and closing of the bights of the clamp combine to form a novel clamp assembly which is instantly available for quick and efficient use for a wide variety of purposes.

One of the uses to which a clamp of the general character outlined above may be efficiently put is the attaching of ladders, planks and the like to supporting objects such as a rack on a motor truck. Depending on the number and character of the pieces to be carried (usually in stacked relation) the clamp employed must be capable of being readily extended or shortened and, further, the configuration and flexibility of the clamping jaws or bights should be such that the same would have effective cooperation with either flat material or rail-like members, which members may be angularly related to each other in stacked assembly. All of these improved features are provided by the present invention wherein not only the jaw structure of the clamp is so designed as to lend the versatility indicated but also the screw-threaded drive of the clamp is formed with a quick releasable feature enabling quick opening and closing of the jaws of the clamp.

The above and other objects and advantages of the invention will become apparent upon consideration of the following detailed specification and the accompanying drawing wherein there is disclosed a preferred embodiment of the invention.

In the drawing:

Figure 1 is a front elevation of the clamp of my invention;

Figure 2 is an enlarged fragmentary view, partly in section, of the clamp of Figure 1;

Figure 3 is a sectional view taken along the line III—III of Figure 1; and

Figure 4 shows alternate methods of employing the clamping device of my invention.

Referring now to the drawing the numerals 10 designate spaced elongated hook members which are of generally C-shaped outline, as viewed in one direction, while being generally flat and straight as viewed at right angles to the said one direction. In the preferred embodiment of the invention the hook members 10 are comprised of a single length of material, there being an integral U-shaped portion 11—11' at the lower end defining the lower legs of the C-shaped members and integrally connecting the said lower legs, substantially as shown in Figure 3.

Welded or otherwise secured to the leg portions 11', in spaced parallel relation to the member 11 is a cross member 12 which defines with the members 11 and 11'

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a generally rectangular opening 13, shown in Figure 3. Received within the opening 13 and extending vertically above and below the cross members 11 and 12 is a tubular member or sleeve 14 which is welded or otherwise secured to the members 11 and 12 centrally between the principal hook members 10. In accordance with the teachings of the invention the sleeve 14 is provided with a smooth interior and is cut away along one side to define an opening or window 15 which extends axially between the upper and lower edges of the cross members 11 and 12, and transversely substantially to the center of the sleeve 14.

Slidably received within the sleeve 14 is a threaded operating rod 16 which is provided at its upper end with a spherical swivel head 17 which engages a U-shaped swivel part 18. The swivel part 18 supports for limited universal movement and for full rotation about the axis of the rod 16 a clamping saddle or member 19 which is preferably in the form of an upwardly opening semi-circular trough.

As shown in Figure 4, the clamping saddle 19 of the clamp assembly is of such axial length that the same is wholly or substantially wholly exposed through the C-shaped opening defined by the principal hook members 10. The arrangement is such that the saddle 19 may be rotated to any position without interference by the principal hook members 10. Thus, the clamp may be employed in the manner shown in Figure 4, with the saddle 19 disposed in parallel with the hooks members 10, or the saddle 19 may be disposed at right angles to the hook members. This is an important feature of the invention since the clamping device is thereby rendered highly versatile.

Referring again to Figure 4, the numeral 20 designates a portion of a pipe rack, for example, such as are commonly incorporated on truck bodies and the like. Supported on the rack are ladder sections 21 and 22 and scaffold plank 23. At the right, in Figure 4, my clamp is employed in securing ladder sections 21 and 22 to the rack member 20 by positioning the C-shaped hook members 10 one on each side of the rack 20, with the bight portions 10' of the hook members 10 extending over the rail of the upper ladder section 22. As will be observed, the bight portion 10' extends substantially equally on either side of the axis of the threaded operating rod 16 so that the ladder section 22 is engaged substantially along the center line of the rod. In the illustrated arrangement the clamping saddle 19 is disposed at right angles to the ladder sections, as is the rack 20, so that the saddle 19 may conveniently engage the rack 20 while the hook members 10 engage the ladder 22 to firmly clamp the same to the rack.

At the left in Figure 4 a similar clamp is employed in another manner, for clamping both the ladder sections 21 and 22 and plank 23. In this respect it will be noted that the outer end portion of the bight 10' is pointed, and the clamping parts are arranged so that the saddle 19 engages the rack 20 while the pointed portion of the bight 10' engages the upper surface of the plank 23, drawing the same downwardly toward the rack 20 in clamping relation while the pointed end portion securely engages with the plank.

Referring now to Figures 2 and 3 of the drawing, there is shown another novel feature of my invention, comprising a quick-release mechanism for the threaded operating rod 16 whereby the clamp may be quickly adjusted into clamping relation. Thus, as shown in Figure 2, the sleeve 14 is provided with an opening 15 in its side wall through which a portion of the threaded operating rod 16 is exposed.

