BULKY DOCUMENTS

(Exceeds 300 pages)

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Title: PETITION FOR CANCELLATION

Part 3 of 3 **Part II**

SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS

(1) REFERENCE CODE	(2) MAINTENANCE LEVEL	(3) NOMENCLATURE	(4) NATIONAL STOCK NUMBER	(5) TOOL PART NUMBER
1	H	TOOL KIT, FIRE CONTROL SYSTEM, MECHANIC	4931-00-947-8243	SC5180-95-B29
2	H	SHOP EQUIPMENT, INSTRUMENT AND FIRE CONTROL: FIELD MAINTENANCE, BASIC	4931-00-754-0740	SC4931-95-CL-A07
3	H	COLLIMATION STANDARD AND STORAGE BOX ASSEMBLY	4931-01-250-1596	9388647
4	H	FIXTURE, AZIMUTH TEST	4931-00-769-1596	7691596
5	H	INDICATOR, DIAL	5210-00-273-9791	A-A-2348
6	H	MIRROR, OPTICAL INSTRUMENT	6650-01-226-0720	10558251
7	H	V-BLOCK	3460-00-517-6073	A-A-55009
8	H	PURGING KIT, FIRE CONTROL INSTRUMENT	4931-00-065-1110	SC4931-95-J54

APPENDIX C

DIRECT AND GENERAL SUPPORT MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS LIST (INCLUDING DEPOT MAINTENANCE REPAIR PARTS)

Section I. INTRODUCTION

C-1 SCOPE

This RPSTL lists and authorizes spares and repair parts required for performance of general support maintenance of the M139/M140 Alinement Devices. It authorizes the requisitioning, issue, and disposition of spares, repair parts, and special tools as indicated by the Source, Maintenance, and Recoverability (SMR) codes.

C-2 GENERAL

In addition to Section I, Introduction, this Repair Parts and Special Tools List is divided into the following sections:

a. *Section II.* Repair Parts List — A list of spares and repair parts authorized by this RPSTL for use in the performance of maintenance. The list also includes parts which must be removed for replacement of the authorized parts. Parts lists are composed of functional groups in ascending alphanumeric sequence, with the parts in each group listed in ascending figure and item number sequence. Bulk materials are listed by item name in FIG BULK at the end of the section.

b. *Section III.* Special Tools List — N/A

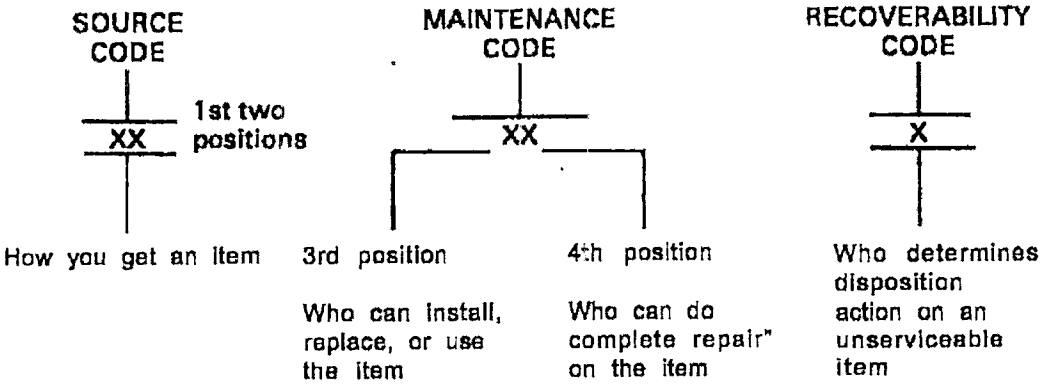
c. *Section IV.* National Stock Number and Part Number Index — A list, in National Identification Number (NIIN) sequence, of all National stock numbered items appearing in the listings, followed by a list in alphanumeric sequence of all part numbers appearing in the listing. National stock numbers and part numbers are cross-referenced to each illustration figure and item number appearance.

C-3 EXPLANATION OF COLUMNS (SECTION II)

a. *ITEM NO. (Column (1))* — Indicates the number used to identify items called out in the illustration.

C-3 EXPLANATION OF COLUMNS (SECTION II) - CONTINUED

b. *SMR CODE (Column (2))* — The Source, Maintenance, and Recoverability (SMR) code is a 5-position code containing supply/requisitioning information, maintenance category authorization criteria, and disposition instruction, as shown in the following breakout:



* Complete Repair: Maintenance capacity, capability, and authority to perform all corrective maintenance tasks of the "Repair" function in a use/user environment in order to restore serviceability to a failed item.

(1) Source Code — The source code tells you how to get an item needed for maintenance, repair, or overhaul of an end item/equipment. Explanations of source codes follow:

CODE	EXPLANATION
PA, PC**, PD, PE, PF, PG	Stocked items; use the applicable NSN to request/requisition items with these source codes. They are authorized to the category indicated by the code entered in the 3rd position of the SMR code. **NOTE: Items coded PC are subject to deterioration.
KD, KF, KB	Items with these codes are not to be requested/requisitioned individually. They are part of a kit which is authorized to the maintenance category indicated by the 3rd position of the SMR code. The complete kit must be requisitioned and applied.

C-3 EXPLANATION OF COLUMNS (SECTION II) — CONTINUED

CODE	EXPLANATION
MO —(Made at org. level) MF — (Made at DS level) MH — (Made at GS level) ML — (Made at Specialized Repair Act (SRA)) MD — (Made at Depot)	Items with these codes are not to be requested/requisitioned individually. They must be made from bulk material which is identified by the part number in the DESCRIPTION AND USABLE ON CODE (UOC) column and listed in the Bulk Material Group of the repair parts list in this RPSTL if the item is authorized to you by the 3rd position code of the SMR code, but the source code indicates it is made at a higher level, order the item from the higher level of maintenance.
AO — (Assembled by org. level) AF — (Assembled by DS level) AH — (Assembled by GS category) AL — (Assembled by SRA) AD — (Assembled by Depot)	Items with these codes are not to be requested/requisitioned individually. The parts that make up the assembled item must be requisitioned or fabricated and assembled at the level of maintenance indicated by the source code. If the 3rd position code of the SMR code authorizes you to replace the item, but the source code indicates the item is assembled at a higher level, order the item from the higher level of maintenance.
XA — Do not requisition an "XA"-coded item. Order its next higher assembly. (Also, refer to the NOTE below.)	
XB — If an "XB" item is not available from salvage, order it using the FSCM and part number given.	
XG — Installation drawing, diagram, instruction sheet, field service drawing, that is identified by manufacturer's part number.	
XD — Item is not stocked. Order an "XD"-coded item through normal supply channels using the FSCM and part number given, if no NSN is available.	

C-3 EXPLANATION OF COLUMNS (SECTION II) – CONTINUED

Note

Cannibalization or controlled exchange, when authorized, may be used as a source of supply for items with the above source codes, except for those source coded "XA" or those aircraft support items restricted by requirements of AR 700-42.

(2) Maintenance Code — Maintenance codes tell you the level(s) of maintenance authorized to USE and REPAIR support items. The maintenance codes are entered in the 3rd and 4th positions of the SMR Code as follows:

(a) The maintenance code entered in the 3rd position tells you the lowest maintenance level authorized to remove, replace, and use an item. The maintenance code entered in the third position will indicate authorization to one of the following levels of maintenance.

CODE	APPLICATION/EXPLANATION
C	Crew or operator maintenance done within organizational or aviation unit maintenance.
O	Organizational or aviation unit category can remove, replace, and use the item.
F	Direct support or aviation intermediate level can remove, replace, and use the item.
H	General support level can remove, replace, and use the item.
L	Specialized repair activity can remove, replace, and use the item.
D	Depot level can remove, replace, and use the item.

(b) The maintenance code entered in the 4th position tells whether or not the item is to be repaired and identifies the lowest maintenance level with the capability to do complete repair (i.e., perform all authorized repair functions). (NOTE: Some limited repair maybe done on the item at a lower level of maintenance, if authorized by the Maintenance Allocation Chart (MAC) and SMR codes.) This position will contain one of the following maintenance codes.

CODE	APPLICATION/EXPLANATION
O	Organizational or aviation unit is the lowest level that can do complete repair of the item.
F	Direct support or aviation intermediate is the lowest level that can do complete repair of the item.
H	General support is the lowest level that can do complete repair of the item.

C-3 EXPLANATION OF COLUMNS (SECTION II) — CONTINUED

L Specialized repair activity is the lowest level that can do complete repair of the item.

D Depot is the lowest level that can do complete repair of the item.

Z Nonreparable. No repair is authorized.

B No repair is authorized. (No parts or special tools are authorized for the maintenance of the "8" coded item.) However, the item may be reconditioned by adjusting, lubricating, etc., at the user level.

(3) Recoverability Code — Recoverability codes are assigned to items to indicate the disposition action on unserviceable items. The recoverability code is entered in the 5th position of the SMR code as follows:

RECOVERABILITY CODES	APPLICATION/EXPLANATION
Z	Nonreparable item. When unserviceable, condemn and dispose of the item at the level of maintenance shown in 3rd position of SMR code.
O	Reparable item. When uneconomically reparable, condemn and dispose of the item at the organizational or aviation unit level
F	Reparable item. When uneconomically reparable, condemn and dispose of the item at the direct support or aviation intermediate level.
H	Reparable item. When uneconomically reparable, condemn and dispose of the item at the general support level.
D	Reparable item. When beyond lower level repair capability, return to depot. Condemnation and disposal of item not authorized below depot level.
L	Reparable item. Condemnation and disposal not authorized below Specialized Repair Activity (SRA).
A	Item requires special handling or condemnation procedures because of specific reasons (e.g., precious metal content, high dollar value, critical material). Refer to appropriate manuals/directives for specific instructions.

C-3 EXPLANATION OF COLUMNS (SECTION II)— CONTINUED

a. *FSCM (Column (3))* — The Federal Supply Code for Manufacturer (FSCM) is a 5-digit numeric code which is used to identify the manufacturer, distributor, or Government agency, etc., that supplies the item.

b. *PART NUMBER (Column (4))* — Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications standards, and inspection requirements to identify an item or range of items.

Note

When you use an NSN to requisition an item, the item you receive may have a different part number from the part ordered. (The parts are interchangeable.)

c. *DESCRIPTION AND USABLE ON CODE (UOC) (Column (5))* — This column includes the following information:

1. The Federal item name and, when required, a minimum description to identify the item.
2. The physical security classification of the item.
3. Items that are included in kits and sets.
4. Spare/repair parts that make up an assembled item are listed immediately following the assembled item line entry. When a separate figure lists the complete breakdown of an assembly/subassembly, a note "See figure for breakdown" in shown.
5. Part numbers for bulk materials.
6. When the item is not used with all serial numbers of the same model.
7. The usable on code, when applicable (see paragraph 5, Special Information).
8. Special Tools List section.
9. The statement "END OF FIGURE" appears just below the last item description in Column 5 for a given figure in Section II.

d. *QTY (Column (6))* — The QTY (quantity per figure column) indicates the quantity of the item used in the breakout shown on the illustration figure, which is prepared for a functional group, subfunctional group, or an assembly. A "V" appearing in this column in lieu of a quantity indicates that the quantity is variable and the quantity may vary from application to application.

C-3 EXPLANATION OF COLUMNS (SECTION II) – CONTINUED

(4) *Explanation of Columns (Section IV)*

a. *NATIONAL STOCK NUMBER (NSN) INDEX*

1. *STOCK NUMBER Column* —This column lists the NSN by National Item Identification Number NIIN) sequence. The NIIN consists of the last nine digits of the NSN.

NSN
(I.e., 5305-01-674-1467),
NIIN

When using this column to locate an item, ignore the first 4 digits of the NSN. However, the complete NSN should be used when ordering items by stock number.

2. *FIGURE Column* -This column lists the number of the figure where the item is identified/located. The figures are in numerical order in Section II.

3. *ITEM Column* —The item number identifies the item associated with the figure listed in the adjacent Figure column, This item is also identified by the NSN listed on the same line.

b. *PART NUMBER INDEX* — Part numbers in this index are listed by part number in ascending alpha numeric sequence (I.e., vertical arrangement of letter and number combination which places the first letter or digit of each group in order A thru Z, followed by the numbers 0 through 9 and each following letter or digit in like order).

1. *FSCM Column* —The Federal Supply Code for Manufacturer (FSCM) is a 5-digit numeric code used to identify the manufacturer, distributor, or Government agency, etc., that supplies the item.

2. *PART NUMBER Column* — Indicates the primary number used by the manufacturer (individual, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications standards, and inspection requirements to identify an item or range of items.

3. *STOCK NUMBER Column* — This column lists the NSN for the associated part number and manufacturer identified in the PART NUMBER and FSCM columns to the left.

4. *FIGURE Column* —This column lists the number of the figure where the item is identified/located in Section II.

5. *ITEM Column* — The item number is that number assigned to the item as it appears in the figure referenced in the adjacent figure number column.

C-3 EXPLANATION OF COLUMNS (SECTION II) — CONTINUED

(5) *Special Information*

a. *USABLE ON CODE* -- The usable on code appears in the lower left corner of the Description column heading. Usable on codes are shown as "UOC: . . . ." in the Description column (justified left) on the first line after the applicable item description/nomenclature. Uncoded items are applicable to all models. Identification of the usable on codes used in the RPSTL are:

CODE	USED ON
U09	M140
U11	M139

b. *FABRICATION INSTRUCTIONS* — N/A

c. *ASSEMBLY INSTRUCTION* — Detailed assembly instructions for items source coded to be assembled from component spare /repair parts a refound in Chapter 2, Section III. Items that make up the assembly are listed immediately following the assembly item entry or reference is made to an applicable figure.

d. *KITS* — N/A

e. *INDEX NUMBERS* —This index number is a cross-reference between the National Stock Number/Part Number Index and the bulk material list in Section II.

f. *ASSOCIATED PUBLICATIONS* — N/A

g. *ILLUSTRATIONS* - LISTING — N/A

(6) *How to Locate Repair Parts*

a. *When National Stock Number or Part Number Is Not Known:*

1. *First* — Using the table of contents, determine the assembly group or subassembly group to which the item belongs, This is necessary since figures are prepared for assembly groups and subassembly groups, and listings are divided into the same groups.

2. *Second*— Find the figure covering the assembly group or subassembly group to which the item belongs.

3. *Third* — Identify the item on the figure and note the item number.

4. *Fourth* — Refer to the Repair Parts List for the figure to find the part number for the item number noted on the figure.

5. *Fifth* — Refer to the Part Number Index to find the NSN, if assigned.

C-3 EXPLANATION OF COLUMNS (SECTION II) - CONTINUED

b. *When National Stock Number or Part Number is Known:*

1. *First* – Using the Index of National Stock Numbers and Part Numbers, find the pertinent National Stock Number or Part Number. The NSN Index is in National Item Identification Number (NIIN) sequence (see 4.1 (1)). The part numbers in the Part Number Index are listed in ascending alphanumeric sequence (see 4 b). Both indexes cross-reference you to the illustration figure and item number of the item you are looking for.

2. *Second* – After finding the figure and item number, verify that the item is the one you are looking for, then locate the item number in the repair parts list for the figure.

(7) *Abbreviations* – N/A

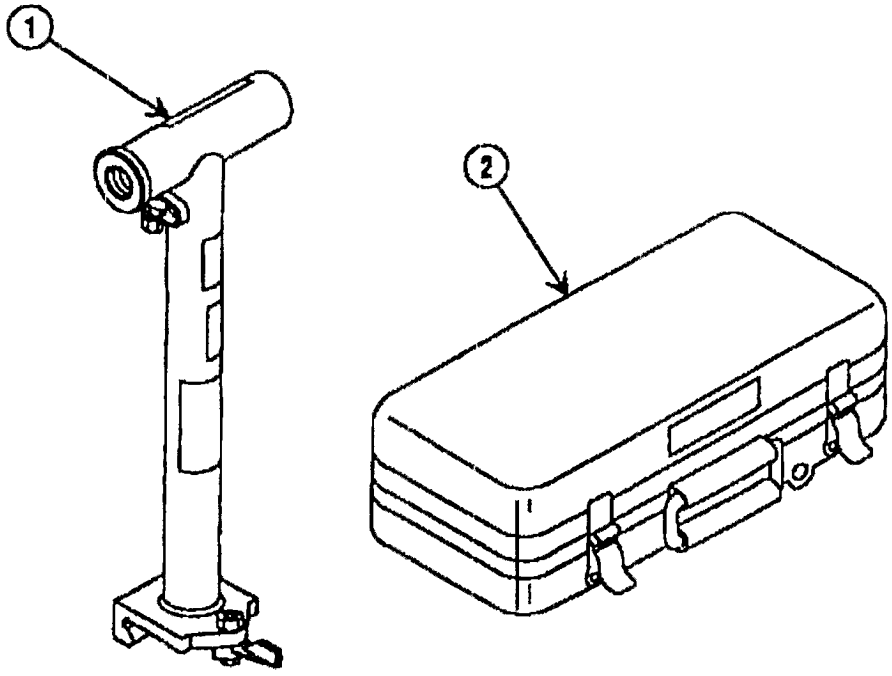


Figure C-1. M140 Alinement Device with Case – 9360187.

