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(54) **SELF ADJUSTING THROW LEVER AND RAIL CLAMP SYSTEM**

(75) Inventors: **William Samson**, Salisbury, MD (US); **Rafael Correa**, Salisbury, MD (US)

Correspondence Address:

Wayne Thompson
5590 Crestwick Way
Cumming, GA 30040 (US)

(73) Assignee: **Machining Technologies, Inc.**

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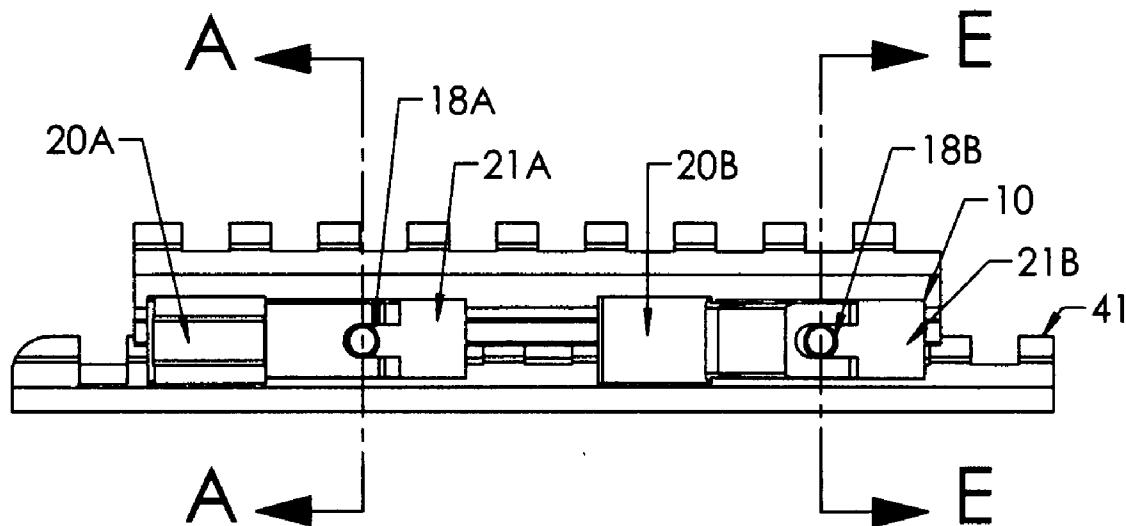
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ABSTRACT

A self adjusting throw lever and rail clamp system for use with sighting equipment where there is a need to efficiently remove or interchange sighting equipment on a host mounting surface. The throw lever self adjusts to compensate for variations in the host mounting surface, such as an angular rail, and utilizes a buffer to prevent the surface of the mounting surface from becoming marred. No tool is required to adjust the throw lever releasable mounting system as the system has an internal means to self adjust to fit the mounting surface. Once the throw lever is secured in the closed position, tension placed by a thru shaft on the housing of the throw lever prevents free movement of the throw lever.