Secured to the members 11 and 11', at the upper and

lower edges thereof are guide plates 24 and 25 respectively, the inner surfaces of which are substantially flush with the axial end edges of the opening 15. The guide plates 24 and 25, in cooperation with the members 11 and 12 slidably receive and guide a half-nut 26 which is provided with threads 27 on its inner face and which is received within the opening 15 in sleeve 14. The threads 27 are adapted to engage with the threaded operating rod 16 so that upon rotation of the latter the clamping member will be advanced or retracted as desired. However, when the half-nut 26 is withdrawn from the opening 15, out of engagement with the operating rod 16, the latter may slide freely in the sleeve 14 to effect a rapid initial adjustment of the clamp.

In accordance with the teachings of the invention I have provided a novel operating arrangement for moving the half-nut 26 into and out of operating engagement with the rod 16 comprising toggle members 28 and 29 which are pivotally connected at their adjacent ends and pivoted on the left hand member 11' and on the half-nut 26 at their respective outer ends. The arrangement is such that when the toggle members 28 and 29 are substantially aligned the half-nut 26 is moved into operative engagement with the rod 16, while the toggle members are substantially out of alignment, or "broken," the half-nut is retracted so that the threads 27 do not engage with the threads of the rod 16.

In the illustrated embodiment of the invention the toggle members 28 and 29 are connected at their adjacent ends by an elongated pin 30 which has portions 31 extending outwardly of the members 11 and 12 of the clamp structure through vertically elongated openings 32 provided therein. The openings 32 are so proportioned that the pin 30 may have substantial movement above the axis of alignment of the toggle members 28 and 29, while having a limited movement below such axis.

Positioned between the lower plate 25 and the toggle members 28 and 29 is a compressible coil spring 33 which acts on the toggle members 28 and 29 to urge the same upwardly from the lower plate 25, into the position shown in broken lines in Figure 2. If desired, the spring 33 may be designed to have a closed or solid height which will limit the downward movement of the toggle links 28 and 29 in conjunction with or independently of the openings 32.

Normally, of course, the spring 33 maintains the toggle links 28 and 29 in their uppermost position, wherein the rod 16 is disengaged from the half-nut 26 and is freely movable within the sleeve 14. Thus the clamping device may be positioned in clamping relation in a minimum of time and effort. After the clamp is approximately positioned the exposed end portions 31 of the toggle pin 30 may be grasped and moved downwardly past the axis of alignment or dead center position, wherein the threads 27 are engaged with the threads of the operating rod 16. While the operator still holds the pin 30 in a down position the operating rod 16 is rotated to tighten the clamping parts. When clamping pressure is applied through the rod 16 pressure is applied through the half-nut 26, which tends to force the same outwardly. This causes the toggle members 28 and 29 to rigidly lock in their lower limit position, as determined by the spring 33, openings 32, or by other means, not shown, which may be optionally employed for this purpose. At this time the operator may release the pin 30.

When it is desired to release the clamp, rotation of the operating rod 16 in an opening direction releases all pressure upon the half-nut 26 so that the toggle members 28 and 29 are automatically forced upwardly by the spring 33. This shifts the half-nut 26 into inoperative position and the rod 16 slides freely in the sleeve 15 to effect a complete release of the parts.

It will thus be observed that I have provided a simple yet highly efficient quick release mechanism for a clamping device which simplifies the placement and removal of the clamping device. The release mechanism is such that the clamping parts are normally disengaged and can be maintained in engagement only upon the application of operating pressure. As soon as the pressure is released the entire mechanism releases and the clamp may be disassembled with the utmost of facility. This is particularly advantageous when the clamp is used in the manner illustrated herein, for example, since the parts to be clamped are of odd shape and arrangement so that in many cases the clamp must be opened wide initially and then closed down substantially to bring the parts into clamping engagement.

Another important advantage of the clamp is the arrangement of the hook members 10 and saddle 19 whereby the last mentioned member may be readily swiveled to any angular orientation with respect to the hooks. Thus, the clamp is readily adaptable for clamping pipes and similar articles whether they be disposed in parallel or in crossed relation, and in no case is it necessary to thread the clamp onto the article, for example, or perform other time consuming operations. This flexibility of use or application, together with the disclosed quick release mechanism provides for maximum efficiency in the use of my clamp as will be readily apparent.

It should be understood, however, that the embodiment herein specifically described is intended to be illustrative only, as many alternations may be made therein within the clear teachings of the invention. Reference should therefore be had to the following appended claim in determining the full scope of the invention.

I claim:

In a screw clamp having a threaded clamp rod and opposing work engaging means, a guide member to slidably receive said rod for axial movement therein, said guide member being open in a lateral direction to slidably receive a half-nut for movement into and out of engagement with said threaded rod, a housing rigidly connected with said guide member and extending outwardly therefrom in said lateral direction, an over-center toggle having one link thereof pivotally connected to said half-nut and the other link pivotally connected to the outer portion of said housing, means comprising an elongated pin to pivotally interconnect said links, said housing having side walls with apertures elongated in a direction parallel to said clamp rod to receive the end portions of said pin whereby said toggle may be manually controlled, and a spring in said housing to bias said toggle from one of its over-centered positions to the other, the arrangement being such that the outward thrust exerted by said half-nut maintains said spring flexed and said toggle in the said one of its over-centered positions upon tightening of said clamp rod while upon said clamp rod being loosened said spring acts to automatically move said toggle to the other of its over-centered positions whereby said half-nut is withdrawn from engagement with said rod.

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