United States Patent

[11] **3,588,156**

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[73] Assignee The United States of America as represented by the Secretary of the Army

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[54] **ADJUSTOCLAMP**
6 Claims, 5 Drawing Figs.

[52] **U.S. Cl.** **292/113,** 114/203, 220/55, 292/256.5
[51] **Int. Cl.** **E05c 15/00,** A42j 36/10, B63h 19/12
[50] **Field of Search** 292/256.5, 256, 256.71, 257, 256.75, 113; 220/55; 114/203; 85/9

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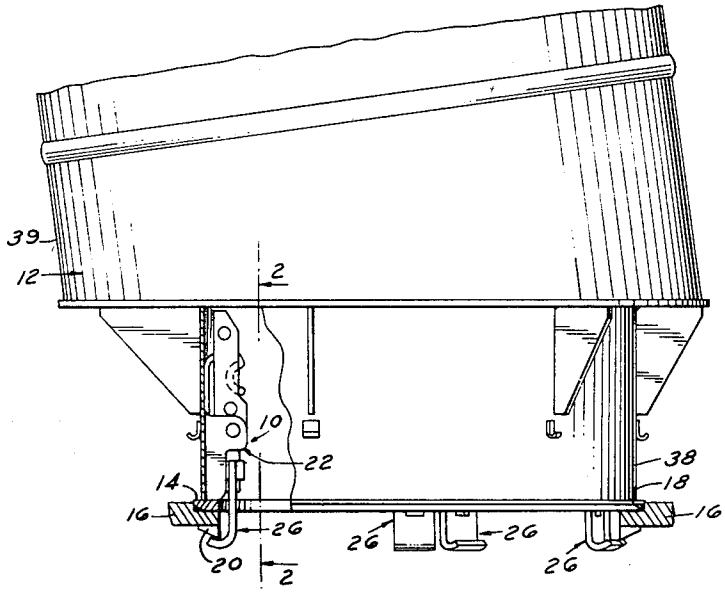
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ABSTRACT: An adjustable clamp comprising an overcenter locking lever and a swing bolt pivotably connected thereto with a catch member rotatably and slidably mounted on the swing bolt. The catch member is a combination hook for engaging a strike and an adjustment tool operable upon its axial and rotational movement on the swing bolt, to cooperatively engage a nut threaded on the bolt for adjustment of the tension of the clamp.