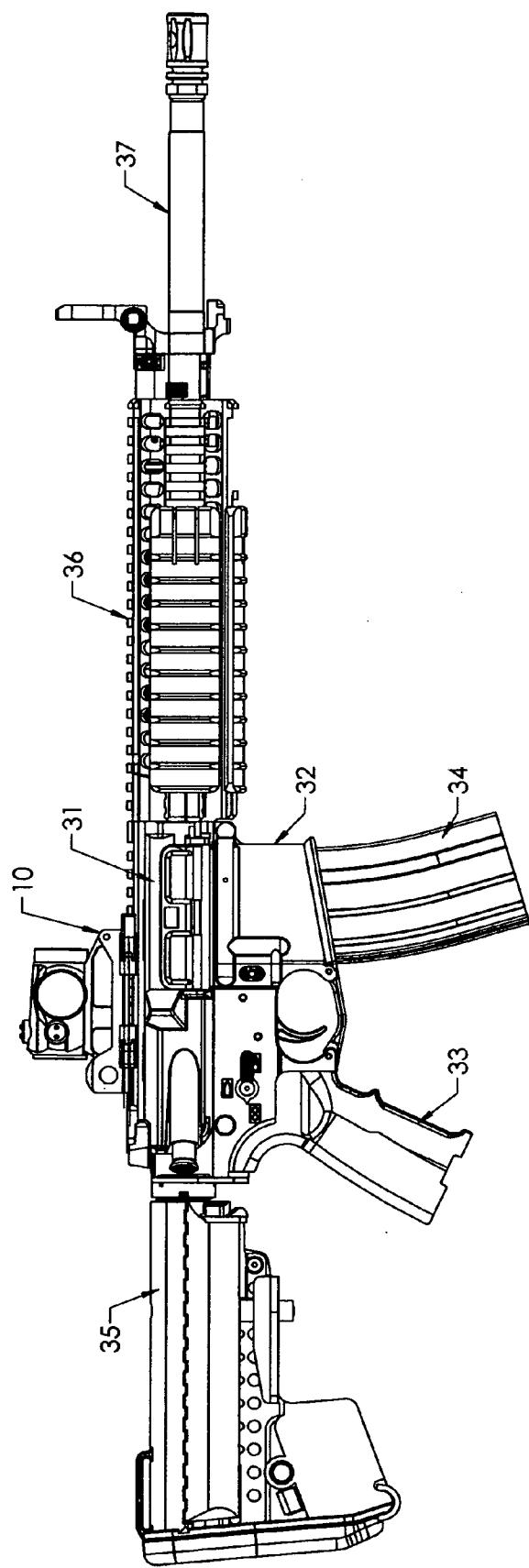
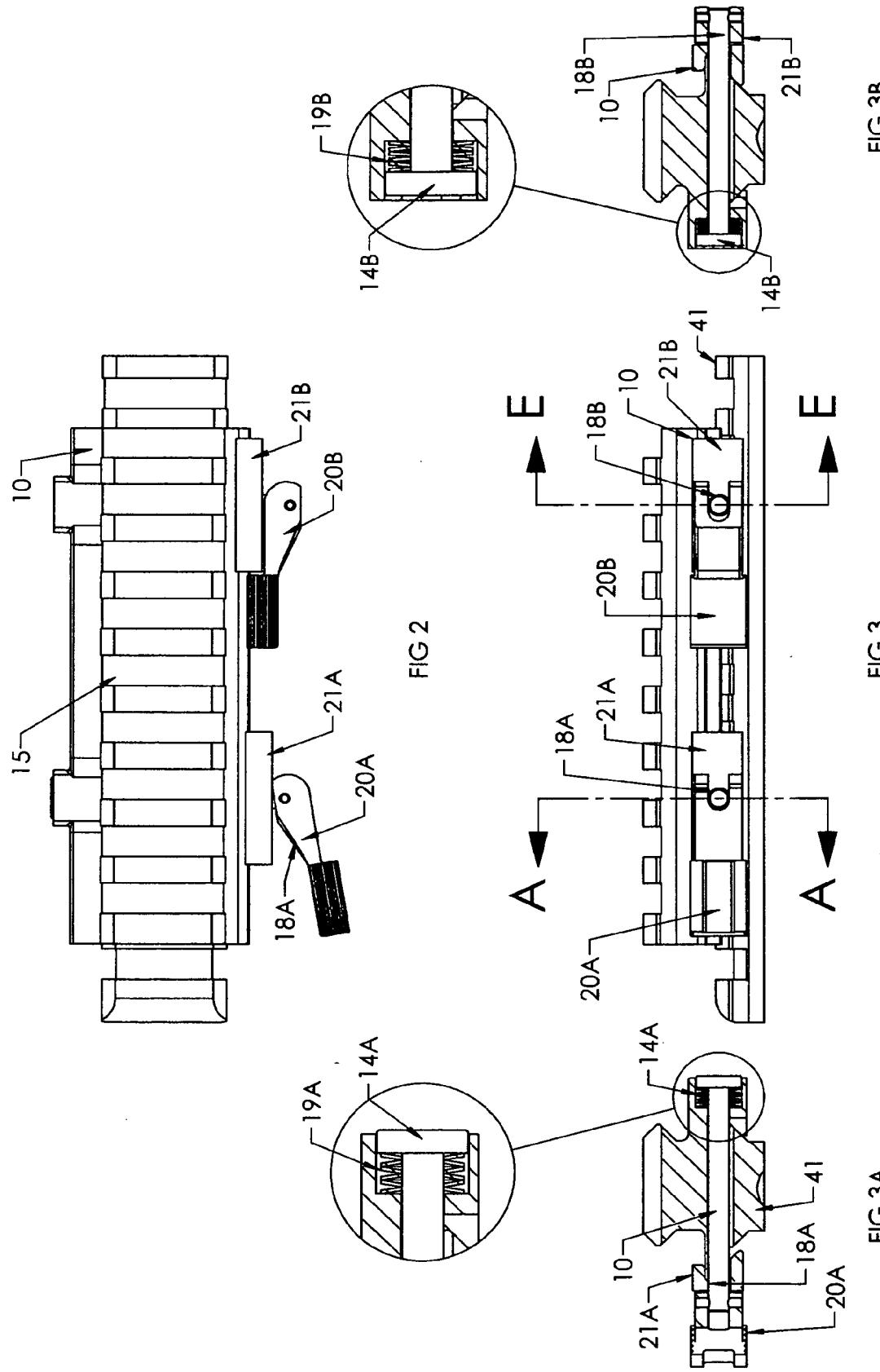


