A quick release toggle clamp utilizes a spring that requires a deliberate positive action for disengagement. The clamp has a sliding bolt that provides a latching mechanism. The bolt is moved by a handle that tends to remain in an engaged position while under tension.

15 Claims, 3 Drawing Sheets
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QUICK ACTION CLAMP

ORIGIN OF THE INVENTION

The invention described herein was made by an
employee of the United States Government and may be
manufactured or used by or for the Government with-
out the payment of any royalties thereon or therefor.

1. Technical Field

This invention is concerned with a clamping device
which positively locks in a clamped position. The in-
vention is particularly directed to a quick action clamp
which utilizes a positive locking bolt to firmly secure an
object in a predetermined position. The quick action
clamp is useful in securing experimental packages dur-
ing flight prior to a free fall when the package is re-
leased.

Various types of commercial toggle clamps of the
bolt-down type have been proposed. Such clamping
units rely on toggle latches which can accidentally
move to the release position. Another problem encoun-
tered with these commercial devices is that they be-
come unlocked during excessive vibration. Also, these
deVICES snap out of the locking position in shock load-
ing by accidental contact with the toggle locking han-
dle. It is, therefore, an object of the present invention to
provide a quick action bolt locking device which has a
positive locking action to firmly secure an object in a
predetermined position.

Another object of the invention is to provide a quick
action clamp which will not snap out of a locking posi-
tion under shock loading conditions.

2. Background Art

U.S. Pat. No. 3,659,886 discloses a toggle latch de-
signed for aircraft use. A spring is relied on to firmly
secure the latch mechanism.

U.S. Pat. No. 4,218,081 describes a latch having a
multiple function prevailing-torque mechanism which
facilitates engagement and disengagement of a draw
bolt and strike. The device further utilizes a secondary
latch to secure the primary latch in the closed position.

U.S. Pat. No. 4,420,905 illustrates a locking mecha-
nism for a window or door closure hingedly mounted
on a fixed frame. The latch incorporates a controlled
cam and catch fixed to the hinged side of the frame.
U.S. Pat. No. 4,522,436 discloses a spring-loaded
toggle clamp to removable securely two panels. The latch
comprises a bracket, a handle, and a draw bar that are
solely joined by coiled tensioned springs which load the
draw bar.

U.S. Pat. No. 4,682,745 relates to a preloadable vec-
tor-sensitive latch which automatically releases when
the force vector from a latch member reaches a specific
release angle. The latch also contains means to remove
clearance between the latched members and to preload
the latch to prevent separation of angles less than the
specified release angle.

DISCLOSURE OF THE INVENTION

This quick release toggle clamp is easy to use. The
clamp cannot be disengaged by excessive vibration, and
it utilizes a spring that requires a deliberate positive
action for disengagement.

The clamp utilizes a sliding bolt that provides a latching
mechanism. The bolt is moved by a handle that
tends to remain in an engaged position while under
tension.

BRIEF DESCRIPTION OF THE DRAWINGS

The advantages and novel features of the invention
will be more fully apparent from the following detailed
description when read in connection with the accompa-
nying drawings wherein

FIG. 1 is a perspective view of a quick action clamp
constructed in accordance with the present invention
that is shown in the open or release position;
FIG. 2 is a perspective view of the quick action clamp
shown in the closed or locked position; and
FIG. 3 is a perspective view showing the cam sur-
faces on the locking block of the quick action clamp.

BEST MODE FOR CARRYING OUT THE
INVENTION

Referring now to the drawings, there is shown in
FIGS. 1 and 2 quick action claims constructed in accor-
dance with the present invention. The device utilizes a
base 10 that is secured to a suitable support 12, such as
the cargo floor of an aircraft, by suitable bolts 14 in slots
16.

A mounting block 18 is rigidly secured to the up-
wardly facing surface of the base 10 by welding or the
like. This block is adjacent to the edge of the base 10
nearest the experimental package or the like which is to
be secured in a predetermined position. A centrally
disposed bore 20 extends through the block 18 as shown
in FIG. 1.

An assembly block 22 is removably secured to the
upwardly facing surface of the base 10 by a pair of bolts
24. This block is adjacent to the opposite edge of the
base remote from the secured package. A centrally
disposed bore 26 extends through the block 22, as shown
in FIGS. 1 and 2.