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FIG. 1

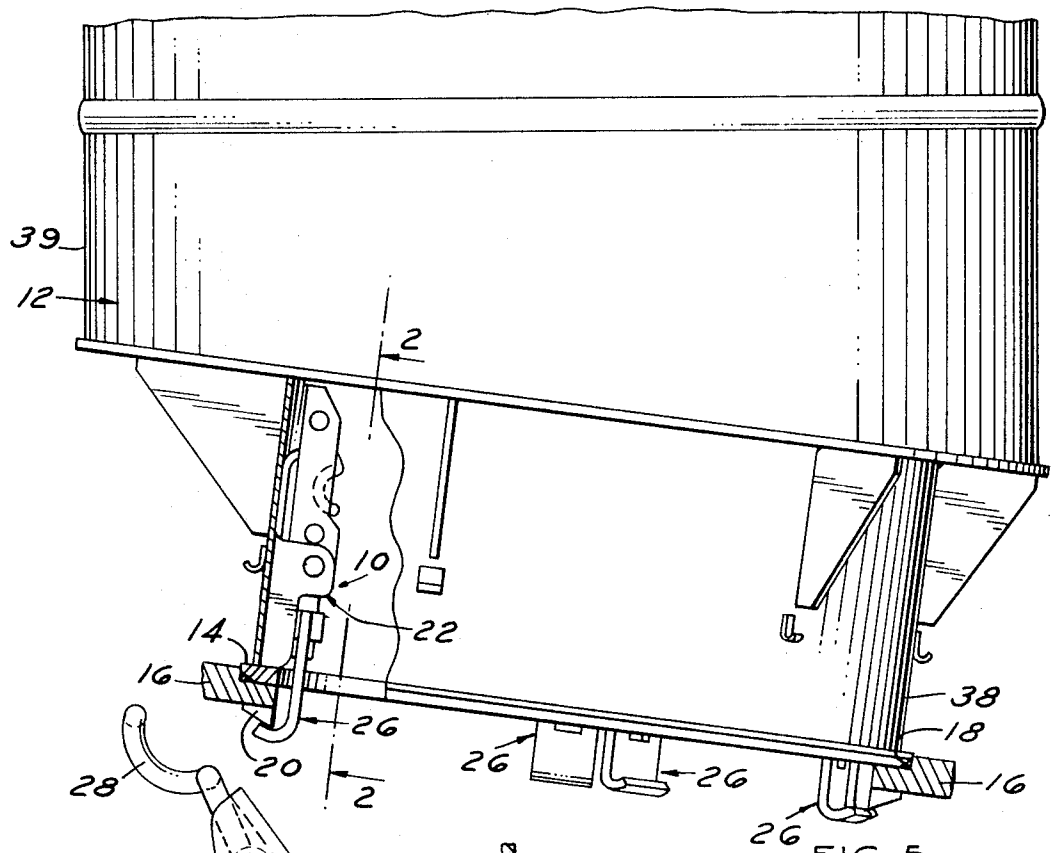


FIG. 4

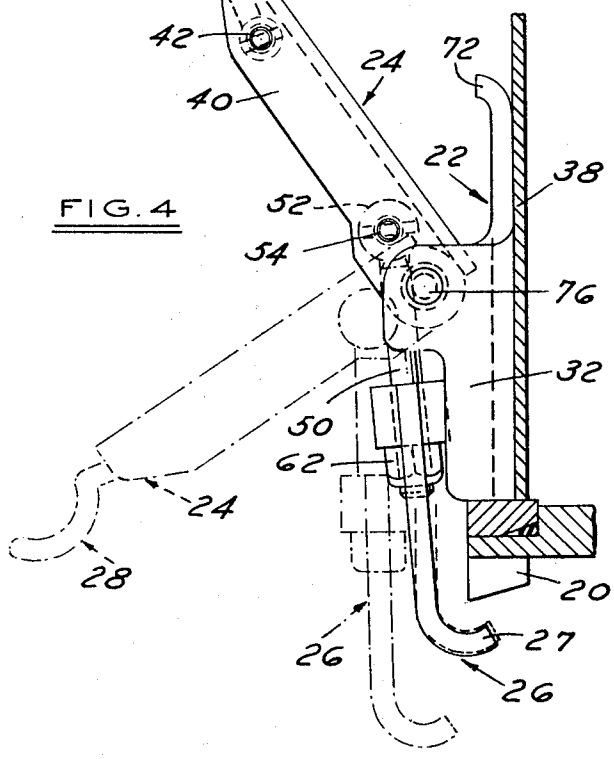
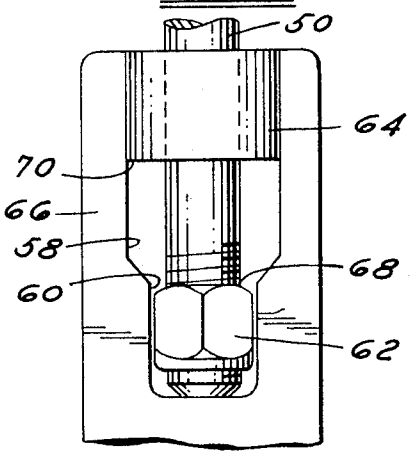


FIG. 5



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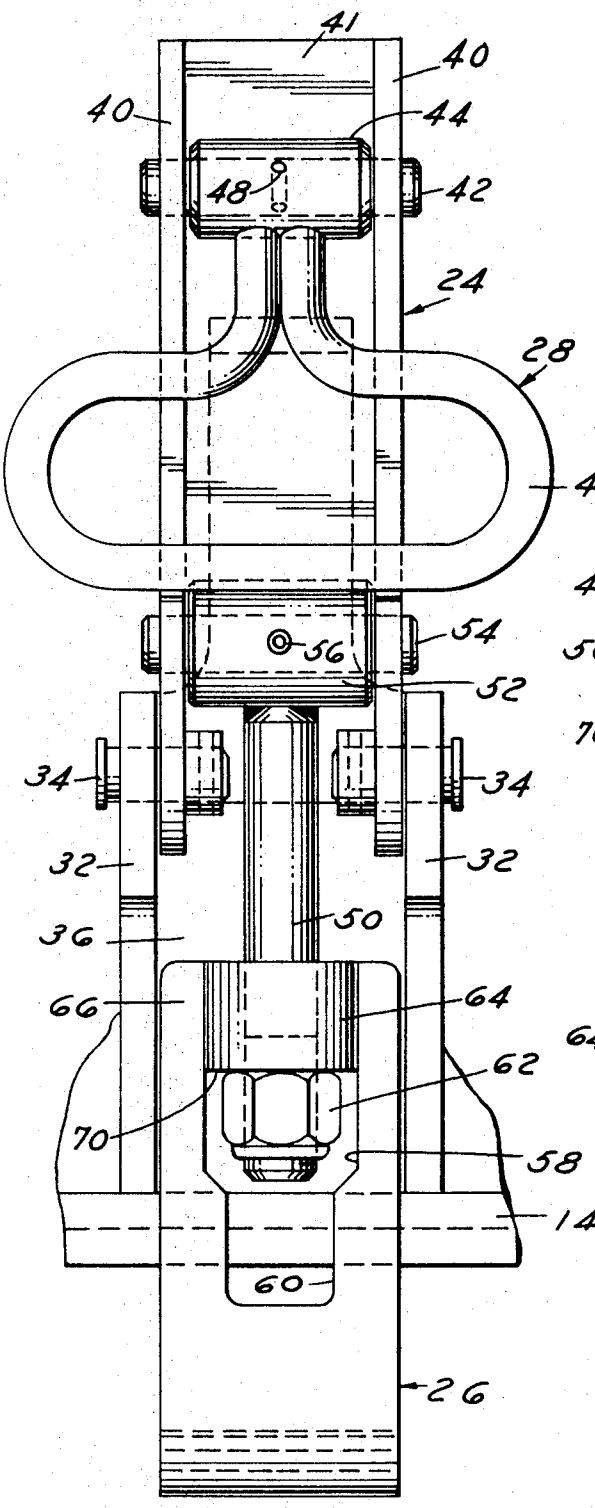