FIG 1



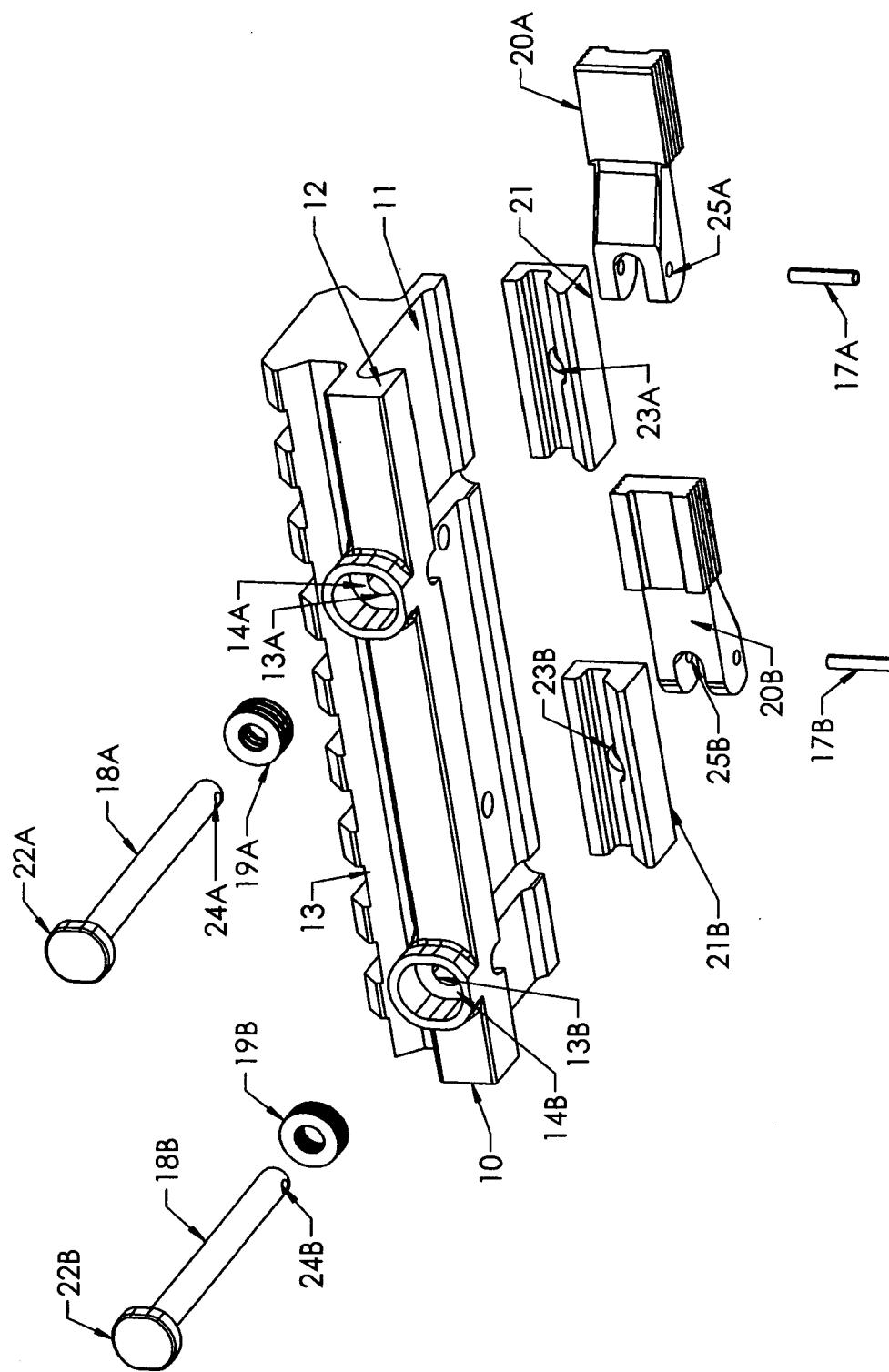


FIG4

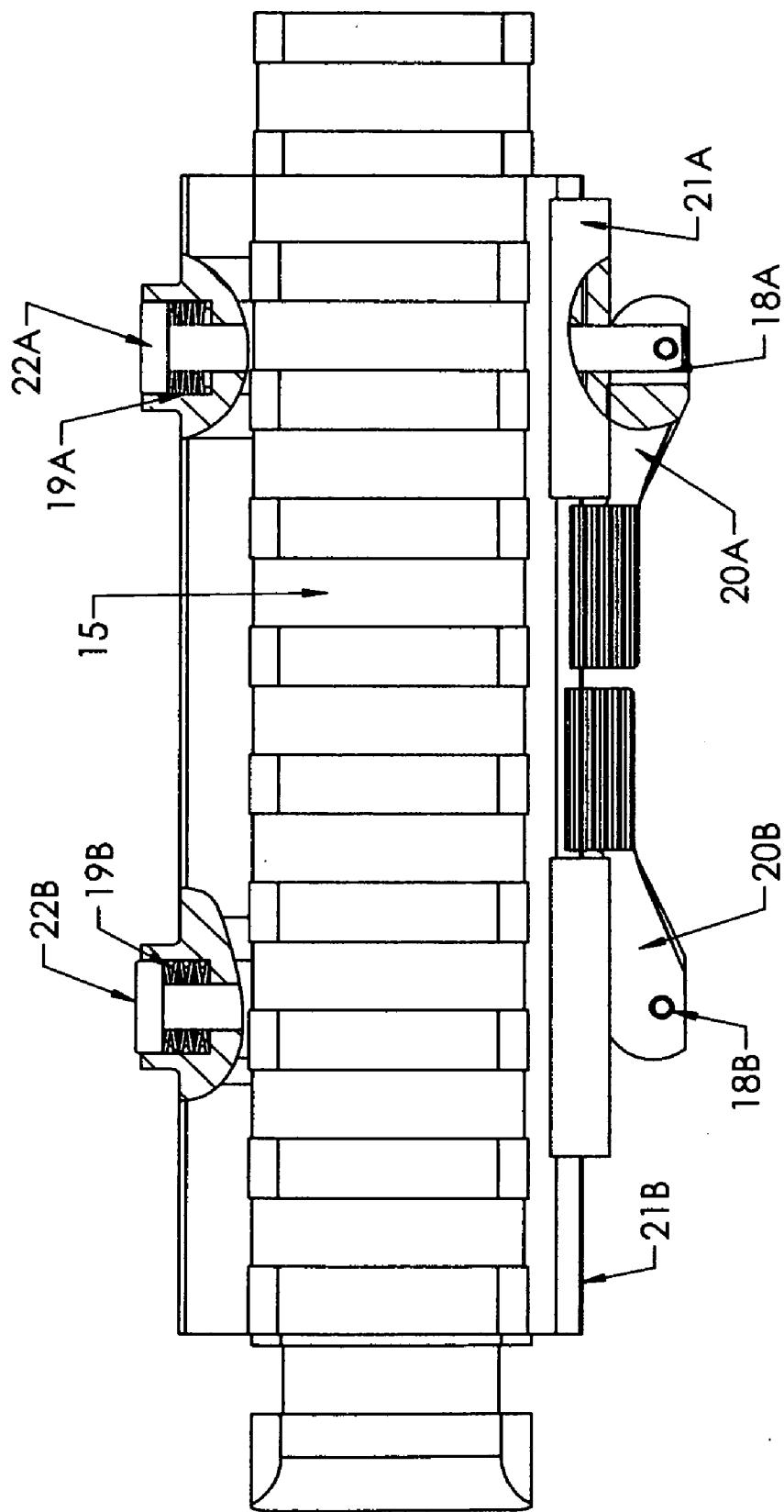


FIG 5

SELF ADJUSTING THROW LEVER AND RAIL CLAMP SYSTEM

BACKGROUND OF THE INVENTION

[0001] 1. Field of Invention

[0002] The herein disclosed invention relates, in general, to attachment means. The present invention also relates to firearms and more specifically to quick-release mounting devices for optical gun sights and other aiming devices for rifles. More particularly, the present device is for quickly securing aiming devices to a US MIL-STD 1913 or other type of railing.

[0003] 2. Prior Art

[0004] The sports and military firearm industry have developed different attachments to be mounted on weapons; each of these attachments enhances the performance of the sportsmen and the war fighter and today they have become the standard in this industry. Each manufacturer developed their own method of attachment, claiming a certain amount of real state on the weapon and most of them did not allow for ease of removal and reinstallation without recalibration.

[0005] The small arms industry and in particular the military have developed a standard mounting rail called the "Picatinny Rail". This rail has a patented design with manufacturing tolerances that allows for removal and reinstallation of attachments without recalibration.

[0006] As new weapons are manufactured with Picatinny rails, the attachment manufacturers began to develop clamping systems that took advantage of these benefits. The U.S. Army developed the "Rail Grabber". The benefit of this attachment is that it can not be over tightened by the end user, as it includes a ratchet mechanism that when the desired torque is reached, the knob skips making a ratchet noise.