(1) ITEM NO	(2) SMR CODE	(3) FSCM	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
				FIG. C-1, GROUP 00: M140 ALINEMENT DEVICE WITH CASE - 9360187	
1			11741648-1	ALINEMENT DEVICE, M139	
1	PCCHA	19200	11741648-2	ALINEMENT DEVICE, OP OP, M140: WITHOUT CASE (SEE FIG. C-2) UOC: U09	1
* 2	PAOOO	19200	11739600	CASE, OPTICAL INSTRUMENT UOC:U09 (SEE FIG. C-5)	1

END OF FIGURE

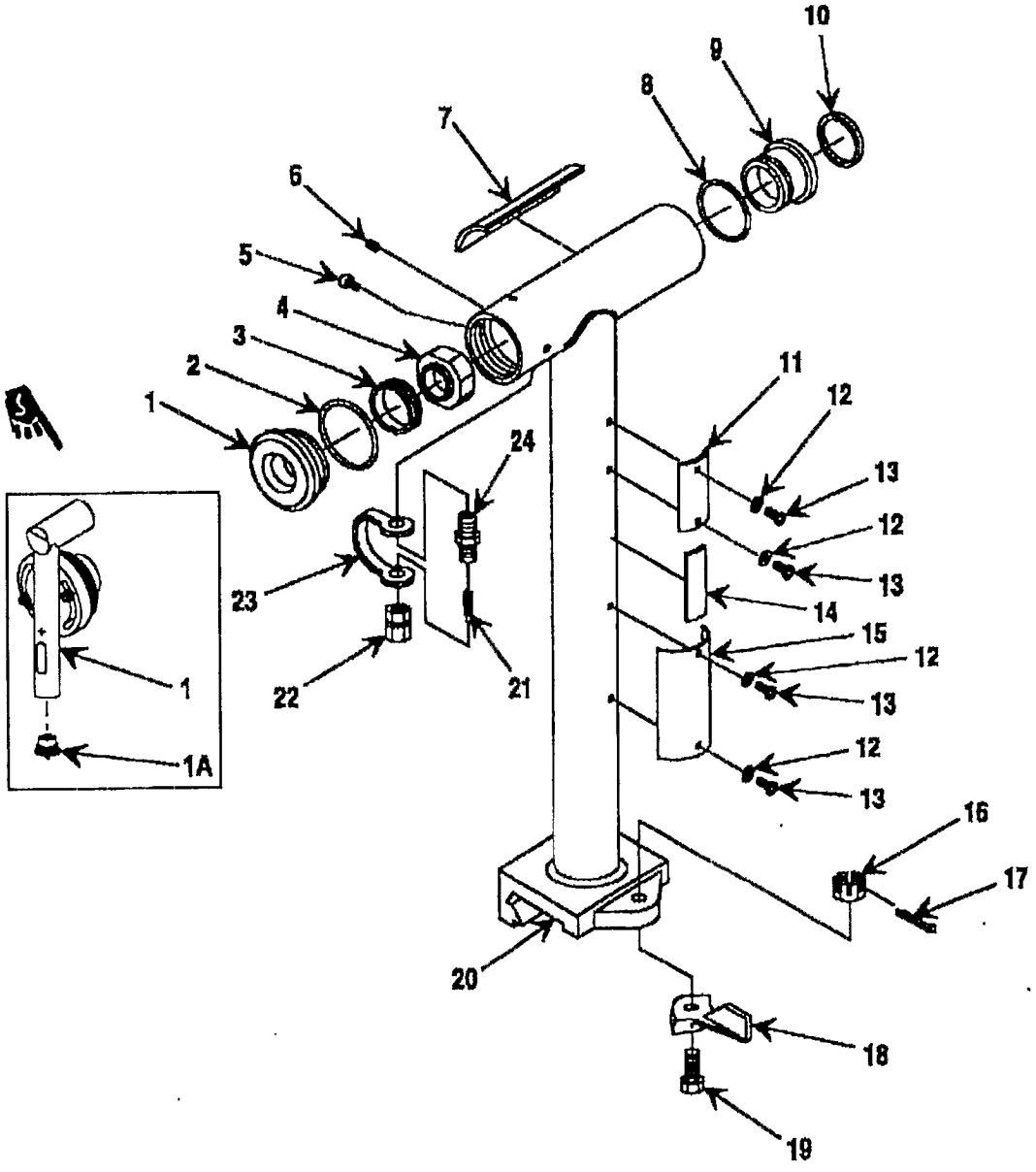


Figure C-2. M139/M140 Alinement Devices (exploded view).

(1) ITEM NO	(2) SMR CODE	(3) FSCM	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
				FIG. C-2, GROUP 01:	
				M139 AND M140 ALINEMENT DEVICES	
* 1	PCHZA	19200	10544462	CAP ASSEMBLY, POTTED	1
* 1	PAOOO	19200	12984672	LIGHT ASSEMBLY, NON-TRITIUM	1
* 1A	PACZZ	19200	12984679	CAP ASSEMBLY	1
* 2	PAHZZ	96906	AS3578-026	O-RING	1
3	PAHZZ	19200	10544461	RETAINER, OPTICAL ELEMENT	1
4	AHHHL	19200	10544455	CELL ASSEMBLY, OPTICAL (SEE FIG. C-3)	1
5	PAOZZ	19200	10555157-4	SCREW, MACHINE	1
* 6	PAHZZ	80205	MS51031-103	SETSCREW	4
7	PAOZZ	19200	11739593	DECAL	1
* 8	PAHZZ	81343	AS3578-024	O-RING	1
9	AHHHL	19200	9360371	CELL ASSEMBLY, OPTICAL (SEE FIG. C-4)	1
* 10	PAHZZ	19200	10544464	RETAINER, OPTICAL ELEMENT	1
11	PAOZZ	19200	10544467	PLATE, INSTRUCTION	1
12	PAOZZ	96906	MS35333-69	WASHER, LOCK	2
13	PAOZZ	96906	MS51957-2	SCREW, MACHINE	2
14	PAOZZ	19200	11731011	PLATE, INSTRUCTION	1
15	PAHZZ	19200	10544458-2	PLATE, IDENTIFICATION UOC:U09	1
15	PAHZZ	19200	10544458-1	PLATE, IDENTIFICATION UOC:U11	1
* 15	PAOZZ	19200	10544458-4	PLATE, IDENTIFICATION (NON-TRITIUM) UOC:U1[illegible]	1
16	PAOZZ	96906	MS35692-3	NUT, PLAIN, SLOTTED, HEX	1
* 17	PAOZZ	80205	MS24665-153	PIN, COTTER	1
18	PAOZZ	19200	10544452	LEVER, MANUAL CONTROL	1
19	PAOZZ	19200	10544465	SCREW, CAP, SOCKET HEAD	1
20	XAHHH	19200	10544450-1	BODY:M139 UOC:U11	1
20	XAHHH	19200	10544450-2	BODY:M140 UOC:U09	1
21	PAOZZ	96906	MS51377-2	VALVE CORE	1
* 22	PAOZZ	19200	8200055	CAP, AIR VALVE	1
* 23	PAOZZ	19200	10516567	STRAP, RETAINING	1
24	PAOZZ	96906	MS51607-1	VALVE STEM, PURGING	1

END OF FIGURE

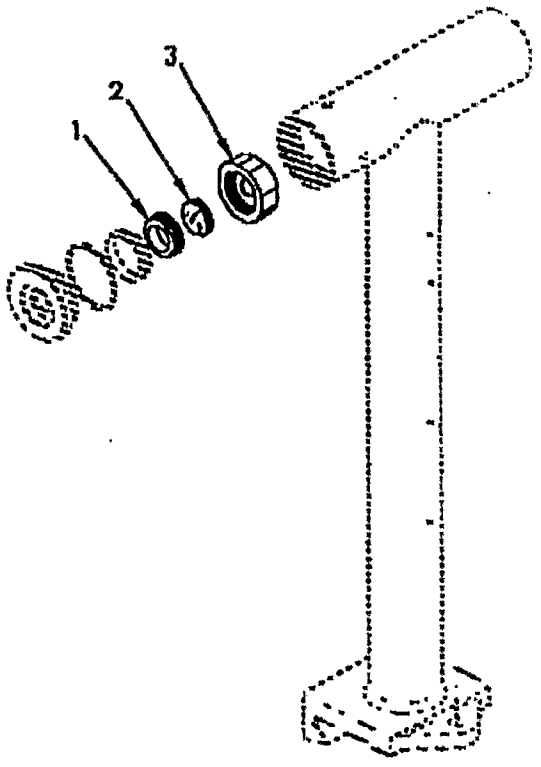


Figure C-3. Optical Cell Assembly – 10544455.

(1) ITEM NO	(2) SMR CODE	(3) FSCM	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
				FIG. C-3, GROUP 0101: OPTICAL CELL ASSEMBLY - 10544455	
* 1	PAHZZ	19200	10544460	RETAINER, OPTICAL ELEMENT	1
2	PAHZZ	19200	10544459	RETICLE, OPTICAL INSTRUMENT	1
3	PAHZZ	19200	10544458	CELL, OPTICAL ELEMENT	1

END OF FIGURE

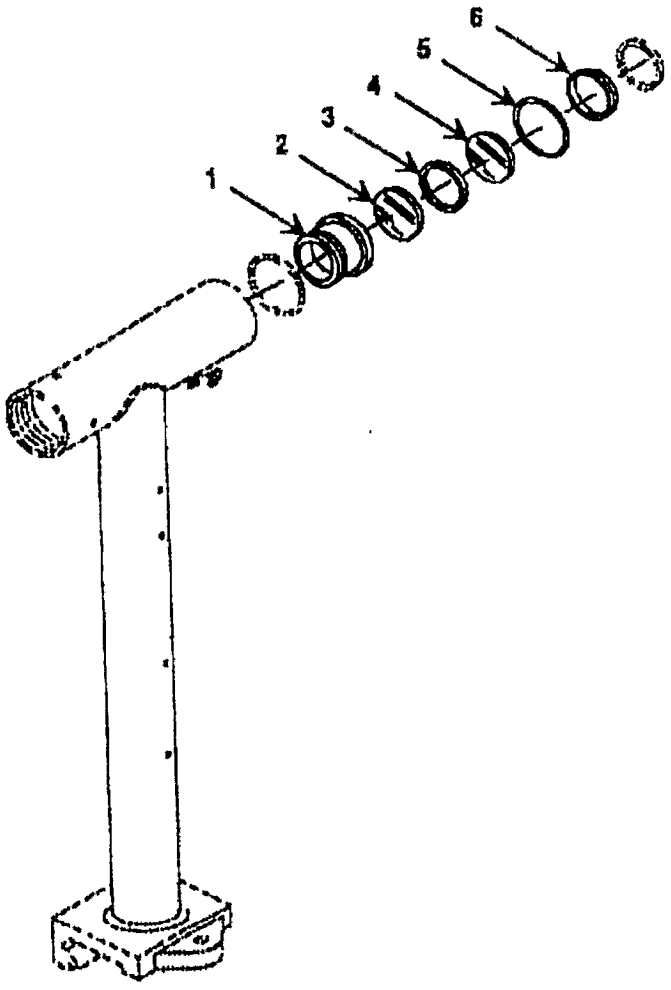


Figure C-4. Optical Cell Assembly – 9360371.

(1) ITEM NO	(2) SMR CODE	(3) FSCM	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
				FIG. C-4, GROUP 0102: OPTICAL CELL ASSEMBLY – 9360371	
1	PAHZZ	19200	9360370	CELL, OPTICAL ELEMENT	1
2	PAHZZ	19200	10547001	LENS, OPTICAL INSTRUMENT	1
3	PAHZZ	19200	10547017	SPACER, RING	1
4	PAHZZ	19200	10547002	LENS, OPTICAL INSTRUMENT	1
* 5	PAHZZ	19200	10547018-2	O-RING	1
* 6	PAHZZ	19200	9360369	RETAINER, OPTICAL ELEMENT	1

END OF FIGURE

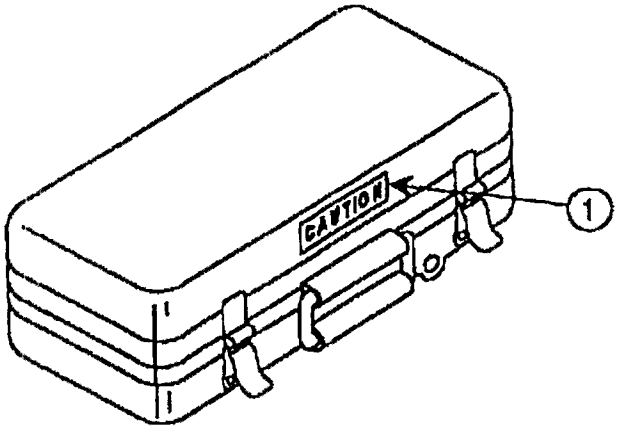


Figure C-5. Optical Instrument Case – 11739600.

(1) ITEM NO	(2) SMR CODE	(3) FSCM	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
				FIG. C-5, GROUP 02: OPTICAL INSTRUMENT CASE - 11739600	
* 1	PAOZZ	19204	11731008-3	INSTRUCTION PLATE..... UOC: U09	1

END OF FIGURE

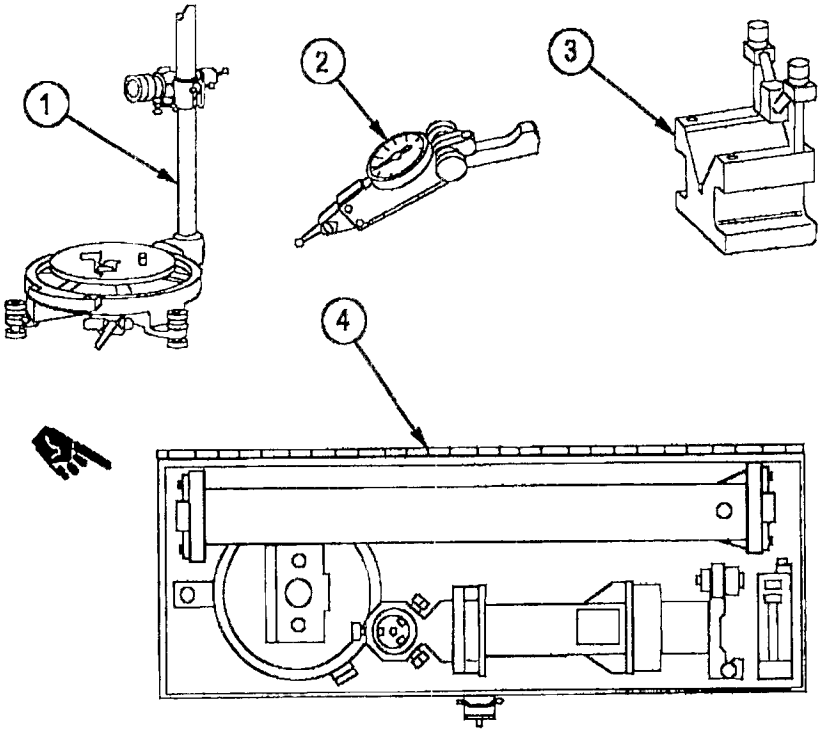


Figure C-6. Special Tools.

(1) ITEM NO	(2) SMR CODE	(3) FSCM	(4) PART NUMBER	(5) DESCRIPTION AND USABLE ON CODES (UOC)	(6) QTY
				FIG. C-6, GROUP 95: SPECIAL TOOLS	
1	PEHDO	19200	7691596	FIXTURE, AZIMUTH TEST	1
*2	PBHZZ	58536	A-A-2348	DIAL INDICATOR	1
*3	PAHZZ	81348	A-A-55009	V-BLOCK	1
*4	PAHZZ	19200	9388647	COLLIMATION STD AND STORAGE BOX ASSY	1
*	XAHHH	19200	9388615-2	.SPACER	1
*	PAHZZ	96906	MS16555-48	.PIN, STRAIGHT HEADLESS	2
*	PAHZZ	19200	10558251	.MIRROR, OPTICAL INSTRUMENT	1
*	XAHHH	19200	9388622-1	.COLLIMATOR	1
*	XAHHH	19200	9388618	.ADAPTER PLATE ASSEMBLY	1
*	XAHHH	19200	9388641	.STORAGE BOX	1

END OF FIGURE

APPENDIX D

EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

Section 1. INTRODUCTION

D-1 SCOPE

This listing is for informational purposes only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items) or CTA 8-100, Army Medical Department Expendable/Durable Items.

D-2 EXPLANATION OF COLUMNS

a. Column 1 – Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material being used.

b. Column 2 – Level. This column identifies the lowest level of maintenance that requires the listed item.