FIG. 2

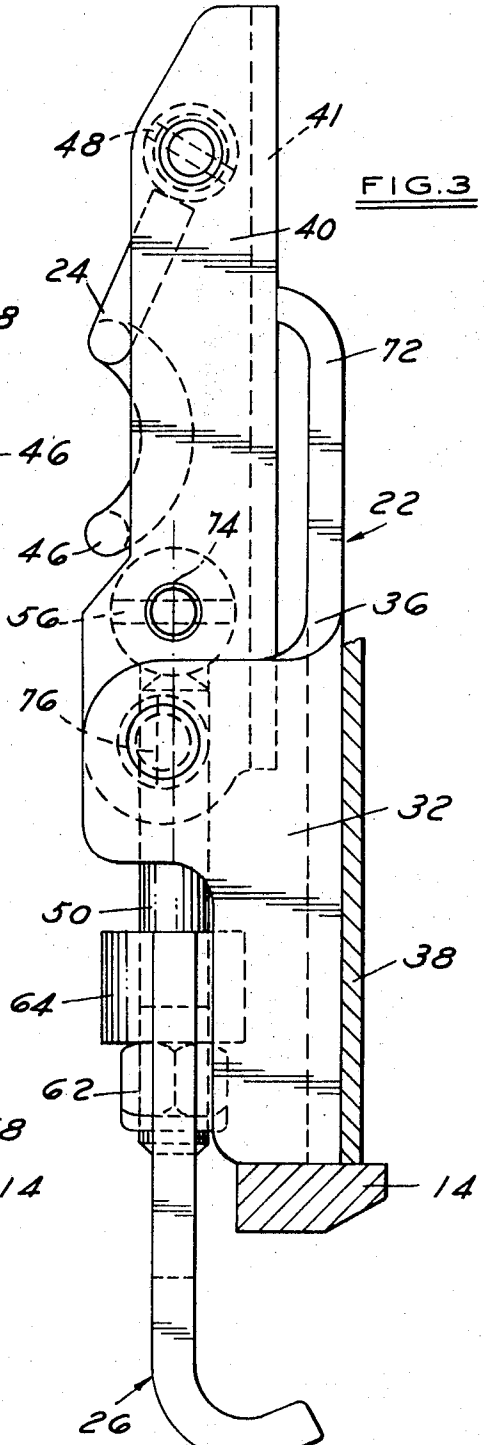


FIG. 3

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ADJUSTOCLAMP

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to an adjustable clamp for a removable structure and more particularly to a quick connecting clamp to be used to releasably seal a removable hatch extension on a vehicle.

2. Description of the Prior Art

Securing means of a type shown in U.S. Pat. No. 2,583,053 granted Dec. 18, 1967 to M. W. Kestner et al. and U.S. Pat. No. 3,307,498 granted Mar. 7, 1967, to E. S. Stevens disclose overcenter clamps that provide for adjustment of the pressure applied. In the case of the prior art patents a separate tool is required to perform the adjustment of the clamp. Applicants have devised a clamp that can be adjusted by means of the clamping mechanism itself without requiring an additional tool while also providing for infinite positioning of the clamping member.