[0007] Other attachments manufacturers developed cam wedge methods. This method, although practical does not serve the war fighter as it can easily be loosened by vibration caused during automatic fire, or the cam knob can get entangled with the soldier's gear. One other alternative was the use of a machinist type screw and a clamp. This method requires an allen torque wrench, and this tool is not necessarily readily available to the soldier in the field.

[0008] One other method is the use of a threaded stud and a clamp with a knob such as in the weapon's carrying handle. Once again the knob can be over tightened and it protrudes on the side of the weapon where it can easily be entangled with the soldier's gear.

[0009] The herein described invention relates to buffered means for attaching a device to a 1913 mil-std rail or other angled interface. U.S. Pat. No. 4,845,871 of Swan discloses a means for attaching first and second Weaver interface platforms of an optical rifle sight mount using throw-lever actuated locking mechanisms. Swan's throw lever is adjustable, but only compensates for the height variations within the rails range of manufacturing tolerances. This limited self adjustability is limited often preventing the throw-lever from being properly closed and the related device secured. Later, Swan (U.S. Pat. No. 5,276,988) developed a throw-lever actuated releasable optical sight mount which incorporated a buffer to prevent wear on an aluminum rail. This buffer or shim is small and with improper installation by the user can become damaged rendering the optical sight mount inoperable. Designs as seen in U.S. Pat. No. 7,272,904 by LaRue, utilizes an adjustable nut which adjusts the clamping forces exerted by the cam surface of the lever on opposing angular surfaces. Without a

buffer element between the cam surface and mounting surface deformation of the mounting surface is highly likely with repeated use. Further, this particular design requires a hand tool to adjust the cam surface.

[0010] It would be highly advantageous, therefore, to remedy the foregoing and other deficiencies inherent in the prior art.

OBJECTS AND ADVANTAGES

[0011] Accordingly several objects and advantages of the present invention are

[0012] (a) To provide an attachment means which does not loosen up after repeated use thereby preventing the mounted accessory from falling off.

[0013] (b) To provide an attachment means which will not damage the mounting surface, i.e. rail, receiver, etc. . . through the incorporation of a buffer between the mounting surface and the cam surface.

[0014] (c) To provide an attachment means which can self adjust to compensate for the variations in mounting surface dimensions, no tools are required.

[0015] (d) To provide an attachment means which can be incorporated to work with mounting rings for sighting devices, low light optical devices, mechanical sighting devices and electronic optical gun sites.