H..... General Support Maintenance

c. Column 3 – National Stock Number. This item is the national stock number assigned to the item. Use it to request or requisition the item.

d. Column 4 – Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the part followed by the Federal Supply Code for Manufacturer (FSCM) in parenthesis, if applicable.

e. Column 5 – Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation. If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) UNIT OF MEAS
1	H	6810-00-201-0906	ALCOHOL, DENATURED: Grade III OE 760 (81348) 16 oz. bottle	BT
2	H	8105-00-269-4662	BAG, PLASTIC: 20 x 25 in. (50.8 x 63.5 cm) MIL-B-117 (81349)	EA
2.1	O	8105-00-299-8532	BAG, PLASTIC: 10 ea pkg PPP-B-26 (81348)	EA
2.1A	O	6135-01-301-8776	BATTERY, TL2100/S, Gage 4J947	EA
2.2	O	8115-00-190-5020	BOX, SHIPPING: 14 x 36 x 14 in. (35.6 x 91.4 x 35.6 cm) 10 ea pkg PPP-B-636 (81348)	EA
3	H	7920-00-205-0565	BRUSH, DUSTING, LENS: R698 (17866)	EA
4	H	6850-00-597-9765	CLEANING COMPOUND: 6G236-6 (80063) 1 gal. can	GL
5	H	8010-00-852-9033	ENAMEL: Yellow, No. 13538 TT-E-489 (81348) 1 pt. can	PT
5.1	o	6515-01-150-2976 6515-01-150-2977 6515-01-150-2978	GLOVES, Patient exam: 100 each pkg ...(...) Size Small E010 Size Large, E011 Size Medium E012	 PG PG PG
6	H	9150-00-985-7247	GREASE, AIRCRAFT: Grease, aircraft instrument, corrosion and water resistant MIL-PRF-23827 (81349) 1 oz. tube	TU
6.1	O	8135-00-281-3920	PAGERBOARD WRAPPING, cushioning PPP291 (...) 250 ft roll	FT

NATIONAL STOCK NUMBER AND PART NUMBER INDEX

NATIONAL STOCK NUMBER INDEX

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
5305-00-054-5636	C2	13			
2640-00-060-3543	C2	21			
1240-00-114-1096	C2	24			
5315-00-234-1854	C2	17			
9905-00-257-2746	C2	14			
5210-00-273-9791	C6	2			
4931-00-341-5119	C1	1			
1240-00-341-5127	C1	2			
*6260-00-360-9445	C2	1			
1240-00-464-4792	C2	23			
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5330-00-600-5041	C2	2			
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5330-00-804-2748	C2	8			
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5310-00-894-2246	C2	16			
5305-00-955-2941	C2	5			
*6650-01-043-2200	C4	2			
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NATIONAL STOCK NUMBER AND PART NUMBER INDEX

PART NUMBER INDEX

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*81348	A-A-55009	3460-00-517-6073	C6	3
*96906	MS16555-48	5135-00-845-5110	C6	4
*80205	MS24665-153	5315-00-234-1854	C2	17
96906	MS35333-69	5310-00-543-4652	C2	12
96906	MS35692-3	5310-00-894-2246	C2	16
*80205	MS51031-103	5305-01-120-4353	C2	6
96906	MS51377-2	2640-00-060-3543	C2	21
96906	MS51807-1	1240-00-114-1096	C2	24
96906	MS51957-2	5305-00-054-5636	C2	13
96906	MS9021-024	5330-00-804-2748	C2	8
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*19200	10547002	6650-01-043-2201	C4	4
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*	9388615-2		C6	4
*	9388618		C6	4
*	9388622-1		C6	4
*	9388641		C6	4

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PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT
3		2		Item 10. Change illustration. Reason: Tube end shown assembled on wrong side of lever cam.
69		51		Item 3. The NSN and P/N are not listed on the ANDF nor the MERL. Request correct NSN and P/N be furnished.
2-8			2-1	Preventive Maintenance Checks and Services Item 7 under "Items to be inspected" should be changed to read as follows: Firing linkage and firing mechanism pawl.

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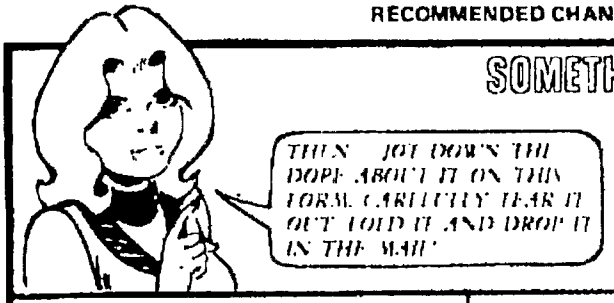

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THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

WEIGHTS

1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 Lb.
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches
1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.386 Sq. Miles

CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches
1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

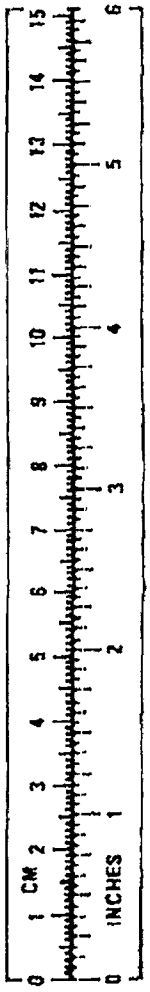
TEMPERATURE

5/9 (°F – 32) = °C
212° Fahrenheit is equivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
9/5 (°C + 32) = °F

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
Kilometers per Liter	Miles per Gallon	2.354
Kilometers per Hour	Miles per Hour	0.621



PIN: 060462-000

EXHIBIT

3

United States Patent [19]

Swan

[11] **Patent Number: 4,845,871**

[45] **Date of Patent: Jul. 11, 1989**

[54] **ATTACHMENT DEVICE**

[76] Inventor: **Richard E. Swan, 171 West St., East Bridgewater, Mass. 02333**

[21] Appl. No.: **183,082**

[22] Filed: **Apr. 19, 1988**

[51] **Int. Cl.**[4] **F41G 1/38**

[52] **U.S. Cl.** **42/101**; 33/250; 403/374

[58] **Field of Search** 42/101; 244/3.25; 33/250; 403/374, 409.1

[56] **References Cited**

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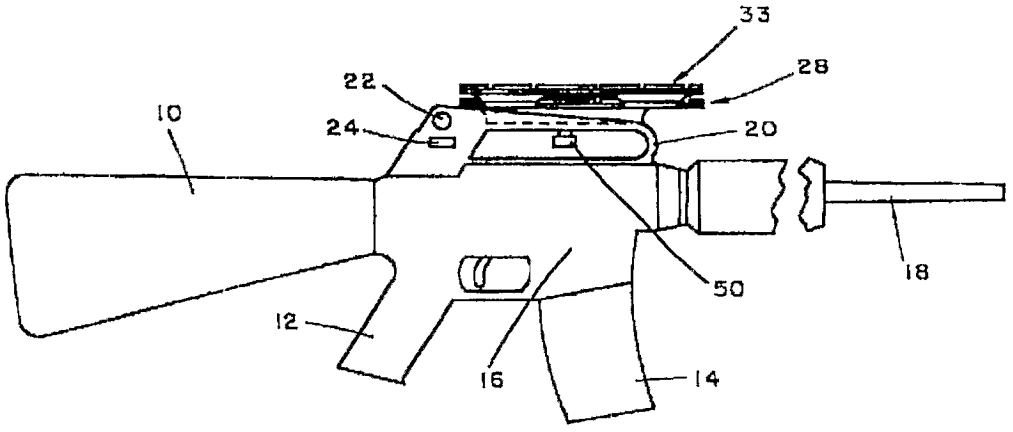
4,722,496	2/1988	Herrmann et al.	244/3.25

Primary Examiner—Deborah L. Kyle
Assistant Examiner—Michael J. Carone

[57] **ABSTRACT**

The invention disclosed herein comprises a means of attaching a first device to a second device. The attachment means includes a camming surface and is spring loaded. The attachment means is particularly useful in attaching a first weaver interface to a second weaver interface. The camming surfaces and spring loading permitting adjustments to permit proper attachment to varying interface surfaces.

7 Claims, 2 Drawing Sheets



EXHIBIT

4

US005276988A

United States Patent [19]

Swan

[11] Patent Number: 5,276,988

[45] Date of Patent: Jan. 11, 1994

[54] **BUFFERED ATTACHMENT DEVICE**

[76] Inventor: **Richard E. Swan**, 375 West Street, E. Bridgewater, Mass. 02379

[21] Appl. No.: **973,409**

[22] Filed: **Nov. 9, 1992**

[51] **Int. Cl.**[5] **F41G 1/387**

[52] **U.S. Cl.** **42/101**; 33/250

[58] **Field of Search** 42/101, 99, 90; 33/250

[56] **References Cited**

U.S. PATENT DOCUMENTS

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4,845,871	7/1989	Swan	42/101
5,142,806	9/1992	Swan	42/101

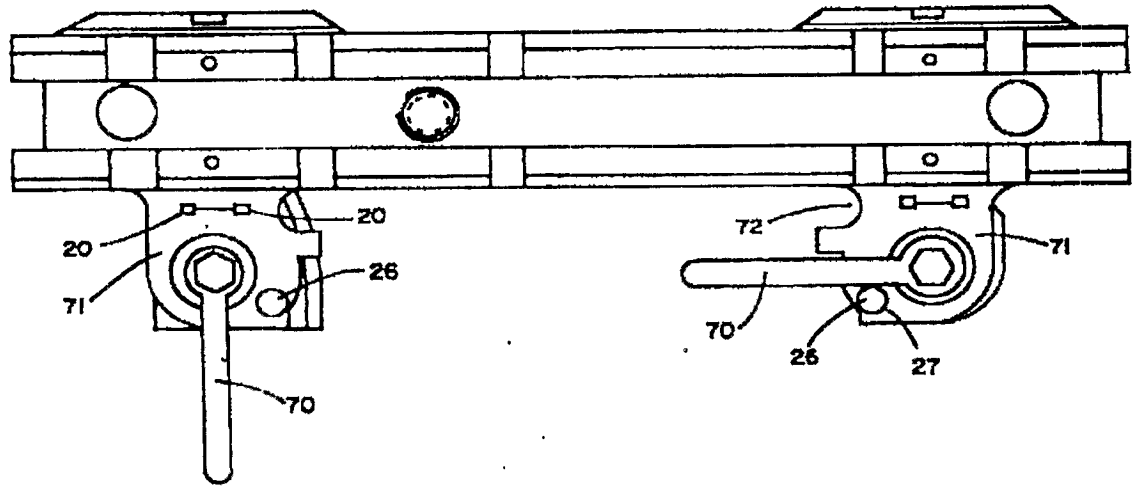
Primary Examiner—David H. Brown

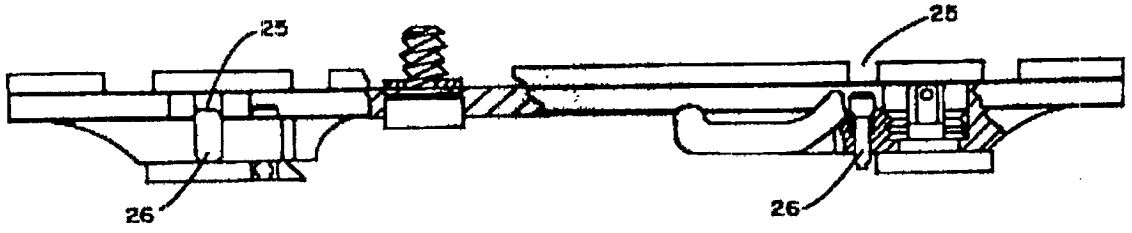
Attorney, Agent, or Firm—John P. McGonagle

[57] **ABSTRACT**

A buffered means for attaching a first device to a second device. The attachment means includes a camming surface. The invention provides a buffer element between the attachment device camming surface and the area to which the attachment device is affixed.

11 Claims, 6 Drawing Sheets





EXHIBIT

5

US006026580A

United States Patent [19]

LaRue

[11] Patent Number: 6,026,580

[45] Date of Patent: Feb. 22, 2000

[54] AIMING SIGHT MOUNT

[76] Inventor: Mark C. LaRue, 14800 Brown Bluff Cir., Leander, Tex. 78641

[21] Appl. No.: 09/012,834

[22] Filed: Jan. 23, 1998

Related U.S. Application Data

[60] Provisional application No. 60/034,078, Jan. 24, 1997.

[51] Int. Cl.[7] F41G 1/38

[52] U.S. Cl. 33/250; 42/101

[58] Field of Search 42/101; 33/250

[56] References Cited

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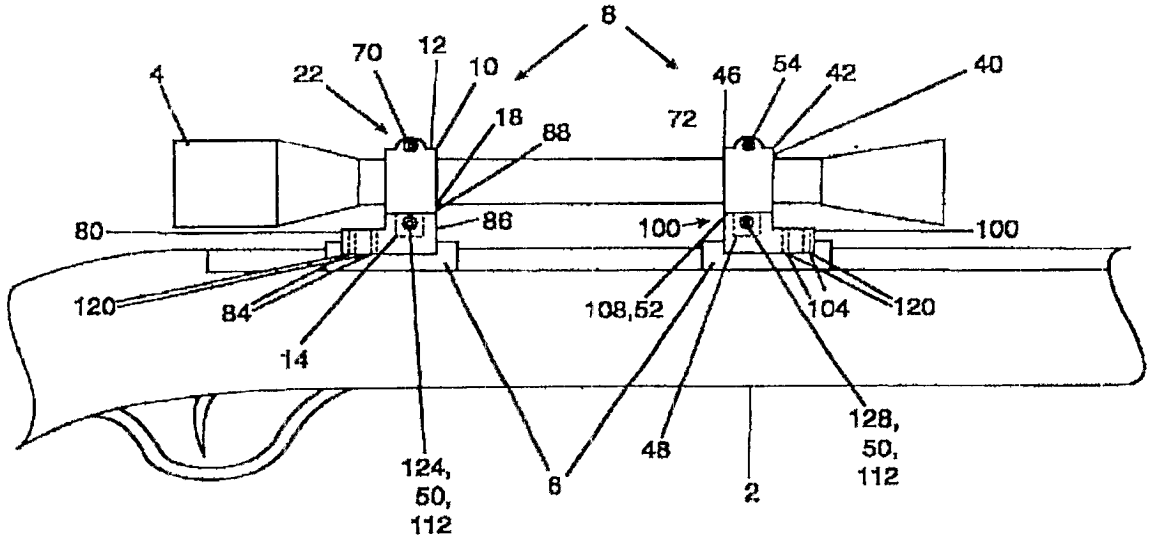
5,353,539	10/1994	Zeh	42/101

Primary Examiner—Charles T. Jordan
Assistant Examiner—Denise J Buckley
Attorney, Agent, or Firm—James J. Leary; Patrick T. Reilly; Carol D. Titus

[57] ABSTRACT

A gun sight mount is provided that enables the accurate and secure positioning of an optical sighting device onto a weapon or other equipment. The mount includes a base and a front and rear ring assemblies. The base is attached at at least two points to the weapon or equipment. The separate front and rear ring assemblies capture the weapon or equipment. The ring assemblies are secured to the base, whereby a secure mounting is acheived.

7 Claims, 9 Drawing Sheets



EXHIBIT

6

United States Patent [19]

Bechtel

[11] **Patent Number: 4,531,321**

[45] **Date of Patent: Jul. 30, 1985**

[54] **SCOPE-MOUNTING DEVICES FOR FIREARMS**

[76] Inventor: **Daniel L. Bechtel, P.O. Box 11281, Ft. Worth, Tex. 76109**

[21] Appl. No.: **457,492**

[22] Filed: **Jan. 12, 1983**

[51] **Int. Cl.**[3] **F41G 1/38**

[52] **U.S. Cl.** ..... **42/1 ST; 33/248**

[58] **Field of Search** ..... 42/1 ST; 33/245, 247, 33/248, 250

[56] **References Cited**

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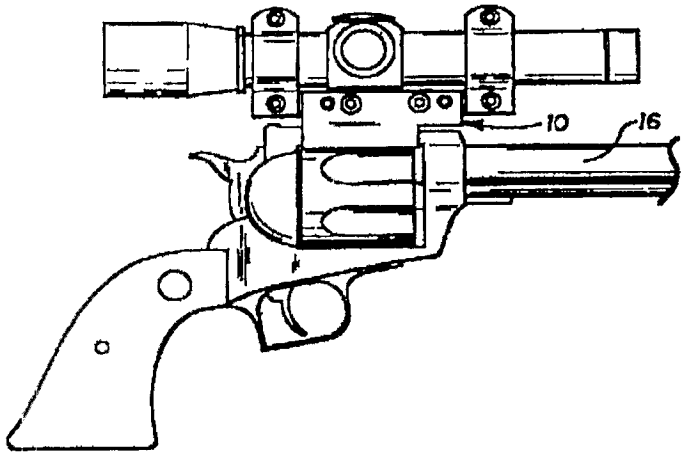
4,317,304	3/1982	Bass	42/1 ST
4,383,371	5/1983	Coffey	42/1 ST

Primary Examiner—Charles T. Jordan
Attorney, Agent, or Firm—Charles W. McHugh

[57] **ABSTRACT**

An apparatus adapted for mounting an auxiliary sighting device (such as a scope or night-vision device) on a firearm includes an anchor member which has a surface that is configured so as to abut a portion of the firearm's exterior surface in load-bearing contact. The anchor member has a longitudinal portion through which a pair of spaced bores extend in a transverse direction. A beam having a length greater than the length of the anchor member has a pair of transverse bores whose centers coincide at least approximately with the centers of the two bores on the anchor member. The diameter of a first one of the beam bores is essentially the same as the diameter of one of the anchor member bores, but the diameter of the second beam bore is significantly different in comparison with the diameter of its associated anchor member bore. A bearing member is sized for a snug fit within those two bores of the anchor member and the beam that are essentially the same size; and the bearing member is adapted to function as a pivot for the beam in order to foster alignment of the beam with respect to the barrel. Set screws or the like are utilized to securely hold the beam in a selected alignment position. Mounting rings or the like are adapted for connecting an auxiliary sighting device to the beam, so that the line of sight of the sighting device may be adjusted with respect to the axis of the firearm barrel by pivoting the beam.