SUMMARY

In developing a conning tower for use on a military tank vehicle capable of underwater fording of streams, it was required to provide a clamping device operable in a restricted space and capable of ready adjustment without the necessity of a separate tool. Due to the design of the tower the clamping operation must be performed from within the tank vehicle while preventing the clamping structure from protruding to an extent that will impede the operators exit into the tower or return to the vehicle. This necessitates providing latch means which will enable the operator to perform instant adjustment to ensure a fluidtight connection with quick manual locking and unlocking required for military operations.

The present invention employs an overcenter locking lever pivoting about a fixed axis of rotation and having a swing bolt member pivotably connected to the lever with a catch member rotatable and slidably mounted on the swing bolt. The catch means has an aligned slotted portion and sleeve for reception of the free end of the bolt having a stop nut threaded thereon. The catch, by means of a reduced notch portion dimensioned for cooperative engagement with the nut, functions as an adjustment tool upon axial and rotational movement of the catch. In this manner the axial position of the catch can be infinitely varied by means of the stop nut determining the axial location of the sleeve member.

A handle is pivotably mounted on the free end of the lever member such that in extended position it serves to increase the effective length of the lever member. After the locking position of the clamp is attained the handle will gravitate about its pivotal axis to a collapsed position.

One of the objects of the present invention is to provide a manual clamping device that is infinitely adjustable to allow the catch portion to be readily moved to allow interchangeability between the structures being clamped.

Another object of the invention is to provide a clamp in which a portion of the clamp itself also serves as the adjustment tool means.

A further object is to provide a quick action clamp for use with a vehicle hatch extension in which the clamp handle functions to extend the leverage of the operating arm during the locking sequence while in the absence of other forces will gravitate to a collapsed position to prevent obstruction of the hatch opening.

Still another object is to provide an adjustable hook-type clamp providing a compact device that can be used in a confined hatch way without obstructing the movement of personnel therethrough.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a fragmentary side elevation view, partially cut away to show details, of a conning tower structure mounted on a vehicle hatch and employing the clamping devices of the present invention;

FIG. 2 is a fragmentary elevation on the line 2–2 of FIG. 1, enlarged;

FIG. 3 is a side elevation of the clamp of FIG. 2;

FIG. 4 is a side view showing the operation of the clamping device;

FIG. 5 is a fragmentary front view of the adjustment means of the device.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to FIG. 1, there is illustrated the improved holddown clamp 10 used in the instant embodiment on a submergible combat vehicle such as a tank equipped with a removable conning tower structure partially indicated at 12, which allows the tank to operate while submerged during the traversing of a stream, for example. As seen in FIG. 1 the tower has a circular collar 14 which seats on the tank hatch coaming, partially indicated at 16, extending around the hatch opening. The hatch coaming 16 has a quarter round gasket 18, formed of a resilient material such as rubber, which deflects to form a conical seat on which the collar 14 is sealed. The coaming 16 has a series of wedge blocks 20 secured on the underside thereof under each holddown clamp and attached by suitable means such as by welding for engagement with the clamp 10.

The quick action clamp 10 comprises, in general a bracket member 22, a lever member 24 pivotally attached thereto, a catch member 26 pivotally attached to the lever member 24 and a pivotal handle member 28 on said lever member. The bracket member 22 can be a single one-piece metal bracket having outstruck flanges 32 at its downward end providing sufficient strength to pivotally support the lever 24 by a pair of pivot pins 34 and having its base portion 36 attached to the reduced portion 38 of the tower by welding or the like.

The lever member 24 is channel shaped in cross section with its sidewalls 40 supporting cross pin 42 which in turn supports handle member 28 by means of cylindrical hub 44 having the rod-shaped grip portion 46 secured thereto. The dowel pin 48 functions to secure the hub 44 to cross pin 42 allowing the handle member to be pivoted about the axis of pin 42. Thus, in the absence of other forces, the handle member 28 will gravitate about pivot 42 in a counterclockwise direction from an extended operable position illustrated in FIG. 4, to an inoperative folded position shown in FIGS. 2 and 3.

Cooperating with strike block 20 is the catch member 26 which is carried by swing bolt 50. Bolt 50 is, in turn, secured to the cylindrical hub 52 as by welding. Cross pin 54 is pivotally mounted in sidewalls 40 and mounts hub 52 therein by means of dowel pin 56. The catch 26 is provided with a elongated slot 58 having a reduced portion 60 dimensioned to receive a pair of opposed parallel faces of a hexagonal self-locking nut 62 threaded on the lower end of bolt 50.