[0016] (e) To provide an apparatus which permits the selective interchanging of a variety of optical devices without loss of a preset zero of each individual sighting device.

[0017] (f) To provide an apparatus that utilizes a throw lever that does not require a secondary means to prevent the rotation thereof.

[0018] (g) To provide an apparatus which does not require tools to be properly installed.

[0019] (h) To provide an attachment means which is both low profile and offers no point of entanglement for a war fighter's equipment.

[0020] (i) To provide an apparatus which has no loose components that would render the device inoperable should one be inadvertently lost.

[0021] (j) To provide an apparatus which has uniform tension on a railing mounting platform regardless of who performs the installation.

[0022] Still further objects and advantages will become apparent from a consideration of the ensuing description and drawings.

SUMMARY

[0023] The present invention's primary function is to provide an apparatus for removably securing accessories to a firearm having a 1913 MIL-STD rail, weaver rail or other angular mounting surface, and a mounting platform to serve as a base to secure the apparatus to the firearm.

[0024] A connecting rod runs transverse, to the bore line of the host firearm, across the utilized rail mount beginning at the fixed clamp, through the buffer element and attaches to the associated throw lever. A series of opposing spring washers are utilized to provide a means for the buffer element to be adjustably secured to the desired mounting surface and place tension on the throw lever. The connecting rod is attached to the throw lever by a pin which, as the throw lever is rotated approximately 180 degrees to its closed position, forces the buffer element against the mounting surface and automati-

cally adjusts the buffer's position to fit snugly due to the tension placed on the system by the spring washers being compressed.

[0025] The herein described apparatus increases the utility of a firearm by allowing for the quick removal and attachment of various mechanical and optical gun sites. Though the herein presented invention and its application to firearms is the primary focus of this disclosure it should be noted that this is not intended to limit the scope of the present invention exclusively for use with firearms. Many other uses will become obvious to one skilled in the art upon examination of the attached detailed description and the associated claims.

DRAWINGS

[0026] The novel features believed to be characteristic of the invention, together with further advantages thereof, will be better understood from the following description considered in connection with the accompanying drawings in which a preferred embodiment of the present invention is illustrated by way of example. It is to be expressly understood, however, that the drawings are for the purpose of illustration and description only and are not intended as a definition of the limits of the invention.

[0027] FIG. 1 is an illustration showing a sight mounting rail on a firearm and showing a removably restrained, self adjusting optical sight mount base according to the principles of the invention;

[0028] FIG. 2 is a bottom view of the herein described invention;

[0029] FIG. 3 illustrates a horizontal side view of the herein described invention;

[0030] FIG. 3A illustrates a partial sectional view taken along the axis line "A" shown in FIG. 3.

[0031] FIG. 3B illustrates a partial sectional view taken along the axis line "B" shown in FIG. 3.

[0032] FIG. 4 shows exploded elevational view according to the invention;

[0033] FIG. 5 is a top view of thereof.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0034] Turning now to the drawings in which like reference characters indicate corresponding elements throughout the several views, attention is directed to FIG. 1. There is illustrated a firearm 32 of the M16 family of weapons with a pistol grip 33, magazine 34, butt stock 35, receiver with Picatinny interface 31 (1913 mil std. rail), handguards with a Picatinny interface 36, and barrel 37. The secondary structures of the firearm, specifically the handguards 36 and the receiver 31 have a Picatinny interface located on the top of each part which is in parallel relation to the barrel 37. Mount base 10 provided with a series of throw levers, hereinafter referred to as cam levers 20A & B, provides a method by which the mount base 10 may be secured to a Picatinny interface 31 or 36. Further, a means is provided on the mount base 10 by which an electronic gun site 40 may be secured.

[0035] FIG. 2 shows a top view of the self adjusting throw lever and rail clamp system 1. The mount base 10 has a Picatinny interface 15 on its top surface. Two cam levers 20A & B are in operational contact with two moving clamps 21A & B. Each cam lever 20A & B is attached to a shouldered stud 18A & B which runs transverse to the axis of the moving clamps 21A & B as illustrated in FIG. 3. The shouldered studs

18A & B each of which have a shoulder 22A & B which serves to contain a series of disc springs 19A & B within a recess 14A & B located on the side of the mount base 10 as illustrated in FIGS. 3A and 3B. The mount base 10 has a Picatinny interface receiving receptacle 11 located on its underside which serves to attach the self adjusting throw lever and rail clamp system 1 to a secondary structure 41 as illustrated in FIG. 3.