3 Claims, 11 Drawing Figures



EXHIBIT

7

Int. Cl.: 13

Prior U.S. Cls.: 2 and 9

United States Patent and Trademark Office

Reg. No. 2,885,336
Registered Sep. 14, 2004

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SWAN, RICHARD E. (UNITED STATES INDIVIDUAL)
171 WEST STREET
E. BRIDGEWATER, MA 02379

FOR: FIREARM ACCESSORIES, NAMELY, MOUNTS FOR USE IN ATTACHING OPTICAL LENS SIGHTS, NIGHT VISION DEVICES IN THE NATURE OF INFRARED DETECTORS, INVISIBLE LIGHT PROJECTORS AND SCOPES, AND LASER BEAM LONG RANGE POINTERS USED TO POINT THE POSITION OF OBJECTS FOR USE WITH NIGHT VISION DEVICES, TO WEAPON, IN CLASS 13 (U.S. CLS. 2 AND 9).

FIRST USE 1-0-1987; IN COMMERCE 1-0-1987.

SER. NO. 76-555,012, FILED P.R. 1-4-2003; AM. S.R. 5-24-2004.

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EXHIBIT

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(54) ADJUSTABLE THROW-LEVER PICATINNY RAIL CLAMP

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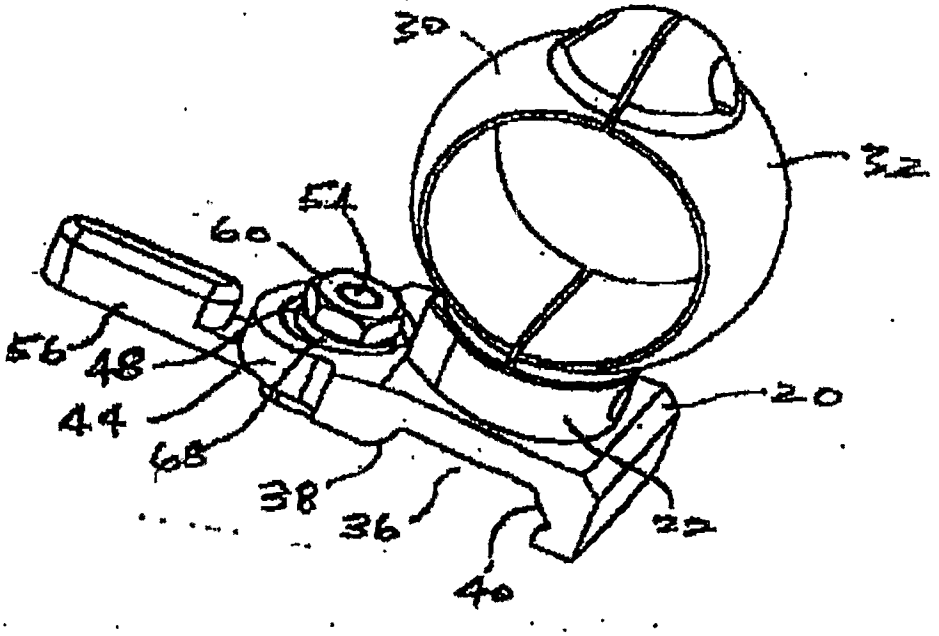
F41G 1/38 (2006.01)
(52) U.S. Cl. 42/127

(57) ABSTRACT

A throw-lever releasable mounting system for mounting a device in quick-release relation to a support member has a mounting base having a configuration fitting opposed angulated rail surfaces and having a locator key engaging a positioning slot of the rail. Each mounting base provides for mounting and stabilization of optics mounting rings. A locking platform projects from the mounting base and defines a locking opening having a circular hard metal insert therein that defines a receptacle receiving a resilient member and providing for location of the splined/spindle shaft of a rotatable locking plate. A locking plate of a throw-lever that is rotatable between locking and unlocking positions has angulated and convex cam surfaces for forcibly engaging correspondingly angulated surfaces of the rail to achieve axes energized precision locating and locking engagement with the rail. A non-circular section of a spline/spindle shaft of the throw-lever is receives a drive member in non-rotatable and linearly-moveable relation. Resilient members are interposed between the drive member and the hardened insert and prevent free throw-lever movement at the release position thereof.



ADJUSTABLE THROW-LEVER PICATINNY RAIL

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention relates generally to quick-release mounting devices for releasably mounting various devices on a support structure. The present invention also relates to firearms and more particularly to releasable sighting or aiming devices for rifles. More particularly, the present invention concerns mounting devices having adjustable locking mechanisms and mounting rings for releasably securing aiming devices, such as the sighting telescopes of rifles and similar firearms and for maintaining optimum sighting accuracy even when the firearm is subjected to repeated heavy recoil when firing high velocity, large bore ammunition. Even more particularly, the present invention concerns locking type mounting rings that enable rifle sighting devices to be simply and efficiently removable and replaceable under field conditions while maintaining a preset zero when replaced.

[0003] 2. Description of the Prior Art

[0004] 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. The throw-lever of Swan is not adjustable, though the patent teaches various embodiments of its adjustability. A subsequently developed throw-lever actuated releasable optical sight mount system is disclosed in U.S. Pat. No. 5,276,988 of Swan, which compensates for the inability of the throw lever to accomplish repeatability of precision positioning over extended periods of repeated firing of rifled rifles. This later patent of Swan discloses a throw-lever actuating mechanism of similar nature as set forth in U.S. Pat. No. 4,845,871, with the exception that the optical sight mount incorporates a buffer element in the form of a shim between the attachment device contacting surface and the area to which the attachment device is affixed. U.S. Pat. No. 6,026,580 of Mark C. LaRue, the inventor of the present invention, discloses a self-centering and self-aligning optical sight mounting system, including front and rear mounting ring assemblies and mounting bases for mounting an optical sighting device on a firearm such as a rifle or on other devices.

SUMMARY OF THE INVENTION

[0005] It is a primary feature of the present invention to provide novel mounting rings for retaining sighting devices, such as telescopes, low light optical devices, mechanical sighting devices on firearms such as rifles and to permit removal and replacement of the sighting devices, even under field conditions, without losing the preset zero of the sighting device;

[0006] It is another feature of the present invention to provide a novel optical sight mounting system which permits one or several daylight, sight or close combat optical sighting devices to be selectively interchanged on a firearm in a manner that maintains the preset sighting zero of each of the optical sighting devices with respect to the firearm that is involved; and

[0007] It is also a feature of the present invention to provide a novel optical sight mounting system that employs self-centering and self-aligning optical sight mounting rings that eliminates the need for lapping for achieving a close fit with the tube of an optical sighting device and prevents damage to an optical sighting device by tube distortion from clamping force.

[0008] Though the present invention is discussed herein particularly with its application to adjustable quick-release mounting devices for firearm optical sighting devices, it should be borne in mind that it is not intended to limit the spirit and scope of the present invention solely to use in conjunction with firearms. The present invention clearly has a wide range of application in circumstances where a device is intended to be releasably mounted in stable fashion to a supporting structure. For example, the present invention has application to camera and spotting scope mounts that are used in connection with various sporting events and commercial activities. Many other uses of the present invention will become obvious to one skilled in the art upon acquiring a thorough understanding of the present invention.

[0009] Briefly, the various objects and features of the present invention are realized by a sighting device mounting system that is designed particularly for mounting to Picatinny rails, Weaver rails or other similar mounting rail systems. Front and rear, substantially identical throw-lever actuated mounting ring assemblies are provided, each having a base structure having a portion thereof configured for fitting opposed angulated rail surfaces and having a locator element that is received within one of the multiple positioning slots of the rail. The base structures each receive a self-centering and self-aligning tube /mounting ring for retaining the tube of an optical sighting device or engaging a circular portion of any supported device.

[0010] The base structures are each provided with integral laterally projecting lock supports, each defining a receptacle receiving the spline/spindle shaft of a rotatable locking plate. The rotatable locking plate has angulated cam surfaces merging with a central curved cam surface for forcibly engaging correspondingly angulated rail surfaces to achieve cam assisted locking engagement with the angulated rail surfaces. Throw-lever project from each of the rotatable locking plates to provide for manual rotation of the rotatable locking plates during locking and unlocking. At least a portion of the spline/spindle shaft is of non-circular, typically hexagonal cross-sectional configuration and receives a generally circular drive washer member having a central opening of corresponding non-circular configuration so as to have non-rotatable and linearly moveable relation with the spline/spindle shaft. To provide a light weight optical sight mount for firearms, the mounting bases and the support rings of the sight mounting system are preferably composed of a light-weight material such as aluminum alloy, hard polymer material or the like. The mounting base is drilled or otherwise formed to eliminate material and reduce the weight thereof. Since the light weight material are often quite soft and easily yielded by application of forces, hardened metal inserts composed of stainless steel, steel or other suitable hard materials are press-fitted or otherwise seated in appropriate openings or receptacles of the mount structure. These inserts are typically threaded so as to have threaded engagement with retainer elements such as Torx or Allen screws.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] So that the manner in which the above recited features, advantages and objects of the present invention are

attained and can be understood in detail, a more particular description of the invention, briefly summarized above, may be had by reference to the preferred embodiment thereof which is illustrated in the appended drawings, which drawings are incorporated as a part hereof.

[0012] It is to be noted however, that the appended drawings illustrate only a typical embodiment of this invention and are therefore not to be considered limiting of its scope, for the invention may admit to other equally effective embodiments.

In the Drawings:

[0013] FIG. 1 is a pictorial representation showing a sight mounting rail on a firearm and showing releasable, adjustable optical sight mounting rings embodying the principles of the present invention and being in locked assembly with the sight mounting rail and mounting an optical sighting device;

[0014] FIG. 2 is a pictorial representation of one of the optical sight mounting ring assemblies of FIG. 1 showing one side of the releasable and adjustable mounting ring assembly of the present invention;

[0015] FIG. 3 is a pictorial representation showing the opposite side of the releasable and adjustable mounting ring assembly shown in FIG. 2 and showing the lever actuated locking mechanism in the locked position thereof;

[0016] FIG. 4 is a plan view of the releasable and adjustable mounting ring assembly of FIGS. 1-3 and showing the locking lever thereof in its release position and with a wave spring providing an urging force on the locking lever assembly;

[0017] FIG. 5 is an isometric illustration of the releasable and adjustable mounting ring assembly of the present invention, again with the locking lever being shown in the release position thereof;

[0018] FIG. 6 is a sectional view of the releasable and adjustable mounting ring assembly taken along line 6-6 in FIG. 4, with the locking lever being shown in the release position thereof;

[0019] FIG. 7 is a partial sectional view of the releasable and adjustable mounting ring assembly of the present invention and with the locking lever being shown in the release position thereof;

[0020] FIG. 8 is an isometric illustration of a drive nut component of the locking lever assembly and showing a downwardly facing annular spring recess for receiving a wave spring or one or more O-ring type locking lever resistance members;

[0021] FIG. 9 is a bottom view of the drive nut component of FIG. 8;

[0022] FIG. 10 is a side elevational view showing a wave spring that is received by the downwardly facing annular spring recess of the drive nut member of FIG. 8;

[0023] FIG. 11 is a sectional view of the drive nut member of FIGS. 8 and 9;

[0024] FIG. 12 is a partial sectional view of an alternative embodiment of the releasable and adjustable mounting ring assembly of the present invention, showing the use of resilient O-ring members which retard inadvertent throw-lever movement at the unlocked position of the adjustable mounting ring assembly.

[0025] FIG. 13 is a bottom view of the releasable and adjustable mounting ring assembly of the present invention showing the bottom of the locking lever and showing the offset position of a rail slot engaging sight locator key element with respect to the pivot point of the locking lever;

[0026] FIG. 14 is a partial isometric illustration of the locking lever, showing the non-circular configuration of the lever spline/spindle post and showing the threaded terminal end of the lever pivot shaft or post;

[0027] FIG. 15 is an isometric illustration showing the disassembled components of the adjustment assembly of the adjustment mechanism of the locking lever and showing the wave spring and the non-circular opening that is defined by a spring urged drive washer member of the locking lever adjustment mechanism;

[0028] FIG. 16 is an isometric illustration showing a preferred embodiment of the present invention comprising a releasable, adjustable optical sight mounting ring assembly having a locking lever assembly of the nature shown in FIG. 1;

[0029] FIG. 17 is another isometric illustration showing the releasable, adjustable optical sight mounting ring assembly of FIG. 16;

[0030] FIG. 18 is a front elevational view of the releasable, adjustable optical sight mounting ring assembly of FIGS. 16 and 17;

[0031] FIG. 19 is a bottom view of the releasable, adjustable optical sight mounting ring assembly of FIGS. 16-18;

[0032] FIG. 20 is an isometric illustration showing the releasable, adjustable optical sight mounting ring assembly with the sighting device mounting elements removed and showing the detailed structure of the mounting base;

[0033] FIG. 21 is a plan view of the mounting base structure of FIG. 20;

[0034] FIG. 22 is a elevational view showing the opposite side of the releasable, adjustable optical sight mounting ring assembly as compared with the views of FIGS. 16 and 17;

[0035] FIG. 23 is a partial transverse sectional view taken along line 23-23 of FIG. 22; and

[0036] FIG. 24 is a partial transverse sectional view taken along line 24-24 of FIG. 22.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

[0037] Though the present invention is discussed herein particularly as it relates to releasable mounts for firearms, particularly tactical rifles used by military and law enforcement personnel, it is to be understood that this invention has application for support of devices other than optical sighting devices or other objects. Referring now to the drawings and first to FIG. 1, an optical sighting device 10, such as a sighting telescope, is supported by front and rear mounting ring assemblies, shown generally at 12 and 14, that mount the sighting device on a mounting rail 16, such as a Picatinny rail or a Weaver rail or the like which is affixed to a firearm

18 or other object. The rail 16 defines a number of evenly spaced upwardly extending mounting projections 15 with evenly spaced transverse slots 17 therebetween to provide for selective location of an optical device on the firearm. As is evident in FIG. 7, each of the spaced upwardly extending mounting projections defines undercut parallel, oppositely angulated clamping surfaces 19 and 21 and oppositely angulated, typically upwardly facing support surfaces 23 and 25 that are disposed in angulated relation with one another. Each of the clamping surfaces 19 and 21 and the support surfaces 23 and 25 are initially formed by elongated surfaces, typically extending the length of the rail structure 16 and are interrupted by transverse slots 17 that are machined or otherwise formed in evenly spaced relation along the length of the rail.

[0038] Each of the mounting ring assemblies 12 and 14 incorporates a mounting base 20 having an integral, upwardly projecting member or boss 22 that is internally machined to define a receptacle 24 within which is received the depending mounting tongue elements 26 and 28 of mounting ring sections 30 and 32. The mounting ring sections 30 and 32 are secured together by fastener members, such as Torx screws, Allen screws or the like, to establish clamping retention of the mounting ring sections 30 and 32 to a tubular housing member of a sighting device such as an optical sighting device or telescope or a laser sighting device. Where fastener members such as retainer screws and set screws are employed to secure soft metal members, such as aluminum members, to assembly, hard metal inserts, typically composed of steel, such as stainless steel, are press-fitted into drilled or bored openings in the soft metal members as shown in FIGS. 6 and 7 as well as FIGS. 23 and 24. These hard metal inserts are typically internally threaded and provide the soft metal members with exceptional resistance to wear or thread damage by hard metal retainer screws and the like. The hard metal inserts may be seated on internal support shoulders of the mounting ring sections to ensure against movement thereof by the forces that are developed when screws are tightened by screwdrivers or by Allen or Torx wrenches.

[0039] In the embodiment of FIGS. 1-15, as shown particularly in FIGS. 7 and 12, one or more shims 34 are located between the mounting tongue elements 26 and 28. The shims ensure proper spacing of the mounting ring sections 30 and 32 for optimum gripping relation with the tubular housing of the optical sighting device, without causing collapsing, excessive application of torque forces or causing rift or damage to the tubular housing of the sighting device and the internal sighting mechanism thereof. The fastener screws of each of the mount bases are sequentially tightened to ensure even and efficiently controlled gripping of the tubular housing of the sighting device, without subjecting the tubular housing to torque forces during tightening. This feature ensures against mount tightening forces deformation of tubular telescope sections and thus ensures protection of delicate internal telescope components from damage and accelerated wear.

[0040] The mounting base 20 is configured to define a rail receiving receptacle 36 with spaced, downwardly and oppositely angulated surfaces 38 and 40 which are adapted for contact with correspondingly angulated support surfaces 23 and 25 of the rail 16. The mounting base 20 also defines an upwardly angulated surface 42 that is positioned for retaining engagement with a correspondingly angulated clamping surface 21 of the rail 16.

[0041] A locking platform 44 is integral with and extends laterally from each of the mounting bases 20 and defines an opening 46 within which is seated an annular insert 48 that is composed of a suitable hard, wear and impact resistant metal material such as steel, stainless steel, titanium alloy or any suitable non-metal material having wear and impact resistance. The annular insert 48 defines a central opening 50 that receives an upwardly projecting circular shoulder 52 of a spline/spindle shaft or post 54 in rotatable relation therewith. The spline/spindle shaft 54 is integral with and projects upwardly from a manually rotated cam shaft of a locking lever structure 56, also referred to as a "throw-lever", as shown in FIGS. 6 and 7. The manually rotatable lever structure 56 of each ring assembly 12 and 14 is manipulated, i.e., rotated, for locking and unlocking of the front and rear mounting bases 20 from the rail 16 when it is desired to remove and replace the optical sighting device 10. Especially when the sighting device is being used on firearms under tactical circumstances, this feature permits the sighting device to be carried in protective fashion, such as in a pocket of a personnel pack, and when its use is needed, the user will simply and quickly clamp the sighting device to the rail device 16 of the firearm, with the sighting device being accurately positioned at its pre-set sighting position or zero. This feature permits a sighting device to be unlocked, removed and re-assembled and locked in place without losing its preset aim point or zero.