The catch 26 has a sleeve 64 disposed between the bifurcated ends 66 of the catch 26 secured as by welding thereto and dimensioned to allow relative sliding movement between bolt 50 and catch 26. By this arrangement an operator is able to infinitely adjust the tension of the clamp for varying tolerances between the strike 20 and clamp. The nut 62 is initially threaded on the swing bolt 50 as shown and the lever member 24 is pivoted to its overcenter position shown in FIG. 3. Then, if the holding force is insufficient, the lever 24 is moved to the position shown in phantom in FIG. 4 whereupon the catch member 26 is slid upward on the bolt 50 to the position shown in FIG. 5.

It will be seen that the reduced slot 60 is dimensioned to receive the nut so that the catch member 26 serves as an adjusting tool to thread nut 62 to the proper position wherein its upper surface will serve as a stop for the under surface 70 of the sleeve 64. Because the catch member 26 is freely rotatable on the bolt 50, the catch can be used to position the nut 62 for infinite adjustment of the clamp tension.

Once the proper tension is determined to load the gasket 18 for attaining a proper watertight seal between the seating surfaces of the collar 14 and hatch coaming 16 during initial as-

sembly, the tower structure 12 can be removed and replaced on the tank without further adjustment. It will be appreciated that during a military operation where the ready interchange ability of the towers between tanks is necessary, the fact that the tower clamps are readily adjustable to fit a vehicle in a watertight manner is vital.

To secure the tower 12 in its locked manner of FIG. 1, handle 28 is gripped and lifted to pivot lever 24 about the axis of rotation 76 of pins 34 in a clockwise direction to the position of FIG. 4 with the hook-forming portion 27 of catch 26 adjacent the strike block 20. Thereafter, lever 24 is pivoted to the position of FIG. 3 where the lever base 41 engages the stop portion 72 of bracket 22 such that the vertical centerline 74 of the bolt 50 is located past the axis of rotation 76. The clamp will remain locked because of the beyond-center position until the lever 24 is rotated in a counterclockwise manner by means of handle 28.

After the operator releases the grip 46 the handle 28 will gravitate about the axis of pivot pin 42 as previously described to the position of FIG. 3. It can be seen that by this arrangement the operator has the mechanical advantage of an extended lever arm during the locking sequence while having the handle 28 pivotally removed from protruding above the reduced portion 38 of tower 12. Compactness of the clamp is thus effected to enable personnel within the vehicle to move up into the enlarged portion 39 of the tower for observation or exit purposes without obstruction by the clamps.

To effect release of the catch member 26 the operator grasps the handle 28 by reaching upwardly through the hatch and applying a a releasing pull to the lever member 24 in a direction radially inwardly until the pivot pins 54 have passed beyond the dead center position as illustrated in full line in FIG. 4. In this position there is no load on the catch member 26 leaving it in condition to pivot about the axis of pin 54 radially inwardly to clear strike block 20 as the lever member is pivoted downwardly about axis 76 to the dashed line position of FIG. 4.

The number of clamp mechanisms necessary to couple the tower 12 as embodied by this invention depend generally upon the diameter of approximately 2 feet, seven clamp mechanisms (FIG. 1) will create adequate distribution of axial thrust to accomplish a substantially fluidtight connection.

We wish it to be understood that we do not desire to be limited to the exact details of construction shown and described, for obvious modification will occur to a person skilled in the art.

We claim:

1. An adjustable clamping device for releasably clamping first and second members comprising:

a frame member adapted to be connected to the first member, a tensioning lever member pivotally mounted to said frame member, a bolt pivotally mounted adjacent the pivoted end of said lever member,

a catch member rotatably mounted on said bolt and axially slidable thereon, a nut threaded on the free end of said bolt limiting the axial movement of said catch member,

hook means on said catch member to effect engagement with the second member, and

means on said catch member operable to cooperatively engage said nut threaded on said bolt upon axial movement thereof whereby the clamping device provides infinite adjustment.

2. The clamping device as defined in claim 1, wherein;

said catch member has a longitudinal slotted plate portion and a hook portion,

said bolt being positioned in the plane of said plate portion having its free end extending toward the base of said longitudinal slot.

3. The clamping device as defined in claim 2, wherein said catch has a sleeve member thereon receiving said bolt for sliding movement therein.

4. The clamping device as defined in claim 3, wherein said longitudinal slot having a reduced notch portion dimensioned to engage said stop nut to whereby said catch can be rotated to adjust the axial position of said nut.

5. The clamping device as defined in claim 1, wherein said lever member having handle means pivotally attached to the free end thereof whereby said handle provides additional effective length for movement into locked position.

6. The clamping device as defined in claim 5 wherein said handle means being manually operable to rotate said lever member to lock said clamp and operable by gravity thereafter to rotate said handle means to an inoperative position.