A solid cylindrical shaft forms a locking bolt 28
which extends through the blocks 18 and 22. This bolt
is free to slide along its longitudinal axis x-x in the bores
20 and 26. A suitable handle 30 is provided on the bolt
28 to facilitate this sliding motion toward and away
from the experimental package. The bolt 28 is also se-
lectively rotatable about its longitudinal axis x-x by the
handle 30.

The clamp is assembled by first removing the assem-
bly block 22 from the base 10. The bolt 28 is inserted
into a compression spring 32. The end of the bolt adja-
cent to the spring 32 is then inserted into the bore 20 of
the fixed mounting block 18.

The end of the bolt 28 remote from the spring 32 and
on the opposite side of the handle 30 is then inserted into
the bore 26 of the block 22. The bolts 24 are inserted
into suitable holes in the assembly block 22 for securing
this block onto the base 10, as shown in FIG. 1.

The bolt 28 is maintained in the open or release posi-
tion shown in FIG. 1 by the compression spring 32
which engages the block 18 and a rigid collar 34 on the
bolt 28. The bolt 28 remains in the open position shown
in FIG. 1 until it is deliberately moved by the handle 30.

An important feature of the invention is the provision
of a cam block 36 that is rigidly mounted on the base 10.
The cam block 36 has a first cam surface 38 for moving
the bolt into a closed or locked position shown in FIG.
2. This cam surface 38 is adjacent the top of the cam
block 36 and faces the mounting block 18.

A second cam surface 40 is formed on a cam block 36
adjacent to the first cam surface 38. This cam surface 40
A first cam surface having a compound curve on said support means for engaging said handle to aid the same in its movement to said engaging position, a second cam surface having a compound curve on said support member for engaging said handle to aid the same in its movement to said release position, and means on said support member for engaging said handle to aid the same in its movement between said first and second curved cam surfaces.

A clamp as claimed in claim 1 wherein the support means comprises a base member having a cam block thereon for engaging said handle.

A clamp as claimed in claim 2 wherein the cam block has the first and second cam surfaces formed thereon.

A clamp as claimed in claim 3 wherein the cam block has a slot formed therein adjacent said second cam surface for positioning said handle in the body engaging position.

A clamp as claimed in claim 4 wherein the biasing means retains the handle in said slot.

A clamp as claimed in claim 5 wherein the biasing means comprises a compression spring surrounding said bolt member.

A clamp as claimed in claim 6 including a collar on said bolt member for engaging one end of said spring.

A clamp as claimed in claim 2 including a mounting block rigidly mounted on said base member adjacent to said body, for slidably supporting one end of said bolt member, and an assembly block removably mounted on said base member remote from said body, for slidably supporting the other end of said bolt member.

A clamp as claimed in claim 8 wherein the biasing means comprises a compression spring carried by said bolt member with one end in engagement with the mounting block.

A clamp as claimed in claim 9 including a collar on the bolt for engaging the other end of the compression spring.

A quick action clamp of the type wherein a reciprocably mounted bolt is moved from a closed position to an open position by a handle thereon, the improvement comprising a member having a slot therein for engaging said handle when the bolt is in the closed position, biasing means for providing a force to maintain said handle in engagement with said slot, and a plurality of compound curved cam surfaces on said member for aiding the reciprocating movement of said handle against said force including a cam surface between two of said compound curved cam surfaces to provide clearance for said handle to move smoothly between said two compound curved cam surfaces.

A quick action clamp as claimed in claim 11 including one of said cam surfaces being adjacent to said slot for engaging the handle to aid the same into engagement with said slot.

A quick action clamp as claimed in claim 12 including another of said cam surfaces being on said member for engaging the handle to aid the same into engagement with said slot.

A quick action clamp of the type wherein a reciprocably mounted bolt is moved from a closed position to an open position by a handle thereon, the improvement comprising
a member having a slot therein for engaging said handle when the bolt is in the closed position, biasing means for maintaining said handle in engagement with said slot, and
a plurality of cam surfaces on said member for aiding the reciprocating movement of said handle, said cam surfaces including one cam surface adjacent to said slot for engaging the handle to aid the same in moving out of engagement with said slot,
another cam surface for engaging the handle to aid the same in moving into engagement with said slot, and
a third cam surface between said one cam surface and said other cam surface to provide clearance for said handle to move smoothly between said one cam surface and said other cam surface.
15. A quick action clamp as claimed in claim 11 including a compression spring mounted on said bolt for maintaining the handle in engagement with said slot.

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