[0042] The outer or terminal extremity of the spline/spindle shaft 54 is threaded as shown at 58 for receiving an adjustment nut 60. The threaded section 58 and the internal threads of the adjustment nut 60 are set on a slightly different pitch to cause interference tightening of the nut on the threaded section 58 of the spline/spindle shaft 54 as the adjustment nut is rotated in the direction, typically clockwise, during assembly of the adjustment nut to the spline/spindle shaft 54. This feature minimizes the potential for loosening of the adjustment nut 60 after it has been selectively positioned on the spline/spindle shaft 54. However, if further tightening or loosening of the adjustment nut is needed, such as for increasing or decreasing the clamping force of the mounting base 20 on the rail 16 of a firearm, rotational movement of the adjustment nut 60 is easily accomplished through the use of a simple hex wrench. The interference tightening arrangement ensures that the adjustment nut 60 will remain in any pre-set position even when the mounting ring assembly of a sighting device is subjected to impacts, vibration or other rough treatment.

[0043] The spline/spindle shaft 54 is also provided with a shaft section 62 of non-circular cross-sectional configuration that may be hexagonal or may have any other non-circular cross-sectional configuration as desired. The shaft section 62 is also referred to herein as a "spline section", with the non-circular configuration or spline thereof extending longitudinally of the spline/spindle shaft 54 from the externally threaded section 58 to the circular shoulder 52. The spline/spindle shaft 54 and the inner cylindrical surface 64 of the annular insert 48 are of significantly different dimensions, thus defining an annular space 66 therebetween within which a drive washer member 68 and one or more resilient members are received. The resilient member or members

United States Patent [19]

Bechtel

[11] **Patent Number: 4,531,321**

[45] **Date of Patent: Jul. 30, 1985**

[54] **SCOPE-MOUNTING DEVICES FOR FIREARMS**

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[21] Appl. No.: **457,492**

[22] Filed: **Jan. 12, 1983**

[51] **Int. Cl.**[3] **F41G 1/38**

[52] **U.S. Cl.** ..... **42/1 ST; 33/248**

[58] **Field of Search** ..... 42/1 ST; 33/245, 247, 33/248, 250

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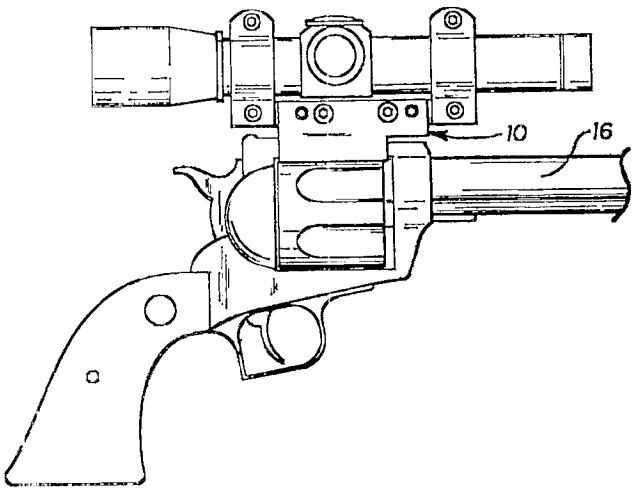
Primary Examiner—Charles T. Jordan
Attorney, Agent, or Firm—Charles W. McHugh

[57] **ABSTRACT**

An apparatus adapted for mounting an auxiliary sighting device (such as a scope or night-vision device) on a firearm includes an anchor member which has a surface that is configured so as to abut a portion of the firearm's exterior surface in load-bearing contact. The anchor member has a longitudinal portion through which a pair of spaced bores extend in a transverse direction. A beam having a length greater than the length of the anchor member has a pair of transverse bores whose centers coincide at least approximately with the centers of the two bores on the anchor member. The diameter of a first one of the beam bores is essentially the same as the diameter of one of the anchor member bores, but the diameter of the second beam bore is significantly different in comparison with the diameter of its associated anchor member bore. A bearing member is sized for a snug fit within those two bores of the anchor member and the beam that are essentially the same size; and the bearing member is adapted to function as a pivot for the beam in order to foster alignment of the beam with respect to the barrel. Set screws or the like are utilized to securely hold the beam in a selected alignment position. Mounting rings or the like are adapted for connecting an auxiliary sighting device to the beam, so that the line of sight of the sighting device may be adjusted with respect to the axis of the firearm barrel by pivoting the beam.

3 Claims, 11 Drawing Figures



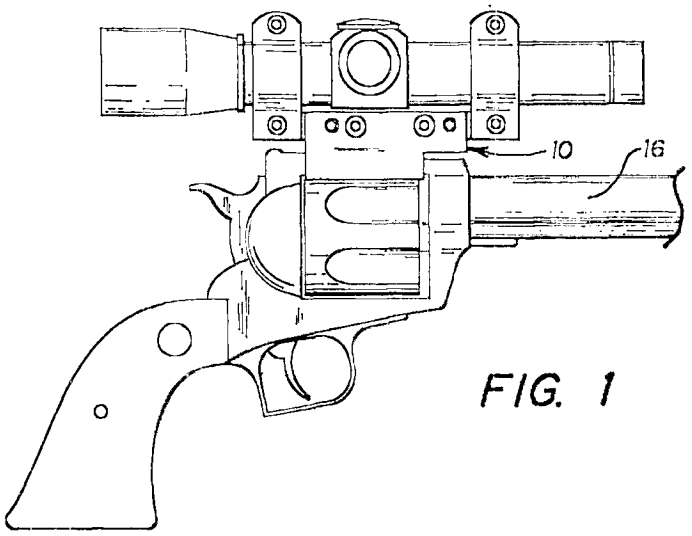


FIG. 1

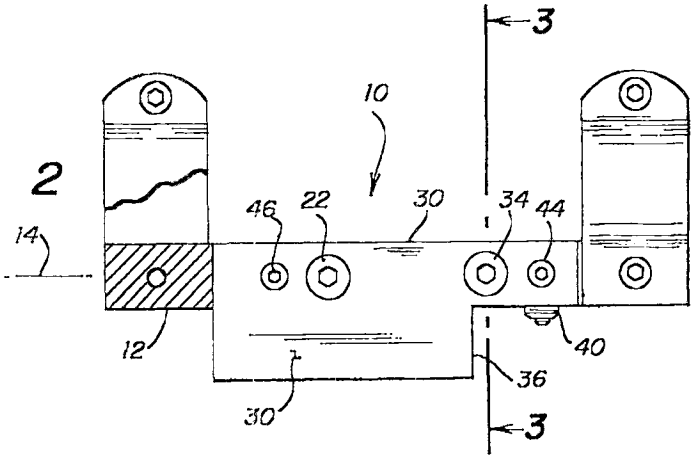


FIG. 2

FIG. 3

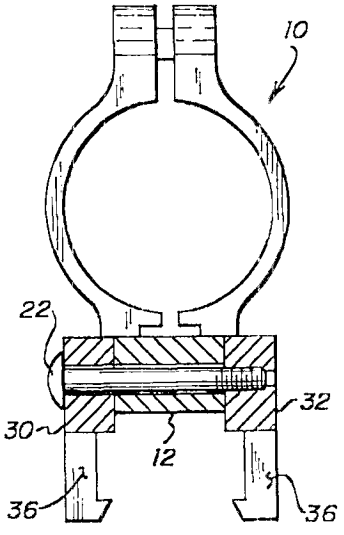
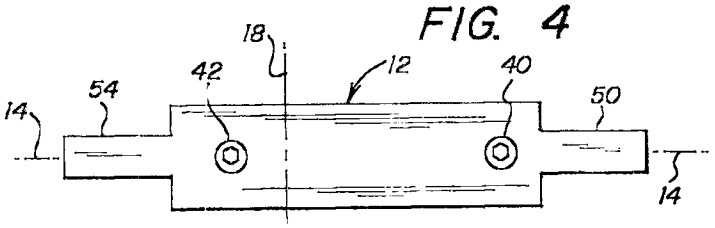


FIG. 4



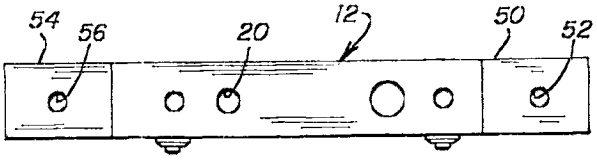


FIG. 5

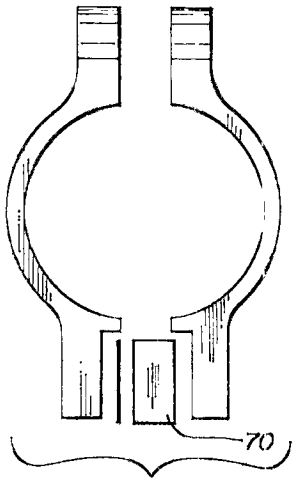


FIG. 11

FIG. 9

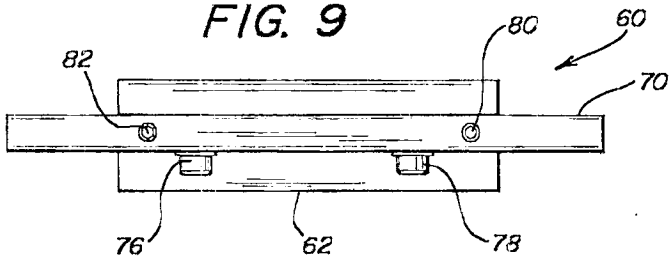


FIG. 7

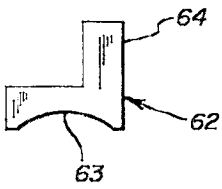
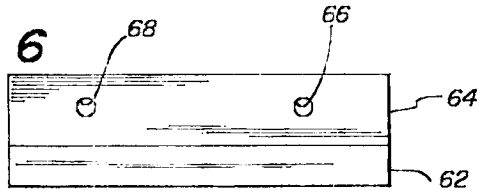


FIG. 6



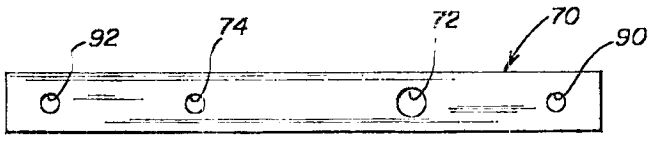


FIG. 8

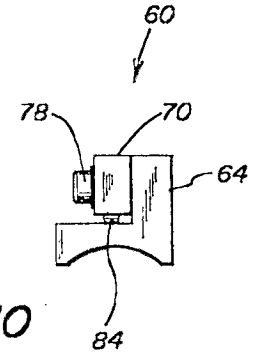


FIG. 10

SCOPE-MOUNTING DEVICES FOR FIREARMS

BACKGROUND AND OBJECTS OF THE INVENTION

This invention relates generally to scope mounts which are adapted to mount a scope onto a firearm; more specifically, it relates to a construction which is capable of being utilized on a wide variety of pistols, rifles and shotguns, and which does not require the special skills and tools normally possessed by a gunsmith.

It is well known to improve the accuracy that can be obtained in shooting a pistol or rifle by affixing a scope in such a way that the longitudinal axis of the scope is at least approximately parallel to the longitudinal axis of the firearm's barrel. Many rifles, for example, have scope mounting holes that are bored into the receiver of the rifle at the factory; such holes are then threaded in order to receive the screws/bolts that constitute the mounting device for the scope mount. However, not all guns have such pre-drilled and tapped holes. And, there are also occasions when the owner of a particular gun would prefer to avoid use of factory-drilled holes, especially if the use of those holes would necessarily dictate that something else (such as open sights that are provided as standard equipment on the rifle) has to be removed. Hence, there has long remained a need for a reliable way of mounting a scope on a rifle or other firearm—perhaps long after the rifle has left the factory, and maybe even after it has been used for hunting, target shooting and the like.

If a person is a skilled gunsmith, the addition of a scope mount to a rifle or pistol may offer only a minimal challenge, provided that everything goes right, and provided further that the heat treat of the steel in the firearm has not made it too hard to drill, and the tap that is being used to create threads in a bored hole does not break, etc. But without proper equipment and without the skill that comes from careful instruction and training, it is possible for a novice to completely ruin a firearm as a result of an imprudent move or the application of a careless force. For this reason, among others, it is desirable to build scope mounts that do not require the meticulous drilling and tapping of holes that are typical of the prior art. Such mounts are often advertised as "no gunsmithing" mounts, regardless of whether they are utilized by a gunsmith or an untrained person. It is a normal characteristic of such scope mounts that they are easy and fast to instal—by both trained and untrained personnel. If for no other reason than speed and economy, such no-gunsmithing mounts can be highly desirable.

One factor that has perhaps limited the widespread use of no-gunsmithing mounts is the manufacturing tolerances that are characteristic of firearms, e.g., plus or minus 0.010 inch for many dimensions. If a manufacturer of scope mounts attempted to accommodate such tolerances with designs of the prior art, there is a great chance that there would be too many cases of loose fits on some guns and interference fits on others. So, even though it has been known for quite some time that no-gunsmithing mounts would offer substantial economies, they have still not been designed and produced in the quantities that would appear to be expected. Accordingly, it is an object of this invention to provide a construction which is particularly adapted for mounting auxiliary sighting devices (including scopes and night-vision devices) on firearms without the need for specialized tools and skills of a gunsmith.

Another object is to provide a scope mount construction which has a great latitude of movement between relatively moing parts, in order that a great range of adjustments might be made within the mount itself.

Still another object is to foster repeatability in the alignment that is achieved between a sighting device (hereinafter often referred to for convenience as simply a scope) and a firearm—when the scope is repeatedly installed on and removed from the firearm.

These and other objects will be apparent from a reading of the specification and the claims appended thereto, as well as reference to the attached drawings in which

FIG. **1** is a side elevational view of a pistol on which a scope has been mounted using an apparatus in accordance with the invention;

FIG. **2** is a partially sectioned, side elevational view—similar to FIG. **1**, showing the apparatus on a different scale (for better visibility of certain parts);

FIG. **3** is a cross-sectional view taken in the plane represented by line 3—3 of FIG. **2**;

FIG. **4** is a top plan view of the rocking base upon which scope-mounting rings or the like are typically attached;

FIG. **5** is a side elevational view of the rocking base;

FIG. **6** is a side elevational view of an anchor member which is adapted to bear against an exterior surface of a firearm, typically the top thereof;

FIG. **7** is a front end view of the anchor member shown in FIG. **6**;

FIG. **8** is a side elevational view of a beam which is configured to match the anchor member shown in FIGS. **6** and **7**;

FIG. **9** is a top plan view showing the assembly of the elements shown in FIGS. **6**, **7** and **8**;

FIG. **10** is a front end view of the embodiment shown in FIG. **9**; and

FIG. **11** is an exploded view of the combination of a scope-mounting ring, a "rocking" beam, and optional shims which are useful in effecting a spatial adjustment of a scope with respect to a fiream barrel.

BRIEF DESCRIPTION OF THE INVENTION

In brief, the invention includes a base which is adapted to be mounted on a firearm so that the longitudinal axis of the base is generally parallel to the longitudinal axis of the barrel. The base also has a pivotable axis which is perpendicular to its longitudinal axis. A structural means is provided for rigidly connecting the base to the frame of the firearm when the base has a desired inclination with respect to the barrel. A bearing has a longitudinal axis coincident with the pivotable axis of the base, in order to foster adjustment of the base in a longitudinal plane that encompasses the barrel of a firearm. At least one adjustment screw is also provided—preferably at a location somewhat removed from the bearing, in order to foster adjustment of the inclination of the base with respect to the barrel. Preferably, there are two adjustment screws, one of which is in front of the pivotable axis and the other being behind the pivotable axis. Additionally, there is provided some structure for rigidly connecting the base to the frame of the firearm when the base has a desired inclination with respect to the barrel. In one embodiment, such a structural arrangement comprises two side plates which are brought together in a clamping fashion by one or more

threaded members. Finally, scope rings or the like are provided for connecting a scope to the base.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE INVENTION

Referring initially to FIGS. 1 and 2, an apparatus 10 is shown that is adapted for mounting a scope on a pistol. The apparatus includes a base 12 having a longitudinal axis 14 that is adapted to be oriented parallel to the longitudinal axis of the pistol's barrel 16. The base also has a pivotable axis 18 that is perpendicular to its longitudinal axis. Therefore, when the base is properly mounted on the firearm, the pivotable axis 18 will be generally perpendicular to the longitudinal axis of the barrel 16. A bore 20 in the base 12 is concentric with the pivotable axis 18, and the bore has a diameter which is appropriately sized to snugly receive a bearing 22, so that the base may be pivoted in order to foster adjustment of the inclination of the base with respect to the barrel. While the bearing 22 (and its associated bore 20) permits adjustment of the relative inclination of the base, there must still be provided something to physically ensure that such an adjustment—once it has been accomplished—will be maintained. In this regard, it must be recalled that the recoil of a pistol is often substantial; and any attempt to mount a scope on a pistol must take into account the significant forces that will arise every time that the pistol is discharged.