[0036] FIG. 4 self adjusting throw lever and rail clamp system 1 consists of a fixed clamp 12 permanently attached to the mount body 10 holding apparatus with matching geometry to the secondary structure 41 with a Picatinny rail interface, a floating opposite clamp 21A or B with similar geometry is placed facing the fixed clamp 12, held by a shouldered stud 18A or B, the stud 18A or B would have a hole 24A & B through its' small diameter located at the opposite end of the shoulder 22A & B, at the center of the fixed clamp 12 there is a recess 14A & B, with a counter bore 13A & B, matching the diameters of the shouldered stud 18A & B to a depth equal to the sum of the disc washers 19A & B and the shoulder 22A & B of the studs 18A & B. The moving clamps 21A & B have a hole 23A & B matching the small diameter of the shouldered stud 18A & B. A cam clamp 20A & B is attached to the shouldered stud 18A & B by a spring pin 17A & B. The spring pin 17A & B passes freely through the lateral holes 25A & B of the cam levers 20A & B and is compressed and retained as it goes through the holes 24A & B located on the shouldered studs 22A & B.

[0037] There are six "Belleville washers" or "disc springs" 19A & B, in the preferred embodiment, with approximately 36 lbs of force and approximately 0.003 inch each of deflection when compressed. Three disc springs 19A & B are placed back to back inside the recess 14A & B of the fixed clamp 12, the shouldered stud 18A & B is then inserted through them, holding them in place, on the opposite end the moving clamps 21A & B are placed, oppositely facing the fixed clamp 12, defining the Picatinny interface receiving channel 11, then the cam levers 20A & B are assembled by inserting the spring pin 17A & B through one ear 25A & B of the cam lever 20A & B, then the hole 24A & B in the shouldered stud 18A & B and the other ear 25A & B of the cam lever 20A & B.

[0038] The disc springs 19A & B allow the travel of the shouldered stud 18A & B to compress the moving clamps 21A & B actuated for the cam lever. When the cam lever 20A & B is moving to the closed position, a maximum compression of the disc springs 19A & B is nearly achieved when the cam levers 20A & B are at an approximately 90 degree angle in relation to the mount base 10. When the lock position is reached (as shown in FIG. 5) the disc springs 19A & B are compressed about 70% of the maximum. The cam levers 20A & B are designed to use the remaining force to hold the cam levers 20A & B closed. This force reduces the possibilities of the cam levers 20A & B from inadvertently becoming open (as shown in FIG. 2). The compression of the disc springs 19A & B allows only 0.018 inch, approximately, total cam lever 20A & B movement.

[0039] The cam levers 20A & B when in the open position must allow clearance for the moving clamps 21A & B to clear the outer edge of the secondary structure with Picatinny interface 41 (as shown in FIG. 3A) so that the attachment may be removed or lifted away from the secondary structure with Picatinny interface 41. When the cam lever 20A & B is flipped 180 degrees to the closed position, it absorbs the clearance and it compresses the disc springs 19A & B maintaining a constant compression force, thus insuring that the cam levers 20A & B do not pop open inadvertently and preventing the mount base 10 from moving.

[0040] The shouldered stud 18A & B fits between the teeth of the secondary structure with Picatinny interface 41 allowing it to be centered between the fixed clamp 12 and moving clamps 21A & B, at the same time restricting any movement forward or back of the mount base 10. The quantity of moving clamps 21A & B would depend on the weight and length of the attachment.

[0041] The mounting surface 15, located on top of the mount base 10, is configured so as to receive the bottom surface of an electronic gun site 40. The electronic gun site 40 (depicted in FIG. 1) has an integrated Picatinny mount on its bottom surface to receive the mounting surface 15 provided by the herein described device

[0042] Various changes and modifications to the embodiments herein chosen for purposes of illustration will readily occur to those skilled in the art. To the extent that such modifications and variations do not depart from the spirit of the invention, they are intended to be included within the scope thereof, which is assessed only by a fair interpretation of the following claims.