Accordingly, there must be some structural means for rigidly connecting the base 12 to the frame of the pistol after the base has been oriented so that it has a desired inclination with respect to the barrel 16. A preferred structural means for providing the rigid connection between the base 12 and the frame comprises a pair of side plates 30, 32 which are placed on opposite sides of some portion of the firearm frame and held tightly together by at least one bolt 34 which passes through the pair of plates in order that they may be pulled together. When tension is established in bolts 34, that portion of the firearm frame which is captured between the two plates 30, 32 must, of course, be sufficiently rigid as to provide a reliable "anchor" for the side plates. The strap that extends over the cylinder of a revolver is such a rigid "anchor" for the side plates 30, 32 and the base 12. A further property of the selected anchor portion of the firearm is that its width must be at least slightly greater than the width of the base 12, in order that the two side plates will not bear against the base prior to the time that a tight gripping force has been achieved between the side plates and the firearm frame. That is, there should ideally be at least a small amount of side clearance between the base 12 and the side plates 30, 32 at the time that the distal portions of the side plates have engaged and begun to apply a compressive load on that portion of the firearm frame which has been selected as the "anchor" portion.

Another characteristic of the pair of side plates 30, 32 is that they must have sufficient stiffness and/or rigidly as to be capable of applying a significant compressive force between their two cantilevered (lower) edges, so that there will be no discernible flexing when the one or more connecting bolts are tightened in the upper part of the side plates. A suitable material for this purpose is extruded and/or machined aluminum which has been hardened to T6 and has a minimum thickness of about 3/16 inch. Another suitable material is a steel investment casting—as cast or heat treated. In the embodiment shown in FIG. 2, the side plates 30, 32 have a thickness in the upper portion of about 0.10 inch, which offers a substantial quantity of material for providing a threaded bore into which a bolt (e.g., bolt 34) can be threaded. Providing a threaded bore is preferable to simply drilling a smooth hole and relying on an external nut to engage the connecting bolt—in order to rigidly mount the apparatus 10 to the frame of the firearm. However, it should be appreciated that any technique for pulling the two side plates together so that they tightly capture a portion of the frame therebetween should be considered to be a feasible way of accomplishing the desired rigid connection.

In order to economize on the number of parts that are employed with this construction, it is particularly advantageous to accomplish two tasks with the aforementioned bearing 22 about which the base pivots in a vertical plane. This is achieved by providing external threads on the bearing 22, so that it functions both as a pivot point for the base 12 and as a clamping screw to grip the pistol frame tightly between the two side plates 30, 32. Furthermore, in order to promote economy and standardization in the manufacture of the apparatus 10, it is preferred that the bearing 22 and the bolt 34 be identical in both diameter and length; a typical size for these elements is a $10\text{-}32\times\frac{7}{8}$ cap screw. Of course, in order to achieve the relative movement that is necessary in order to allign the scope in a desired manner, the diameter of bore 20 that receives bearing 22 must be substantially less than the diameter of the rear hole through which bolt 34 passes. Expressed another way, there is substantial clearance around bolt 34, so that the base 12 may have an appreciable degree of freedom to pivot about bearing 22. In general, moving the front of base 12 up or down by perhaps 0.020 inch with respect to a center position will be all of the adjustment that would reasonably be required in order to align a scope in a desired manner with the barrel of the firearm. So, a hole diameter 0.040 inch greater than the diameter of bolt 34 should be adequate for most needs.

While a certain amount of inclination adjustment of the base is possible by exercising personal judgment as to when to achieve maximum gripping power with bolts 22, 34, such an adjustment could be criticized as being relatively crude. Accordingly, a preferred embodiment of the invention includes a more positive means for adjusting the inclination of the base 12 with respect to the barrel 16. This positive means includes at least one vertical adjustment member which extends downwardly through the base 12 where it is permitted to make contact with and bear against some portion of the firearm. In the preferred embodiment, this positive adjustment means includes a first adjustment member 40 in front of the pivotal axis 18 and a second adjustment member 42 behind the pivotal axis 18. The preferred form for each of these adjustment members 40, 42 is a tapped hole extending all the way through the base 12—which is engaged by a set screw; and, if desired, the set screw may have a brass tip in order to avoid the risk of creating an unsightly blemish on the surface of the firearm. By alternately raising one of the two set screws 40, 42 and lowering the other, the inclination of the base 12 can be firmly and tightly regulated. And, after the desired inclination has been achieved, another way in which it can be maintained is to provide transverse openings through one side of the base. These transverse openings are threaded in order to accommodate relatively small locking screws 44, 46 which bear against

the set screws 40, 42 and help prevent them from becoming loosened as a result of recoil forces that may be exerted thereon.

In the optimum form of the invention, the base 12 has a length of about 4 inches, which readily permits the two set screws 40, 42 to be separated by at least 1 inch and preferably 1½ inches. (This facilitates the inclination of the base with respect to the longitudinal axis of the firearm through an angle that is sufficient to move the line of sight at least 20 inches at 100 yards.) At respective ends of the base are front and rear elements 50, 54 which are configured to receive rings for connecting a scope or other auxiliary sighting device to the base. The preferred technique for this connection constitutes a transverse aperture 52 that is bored horizontally through element 50, and a similar aperture 56 bored through element 54. These apertures 52, 56 are sized to receive bolts that securely clamp scope rings to the base at two widely separated points.

Another feature of the side plates shown in FIG. 1 is the provision of a generally vertical and forwardly facing bearing surface 36 on each of the side plates 30, 32, which surface is provided to bear against the front of the opening for the revolver's cylinder. By providing this solid surface 36 which makes intimate contact with a rigid portion of the revolver, a substantial part of the recoil that typically occurs when the pistol is discharged is passed to the mount directly through metal-to-metal contact. That is, recoil loads having a longitudinal component do not have to be passed to the side plates through any bolt, screw or other fastener; and, those longitudinal recoil loads which are subsequently passed from the side plates to the base are passed through two fasteners—which helps distribute said loads in such a way as to minimize any tendency to loosen the fastners.

Another embodiment of the invention is appropriate for certain firearms (pistols, rifles and shotguns) which do not have a configuration that is susceptible to a pinching or clamping action in order to provide a foundation upon which a pivotable base can be secured. Referring to FIGS. 6–10, the apparatus 60 includes an anchor member 62 which has one exterior surface 63 that is configured to bear against an exposed surface of the firearm in order to provide adequate load-bearing contact between the anchor member and the firearm. The anchor member 62 also has an upper portion which will be referred to (for convenience) as an elongated member or rail 64. The rail 64 has a longitudinal axis which is intended to be placed so it is approximately parallel to the longitudinal axis of the firearm's barrel; and, for simplicity in manufacturing, the rail will normally be continuous. However, if the operation of the firearm should cause an empty shell to be ejected in a direction that would cause it to strike a mid-portion of the rail 64, it is possible to provide a gap within part of the rail so as not to interfere with normal shell ejection.

Provided within the rail 64 are two transversely oriented bores 66, 68, with the front bore 66 being spaced as far from the rear bore 68 as is feasible—but at least one inch. (If the spacing between the front and rear bores 66, 68 is significantly less than one inch, there will usually not be sufficient distance to create the desired elevation adjustment when an auxiliary sighting device is subsequently affixed to the base.) Whenever possible, it is preferred that the spacing between the two bores 66, 68 permit at least a 20" (and preferably 30") adjustment in the strike of a bullet at 100 yards.

A beam 70 having a length greater than the length of the rail 64 also has a pair of transverse bores 72, 74. The centers of the bores 72, 74 coincide at least approximately with the centers of the two rail bores 66, 68. The diameter of the rear bore hole 74 is essentially the same as the diameter of the rail bore hole 68, but the diameter of the forward beam bore 72 is significantly different in comparison with the diameter of the rail bore 66. The reason for this difference in bore diameters is to permit the beam to be selectively rocked or pivoted with respect to the rail, and hence pivoted with respect to the longitudinal axis of the firearm's barrel; the pivoting referred to here is in a plane that includes the longitudinal axis of said barrel. Pivoting is accomplished by providing a bearing member 76 which is sized for a snug fith within bores 68, 74. That is, when the foremost portion of the beam 70 is raised or lowered with respect to rail 64, then forward bores 66, 72 may be considered to experience relative sideward movement. By use of the term "snug fit", it is intended to refer to the closest fit that can be assembled by hand without appreciable pressure. There is essentially zero allowance, and the parts doe not shake or move freely under a load.

After the beam 70 has been pivoted about bearing member 76 so as to achieve a desired alignment of the beam, there is obviously a need for rigidly maintaining the desired relative position—even though the firearm may be subjected to substantial recoil loads when it is fired. At least one way for rigidly holding the beam in fixed position next to the rail comprises a high-strength screw 78 which extends transversely through bores 66, 72. Ideally, the bore 66 is threaded so as to receive male threads on screw 78; a typical screw for this purpose is a 10–32×⅜ socket head screw. A further means for rigidly holding the beam 70 in a desired alignment includes two "vertical" bores on the beam, which bores are positioned at opposite ends of the beam so that they lie on different sides of the pivot bore 74. When bearing member 76 has been threadably engaged with bore 68, the beam 70 is free to pivot about the axis of bearing member 76 (like a see-saw or "teeter-totter") until such time as set screws are threaded into the bores 80, 82 until they bear against a surface of anchor member 62. The frontal set screw in vertical bore 80 is particularly beneficial in minimizing the holding task that would otherwise rest on screw 78, because the rear of a scope normally tends to be forced upwardly when a firearm is fired; firing also tends to rotate the front of the rail downwardly when such rotation is physically possible. By taking at least some of the recoil loading with forward set screw 84 in "vertical" bore 80, the tension loading on "horizontal" screw 78 need not be so great.

As with the earlier described embodiment, there are provided smooth bores 90,92 at respective ends of the beam 70—in order to accommodate bolts that can readily secure scope-mount rings to the beam. By using vertically split scope-mount rings, the sighting device may be adjusted both vertically and horizontally with respect to the longitudinal axis of the firearm's barrel. The "horizontal" adjustment is accomplished by placing small shims, as required, on either the right or left sides of the vertically oriented end surfaces of the beam 70, as shown in FIG. 11. In other words, putting one or more shims on the side of the beam prior to installing a vertical scope-mount ring can physically shift one ring with respect to the other ring; of course, this shift takes place in a plane that is perpendicular to the longitudinal axis of the firearm's barrel.

After the beam 70 has been appropriately aligned with respect to the barrel, and after the respective fasteners have been tightened so as to rigidly hold the achieved alignment, the scope rings or other supporting hardware for a sighting device can be selectively removed and replaced without affecting the position of a beam and its supporting structure. That is, after the beam 70 has been correctly oriented for a specific rifle, a sighting device may be sequentially installed and removed without risking any significant change in the relative orientation between the scope and the firearm. And, if desired, a variety of different sighting devices may be alternately employed with a variety of rings that are sized so as to match the thickness and depth of a single rail.

In addition to the two principal embodiments illustrated herein, it should be apparent to those skilled in the art that other variations in size, shape and proportion would be capable of being incorporated into the system described herein. Accordingly, the invention should be understood to include all of the modifications and variations that are suggested herein and contemplated by the claims appended hereto.

I claim:

1. An apparatus adapted for mounting an auxiliary sighting device such as a scope on a firearm, and the firearm having a longitudinal barrel and a frame, comprising:

(a) a base having a pivotal axis, and the base being adapted to be mounted on the firearm so that the pivotal axis is generally perpendicular to the longitudinal axis of the barrel, and said base also having a longitudinal axis that is adapted to be oriented so that it is approximately parallel to the longitudinal axis of the barrel;

(b) bearing means for pivoting the base about its pivotal axis in order to foster adjustment in a vertical plane of the relative inclination of the base with respect to the barrel;

(c) means for adjusting the inclination of the base with respect to the barrel, and said means including a first vertical adjustment member in front of the pivotal axis and a second vertical adjustment member behind the pivotal axis;

(d) structural means for rigidly connecting the base to the frame of the firearm when the base has a desired inclination with respect to the barrel, and said structural means including a pair of plates which are placed on opposite sides of a portion of the firearm frame, and further including at least one bolt which passes through the pair of plates in such a way as to permit pulling the plates together in order to rigidly capture a portion of the firearm frame between the plates, and wherein said at least one bolt also passes through an opening in the base, and the size of said base opening being appreciably larger than the diameter of the bolt, whereby the presence of the bolt does not interfere with the action of rotating the base about its pivotal axis during the adjustment thereof; and

(e) means for connecting an auxiliary sighting device to the base.

2. An apparatus adapted for mounting an auxiliary sighting device such as a scope on a firearm, and the firearm having a longitudinal barrel and a frame, comprising:

(a) a base having a pivotal axis, and the base being adapted to be mounted on the firearm so that the pivotal axis is generally perpendicular to the longitudinal axis of the barrel, and said base also having a longitudinal axis that is adapted to be oriented so that it is approximately parallel to the longitudinal axis of the barrel;

(b) bearing means for pivoting the base about its pivotal axis in order to foster adjustment in a vertical plane of the relative inclination of the base with respect to the barrel;

(c) means for adjusting the inclination of the base with respect to the barrel, and said means including a first vertical adjustment member in front of the pivotal axis and a second vertical adjustment member behind the pivotal axis;

(d) structural means for rigidly connecting the base to the frame of the firearm when the base has a desired inclination with respect to the barrel; and

(e) means for connecting an auxiliary sighting device to the base, including two structural extensions that are integrally formed with said base and which respectively extend forwardly and rearwardly of said base, and each of said extensions having a transverse aperture for receiving a bolt which is adapted to secure a mounting ring to the extension, and each mounting ring being centrally split into two halves by a plane that passes longitudinally through the firearm's barrel, whereby the relative inclination of the auxiliary sighting device may be adjusted with respect to the base by placing appropriate shims alongside the base and interiorly of the split mounting rings.

3. An apparatus adapted for mounting an auxiliary sighting device on a firearm, and the firearm having a barrel with a longitudinal axis, comprising:

(a) an anchor member having a surface which is configured so as to abut a portion of the exterior surface of the firearm in load-bearing contact, and said anchor member having a longitudinal rail which extends in a direction approximately parallel to the firearm barrel, and said rail having a pair of spaced bores which extend transversely through the rail near opposite ends thereof;

(b) a beam having a length greater than the length of said rail and having a pair of transverse bores whose centers coincide at least approximately with the centers of the two bores on said rail, and the diameter of a first one of the beam bores being essentially the same as the diameter of one of the rail bores, and the diameter of the second beam bore being significantly different in comparison with the diameter of the second rail bore;

(c) a bearing member which is sized for a snug fit within those two bores of the rail and the beam that are essentially the same size, and the bearing member being adapted to function as a pivot for the beam in order to foster sideward movement of one of the non-equal bores with respect to its confronting bore, and wherein the two confronting bores of the rail and the beam which are essentially the same size are positioned to the rear of the two non-equal bores when the apparatus is mounted on the firearm, such that pivotable adjustment of the beam with respect to the rail is accomplished by pivoting the beam about a rearward pivot axis that extends through the two essentially equally sized bores, and wherein the two bores on the rail have essentially equal sizes, and the two bores on the beam have significantly non-equal sizes, and wherein the con-

fronting surfaces of the beam and the rail are both smooth and flat, such that any necessary shims may be selectively placed between the beam and the rail for physically shifting the sighting device in a plane that is perpendicular to the longitudinal axis of the firearm's barrel;

(d) means adapted for connecting an auxiliary sighting device to the beam, whereby the line of sight of an auxiliary sighting device may be adjusted with respect to the axis of the firearm barrel by pivoting the beam with respect to the rail; and

(e) means for rigidly securing the beam to the rail after a desired relative orientation has been established between the beam and the rail.

* * * * *

United States Patent [19]

Swan

[11] Patent Number: 4,845,871

[45] Date of Patent: Jul. 11, 1989

[54] ATTACHMENT DEVICE

[76] Inventor: Richard E. Swan, 171 West St., East Bridgewater, Mass. 02333

[21] Appl. No.: 183,082

[22] Filed: Apr. 19, 1988

[51] Int. Cl.[4] F41G 1/38

[52] U.S. Cl. 42/101; 33/250; 403/374

[58] Field of Search 42/101; 244/3.25; 33/250; 403/374, 409.1

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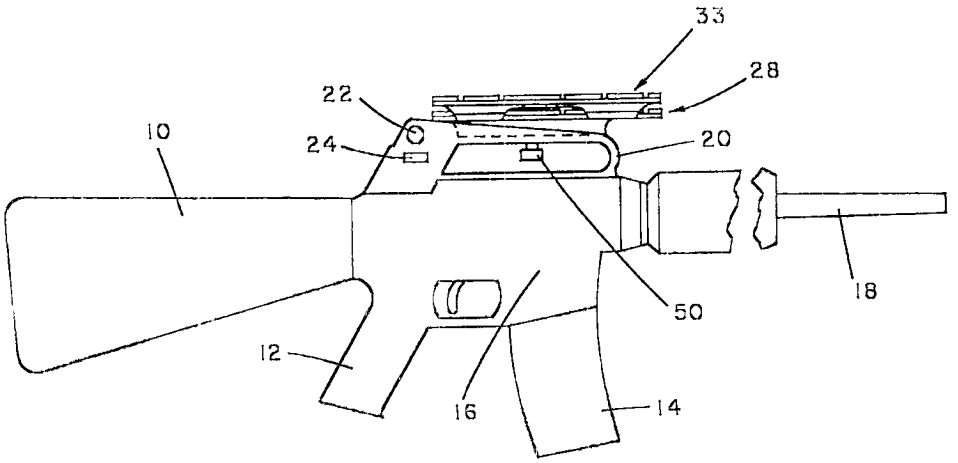
Primary Examiner—Deborah L. Kyle

Assistant Examiner—Michael J. Carone

[57] ABSTRACT

The invention disclosed herein comprises a means of attaching a first device to a second device. The attachment means includes a camming surface and is spring loaded. The attachment means is particularly useful in attaching a first weaver interface to a second weaver interface. The camming surfaces and spring loading permitting adjustments to permit proper attachment to varying interface surfaces.

7 Claims, 2 Drawing Sheets



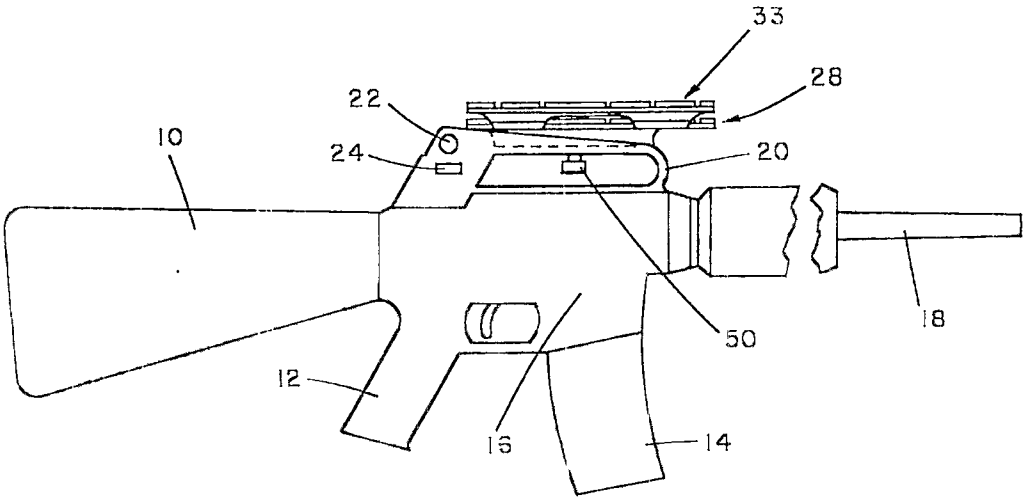


FIG. 1

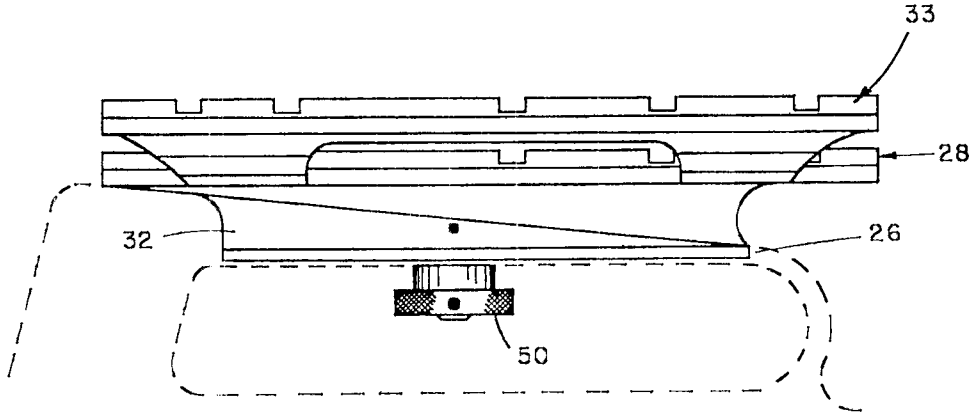


FIG. 2

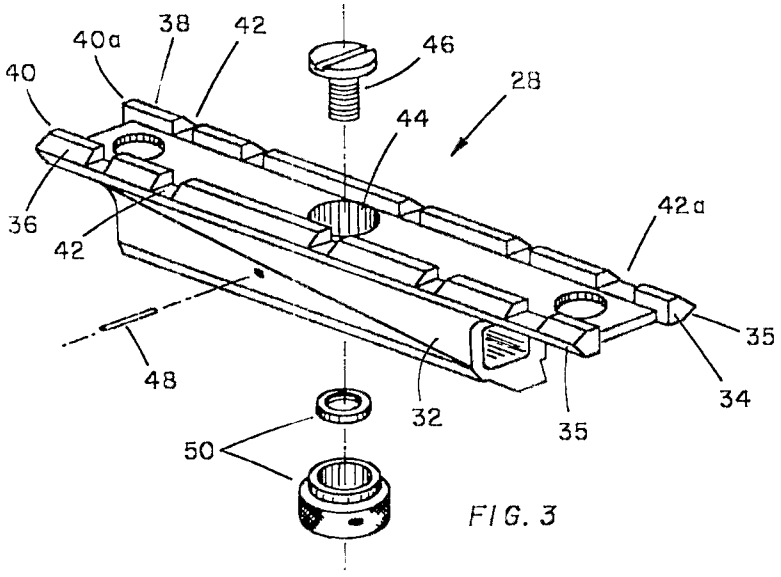


FIG. 3

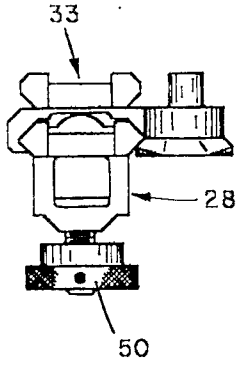


FIG. 4

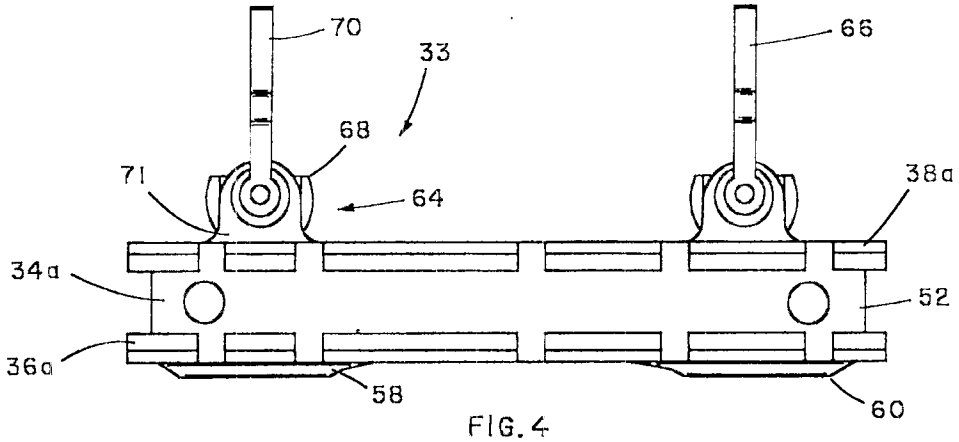


FIG. 4

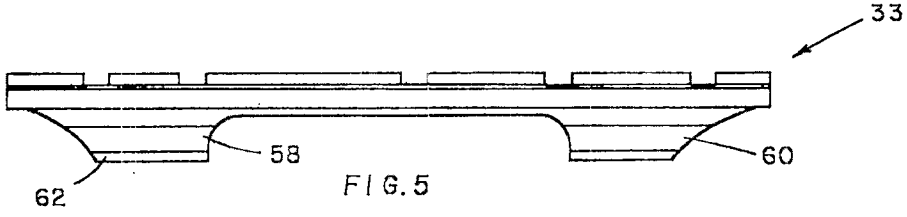


FIG. 5

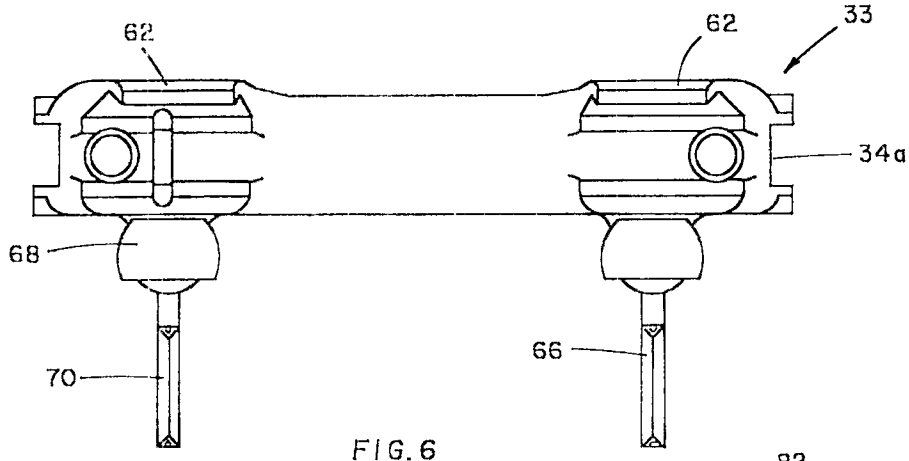


FIG. 6

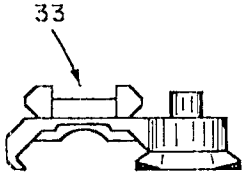


FIG. 7

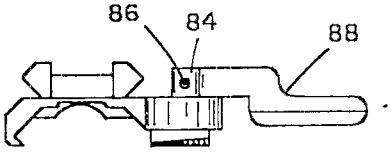


FIG. 8

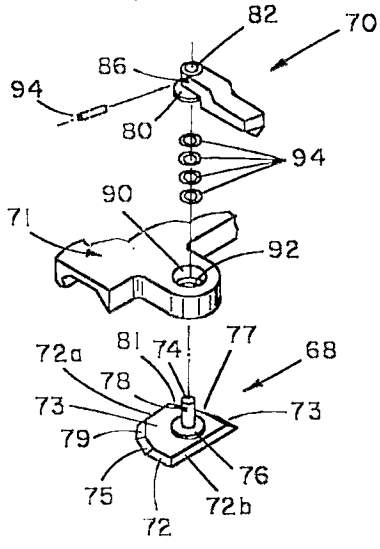


FIG. 9

ATTACHMENT DEVICE

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to attachment means and more specifically to a means of attaching device to a weaver railing.

BRIEF DESCRIPTION OF THE DRAWINGS

Further details are explained below with the help of the example(s) illustrated in the attached drawings in which:

FIG. 1 is a side elevational view of a firearm with a first and second weaver rail, the first weaver rail attached to the firearm using a lock nut and the first and second weaver rails connected together using the attachment means according to the present invention;

FIG. 2 is an enlarged side elevational view of the first and second weaver rails and a portion of the firearm shown in FIG. 1;

FIG. 3 is an enlarged, exploded perspective view of the first weaver rail shown in FIG. 1;

FIG. 4 is a top plan view of the second weaver rail shown in FIG. 1 according to the present invention;

FIG. 5 is a side elevational view of the second weaver rail shown in FIG. 4;

FIG. 6 is a bottom plan view of the second weaver rail shown in FIG. 4;

FIG. 7 is a front elevational view of the first fastener device attached to the second weaver rail shown in FIG. 4 without the first actuating means attached thereto;

FIG. 8 is a front elevational view of the first fastener device attached to the second weaver rail shown in FIG. 4 with the first actuating means attached thereto; and

FIG. 9 is an enlarged, exploded perspective view of the first fastener device attached to the second weaver rail shown in FIG. 4 broken away.

SUMMARY OF THE INVENTION

The invention disclosed herein comprises a means of attaching a first device to a second device. The attachment means including a camming surface and being spring loaded. The attachment means is particularly useful in attaching a first weaver interface to a second weaver interface. The camming surfaces and spring loading permitting adjustments to permit proper attachment to varying interface surfaces.

DESCRIPTION OF THE PREFERRED EMBODIMENT(S)

There is shown in the drawings at FIG. 1 an outline of an automatic firearm 9 of the M16 rifle family with a conventional stock 10, pistol grip 12, magazine 14, chamber 16 and barrel 18. An arced handle 20 is positioned above the chamber 16 and has the after part of a non-optical bead sight with windage and elevational adjustment devices 22, 24 located at the rear thereof remote from the barrel 18. The upper, horizontal run 26 of the handle 20 provides a recess for receiving a first weaver interface or first weaver platform 28. The run 26 includes a through hole for a purpose to be described hereinafter. A telescopic sight, not shown, is removably mounted, by means well known in the art, through weaver rings for example, to a locking weaver interface 33 which is engaged to the first weaver interface 28 and is placed in parallel relation with the run 26 of the handle 20 as is the first weaver interface 28.

FIG. 3 discloses that the first weaver interface 28 includes a base portion 32 formed to mate with the recess of the handle 20. The first weaver interface 28 is in parallel relation with the longitudinal axis of the firearm 9. A support portion 34 is connected to the base portion 32 and extends in spaced, parallel relation to the longitudinal axis of the firearm 9. The support portion 34 is generally rectangular in cross section having two long side edges. A first rail 36 extends upward from the support portion 34 adjacent one of the long side edges and a second rail 38 extends upward from the support portion 34 adjacent the other of the long side edges. The second rail 38 is in spaced parallel relation to the first rail 36. The upper surface 40 of the first rail 36 lies on the same horizontal plane as the upper surface 40*a* of the second rail 38. A series of notches 42, 42*a* are formed transversally through the first and second rails 36, 38 as shown in FIG. 3. The notches 42, 42*a* provide means of engaging other components. The notches 42, 42*a* are of varying widths. Each of the two long side edges of the support portion 34 are integral with an angled engagement surface 35 which extends the full length of the first and second rails 36, 38, lying below the plane of the first and second rails 36, 38 and are directed downwardly and away from the plane of the upper surfaces 40, 40*a* of the first and second rails 36, 38. The hole formed through the run 26 of the handle 20 and the through aperture 44 of the base portion 32 of the interface 28 are positioned in axial alignment. A headed screw 46 is positioned in coaxial relation to the aperture 44 with its threaded shank in coaxial relation to the aperture 44 and extending below the lower surface of base portion 32. The screw 46 is held in engagement with the interface 28 by passing a pin 48 through holes formed on the base portion 32 and on the groove formed on the head of the screw 46 as shown in FIG. 3. When the base portion 34 is positioned in the recess of the handle 20, the through hole is in coaxial alignment with the aperture 44 and the shank of the screw 46 extends below the lower surface of the handle 20, as shown in FIG. 2. A lock nut 50 is engaged to the threaded shank of the screw 46 completing the attachment of the interface 28 to the handle 20.

The locking weaver interface 33 includes a support portion 34*a* which is bar like in configuration and has a top surface 52. The support portion 34*a* has two long side edges. A first rail 36*a* extends upward from the support portion 34*a* adjacent one of the long side edges and a second rail 38*a* extends upward from the support portion 34*a* adjacent the other of the long side edges. A first engagement portion 58 extends from a portion of one of the long side edges of the support portion 34*a* in close proximity to one end thereof and beyond the area defined by the support portion 34*a* and lies on a horizontal plane below the bottom surface of the portion 52. A second engagement portion 60 extends from a portion of the same long side edge as that from which the first engagement portion 58 extends in close proximity to the other end thereof and beyond the area defined by the support portion 34*a* and lies on a horizontal plane below the bottom surface of the portion 52. Both the first engagement portion 58 and the second engagement portion 60 include a inturned angular grip portion 62.

A first fastening device 64 extends from a portion of the other long side edge of the support portion 34*a* in close proximity to one end thereof and in opposed rela-

tion to the first engagement portion 58. A second fastening device 66 extends from a portion of the same long side edge as that from which the first fastening device 64 extends, in close proximity to the other end thereof and in opposed relation to the second engagement portion 60.

The first fastening device 64 comprises a first locking means 68, first actuating means 70 and, as used in the embodiment disclosed herein, a support 71. The locking means 68 includes a first base portion 72 and a shaft 74. The base portion 72 has an upper surface 73 with the shaft 74 centrally positioned on and extending from the upper surface 73 in right angle relation thereto. A ring 76 extends from the upper surface 73 in circumscribing, abutting relationship to the shaft 74. The shaft 74 includes a free terminal end and an opening 78 transversely formed through the shaft in close proximity to the terminal end. The first base portion 72 is defined by first and second edges 72*a*, 72*b* which are in spaced parallel relation to each other and connected at one end by a first arced portion 75 and at the other end by a second arced portion 77. The upper surface of the first arced portion 75 of the first base portion 72 includes a first camming area 79 and the upper surface of the second arced portion of the first base portion 72 includes a second camming area 81. The first and second camming areas 79, 81 each have at least two portions beginning with the one nearest the first edge 72*a* of increasing sharpness of slope, for a purpose to be setforth hereinafter.

The first actuating means 70 includes a base 80 having a top surface, a bottom surface and a centrally positioned aperture 82 formed therethrough. A tubular portion 84 extends from the top surface in coaxial relation to the aperture 82 and in right angle relation to the top surface. A hole 86 is formed transversely through the tubular portion in right angle relation thereto. The tubular portion 84 includes an external surface from which an actuating handle 88 extends in right angle relation to the vertical axis of the tubular portion 84.

The support 71 is integral with the long side edge, includes an uppermost surface, a lowermost surface and has a first aperture 90 formed therethrough and in right angle relation thereto. The first aperture 90 includes an annular, internal shoulder 92.