CONCLUSION, RAMIFICATIONS, AND SCOPE

[0043] Accordingly the reader will see that I have provided a self adjusting throw lever and rail clamp system for an optical gun site. Moving clamps in operational contact with a throw lever, shouldered stud and a series of disc springs provides a means to removably secure the moving clamps, and thereby the mount base, about a Picatinny or 1913 mil-std rail. The mounting surface provided by the herein described device is, in its preferred embodiment, a 1913 mil-std rail also known as a Picatinny rail. This mounting surface allows for a variety of optical gun sites to be attached. This system for attaching the mount base to a rifle with a Picatinny rail, or other secondary structure, provides a low profile which will not get tangled in a war fighter's gear during use. Further, the herein described device does not require tools to adjust the tension or retain the mount base on the appropriate mounting surface.

[0044] Another embodiment of the self adjusting throw lever and rail clamp system could be used for telescopic sights utilized with firearms. A mount base or series of mount bases incorporating standard scope rings, well known in the prior art, in place of the Picatinny mounting surface would be provided. The mount base could take the form of a single piece for better rigidity or two separate units to reduce weight.

[0045] While my above drawings and description contain much specificity, these should not be construed as limitations on the scope of the invention, but rather as an exemplification of one preferred embodiment thereof.

[0046] Accordingly, the scope of the invention should be determined not by the embodiments illustrated, but by the appended claims and their legal equivalents.

What is claimed is:

1. A self adjusting mounting system comprising: a mounting base with an aperture therein mounting into position on a secondary device attached to a structure, at least one shouldered stud runs transverse to the aperture thereby connecting a fixed clamping structure to at least one moveable clamp and a moveable cam lever with locking means; the moveable clamp defines a clamping surface that has means to interface with said secondary device and has a flat base portion; the moveable cam lever is in operational contact with the moveable clamp and the secondary device, said cam lever has an open position and closed position of operation; the shoul-

dered stud provides means to adjustably fit the mounting base to the secondary device; the fixed clamping structure is oppositely placed in relation to the moveable clamp and defines a clamping surface which has means to interface with said secondary device.

2. A self adjusting mounting system in accordance with claim 1, wherein:

between the fixed clamping structure and shouldered stud is housed a means to resist said shouldered studs movement, with the moveable cam lever in the open position the moveable clamp has a free range of adjustment to accommodate the secondary device, once mounting base is secured to the secondary device the moveable cam lever is rotated approximately 180 degrees thereby actuating the means to resist the shouldered studs movement by pulling the shouldered stud through the mounting base thus removably securing the moveable clamp against the secondary device, the cam lever acts as a locking means to prevent the release of the moveable clamps.

3. A self adjusting mounting system in accordance with claim 2, further comprising:

means to resist the shouldered studs movement is provided by a series of disc springs placed between the shouldered studs head and the fixed clamping structure, as the moveable cam lever is rotated to the closed position the shouldered stud is pulled through the mounting base thereby compressing the disc springs.

4. A self adjusting mounting system in accordance with claim 2, further comprising:

the moveable cam lever has a rounded surface which is in operational contact with the moveable clamps and provides a rotating surface by which the moveable cam lever is moved from the open position to the closed position, also present is an approximate 90 degree stop defining the back of the cam lever.

5. The combination of a attachment means and a base, the attachment means comprising a locking means and an actuating means, the actuating means includes a rotatable throw lever in operational contact with the locking means which is comprised of a shouldered stud linking the throw lever with the spring biased moving clamps and a fixed clamp surface adjacent to the moving clamps, the throw lever is in operational contact with the spring biased moving clamps; the base has a bottom surface having an aperture which is designed to interface with a secondary mounting surface, a top surface having means to secure an aiming device.

6. The combination according to claim 5, wherein the bottom surface of the base will interface with a 1913 mil-standard rail.

7. The combination according to claim 5, wherein the springs which resist the movement of the moving clamps are located between the shouldered stud and the fixed clamp surface, when the actuating means is utilized the shouldered stud is pulled through an aperture in the moving clamp thereby compressing the springs and causing the moving clamp to engage the secondary mounting surface.

8. The combination according to claim 5, wherein the throw lever has an open position and closed position, the closed position of the throw lever has a means to resist the movement of the shouldered stud thereby preventing the movement of the moving clamp.