To associate the locking means 68 with the support 71, the shaft 74 of the locking means 68 is passed through the first aperture 90 of the support 71 positioning the ring 76 of the locking means 68 within the first aperture 90 and the upper surface of the first base portion 72 in abutting relation to the lowermost surface of the support 71. A series of stacked springlike belleville washers 94 are mounted within the tubular portion in circumscribing relation to the shaft 74 with the lowest of the belleville washers 94 abutting the shoulder 92 and the ring 76. The free terminal end of the shaft 74 of the locking means 68 with the opening 78 is placed above the uppermost surface of the support 71. Association of the subassembly of the locking means 68 and the support 71 with the first actuating means 70, is accomplished by passing the shaft 74 of the locking means 68 through the aperture 82 and then through the tubular portion 84, in a press fit, horizontally aligning the opening 78 of the shaft 74 and the hole 86 of the tubular portion 84. This engagement extends the actuating handle 88 of the first actuating means 70 away from the support portion 34*a* and across the plane of the second edge 72*b* of the first base portion 72. A pin 94 is then passed through the hole 86 of the tubular portion 84 and the aligned opening 78 of the shaft 74. The components and method of assembly of the second fastening device 66 is identical with that of the first fastening device 64 as setforth hereinbefore.

Engagement of the locking weaver interface 33 with the first weaver interface 28 is accomplished by positioning the inturned angular grip portion 62 under and in abutting relation with the engagement surface 35 of the second rail 38. The first edge 72*a* of the first base portion 72 and the equivalent of the first edge 72*a* of the second fastening device 66 are positioned in close proximity to the engagement surface 35 of the first rail 36. Rotation of the lever of the first fastening device 64 in a counterclockwise direction and of the lever of the second fastening device 64 in a clockwise direction causes their respective first or second camming areas to pass, in abutting relation, under the engagement surface 35 of the first rail 36. Continuing the rotation increases the tightness of the engagement and the compression of the beleville washers or springs 94 provide the means of self adjusting from one Weaver rail to a different one. The engagement and disengagement of the weaver interface 33 with the first weaver interface 28 can thus be accomplished quickly and under military combat conditions.

What I claim is:

1. A fastening device comprising a locking means and an actuating means, the locking means including a base portion and a shaft, the base portion having an upper surface and the shaft centrally positioned on the upper surface in right angle relation thereto, a ring extends from the upper surface in circumscribing, abutting relationship to the shaft, the shaft including a free terminal end and an opening being transversely formed through the shaft in close proximity to the terminal end, the upper surface of the locking means including a first camming area and a second camming area spaced from the first camming area, the actuating means including a base having a top surface, a bottom surface and a centrally positioned aperture formed therethrough, a tubular portion extending from the top surface in coaxial relation to the aperture and in right angle relation to the top surface, a hole is formed transversely through the tubular portion in right angle relation thereto, the tubular portion includes an external surface from which a handle extends, the fastening device adapted to engage a support wherein the support having a platform means extending therefrom, the platform means including a support base having a first aperture formed therethrough, the first aperture including an internal shoulder, the support base including an uppermost surface and a lowermost surface and the shaft of the locking means passed through the first aperture of the support positioning the ring of the locking means within the first aperture and the upper surface of the base portion in abutting relation to the lowermost surface of the support, the shaft of the locking means being positioned in the tubular portion of the actuating means with the actuating means engaged to the locking means.

2. A fastening device comprising a locking means and an actuating means, the locking means including a base portion and a shaft, the base portion having an upper surface and the shaft positioned on the upper surface in right angle relation thereto, the shaft including a free terminal end, the upper surface of the base portion including a first camming area and a second camming area spaced from the first camming area, the actuating

means including a base having a top surface and a centrally positioned aperture formed therethrough, a tubular portion extending from the top surface in coaxial relation to the aperture and in right angle relation to the top surface, the fastening device adapted to engage a support wherein the support having a platform means extending therefrom, the platform means including a support base having a first aperture formed therethrough, the first aperture including an internal shoulder, the support base including an uppermost surface and a lowermost surface and the shaft of the locking means passed through the first aperture of the support positioning a portion of the shaft of the locking means within the first aperture and the upper surface of the base portion in abutting relation to the lowermost surface of the support, the shaft of the locking means being positioned in the tubular portion of the actuating means with the actuating means engaged to the locking means and the tubular portion butted against the support.

3. A fastening device as set forth in claim 2 wherein the device is spring loaded.

4. The combination of a fastening device and a support, the fastening device comprising a locking means and an actuating means, the locking means including a base portion and a shaft, the base portion having an upper surface and the shaft positioned on the upper surface in right angle relation thereto, the shaft including a free terminal end, the upper surface of the base portion including a first camming area and a second camming area spaced from the first camming area, the actuating means including a base having a top surface and a centrally positioned aperture formed therethrough, a tubular portion extending from the top surface in coaxial relation to the aperture and in right angle relation to the top surface, the support having a platform means extending therefrom, the platform means including a support base having a first aperture formed therethrough, the first aperture including an internal shoulder, the support base including an uppermost surface and a lowermost surface and the shaft of the locking means passed through the first aperture of the support base positioning a portion of the shaft of the locking means within the first aperture and the upper surface of the base portion in abutting relation to the lowermost surface of the support, the shaft of the locking means being positioned in the tubular portion of the actuating means with the actuating means engaged to the locking means and the tubular portion butted against the support.

5. The combination as set forth in claim 4 wherein a ring extends from the upper surface in circumscribing, abutting relationship to the shaft, the shaft of the locking means passed through the first aperture of the support positioning the ring of the locking means within the first aperture, an opening being transversely formed through the shaft, a hole being formed transversely through the tubular portion in right angle relation thereto whereby the opening and the hole are aligned.

6. A combination as set forth in claim 5 wherein the device is spring loaded, the spring circumscribing the shaft and bearing against the base.

7. A combination as set forth in claim 6 wherein the spring is a belleville washer.

* * * * *

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United States Patent [19]

Swan

[11] Patent Number: 5,276,988

[45] Date of Patent: Jan. 11, 1994

[54] **BUFFERED ATTACHMENT DEVICE**

[76] Inventor: **Richard E. Swan**, 375 West Street, E. Bridgewater, Mass. 02379

[21] Appl. No.: **973,409**

[22] Filed: **Nov. 9, 1992**

[51] **Int. Cl.**[5] **F41G 1/387**

[52] **U.S. Cl.** **42/101**; 33/250

[58] **Field of Search** 42/101, 99, 90; 33/250

[56] **References Cited**

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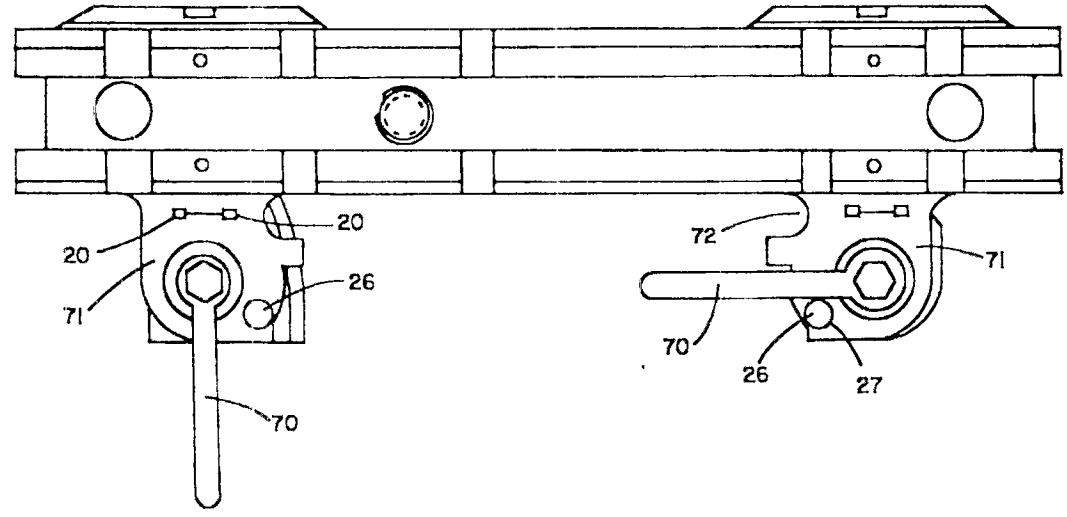
Primary Examiner—David H. Brown

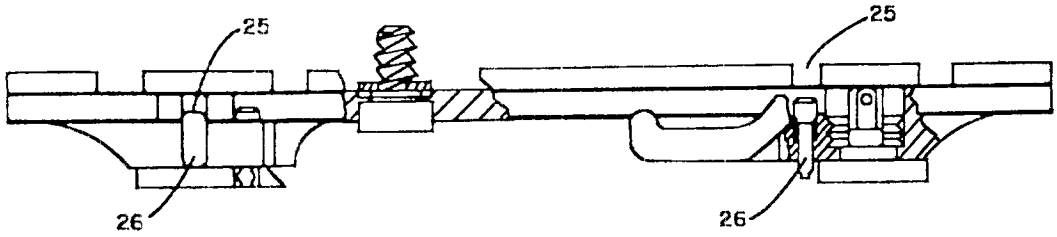
Attorney, Agent, or Firm—John P. McGonagle

[57] **ABSTRACT**

A buffered means for attaching a first device to a second device. The attachment means includes a camming surface. The invention provides a buffer element between the attachment device camming surface and the area to which the attachment device is affixed.

11 Claims, 6 Drawing Sheets





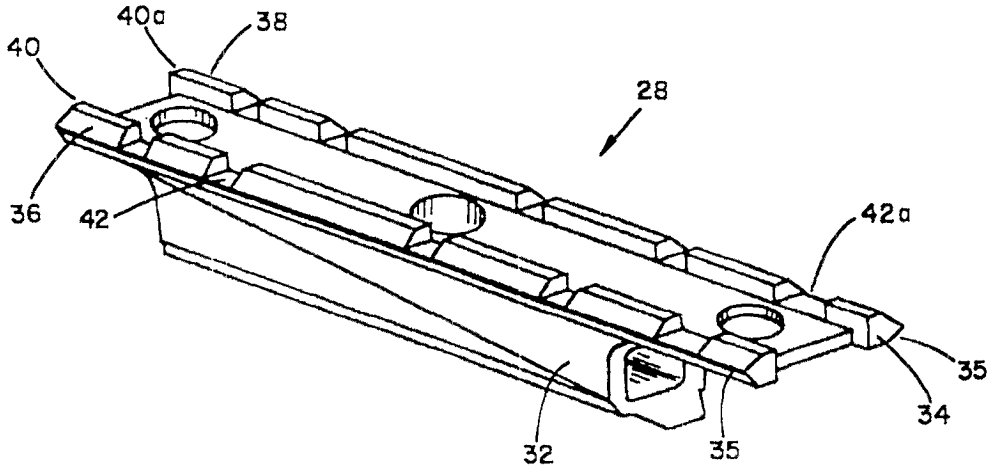


FIG. 1

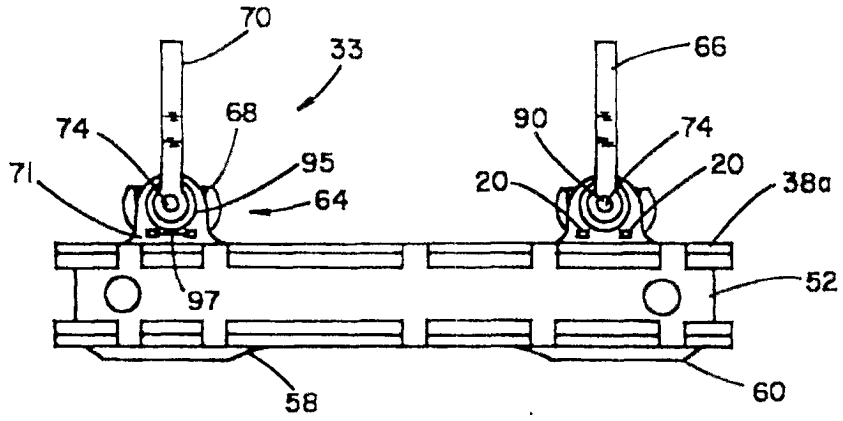


FIG. 2

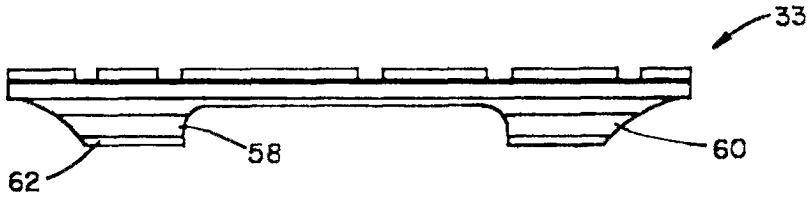


FIG. 3

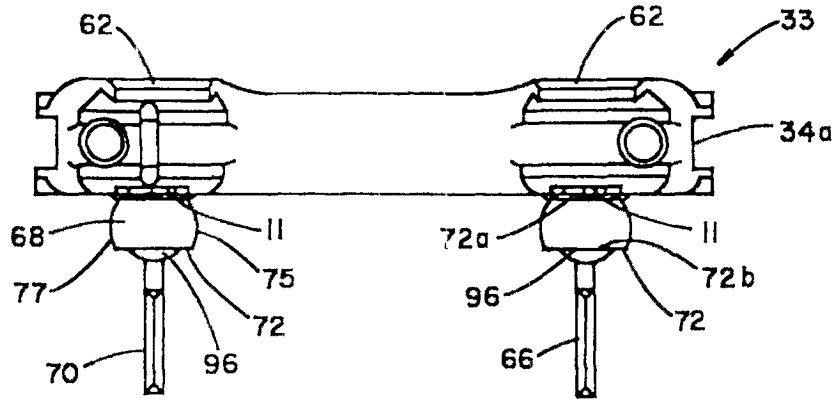


FIG. 4

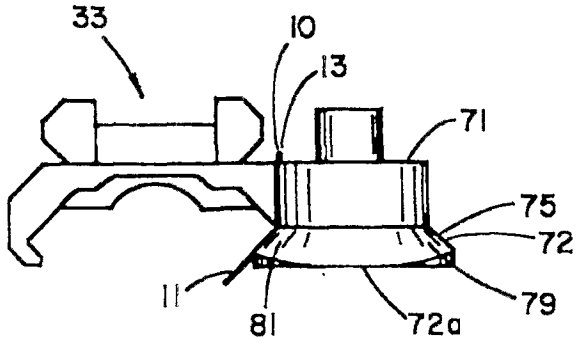


FIG. 5A

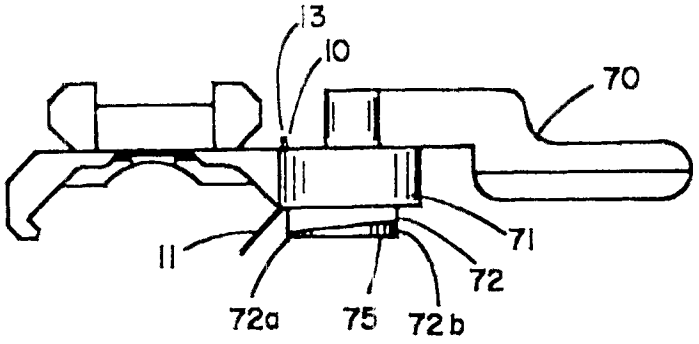


FIG. 6A

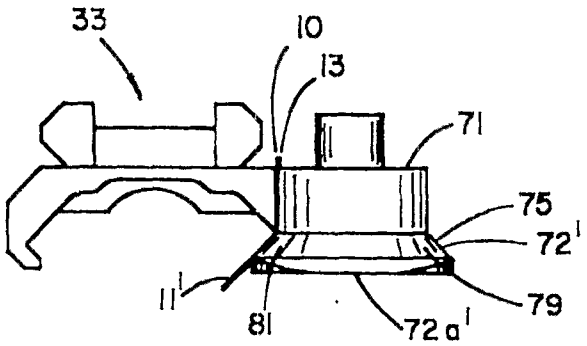


FIG. 5B

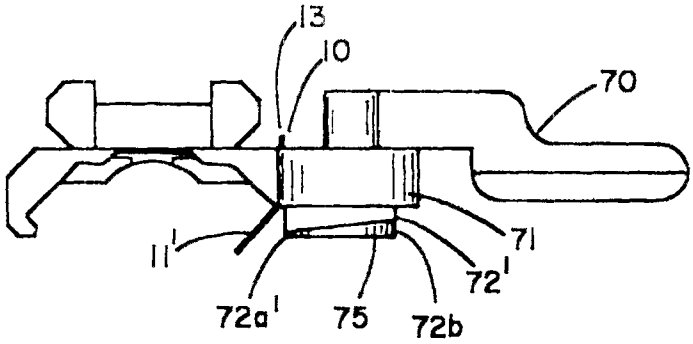


FIG. 6B

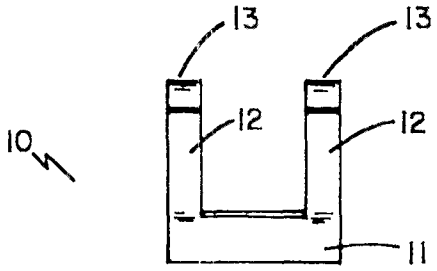


FIG. 7A

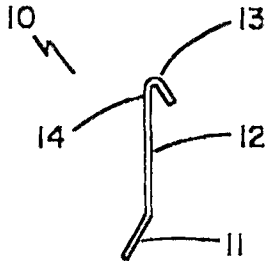


FIG. 7B

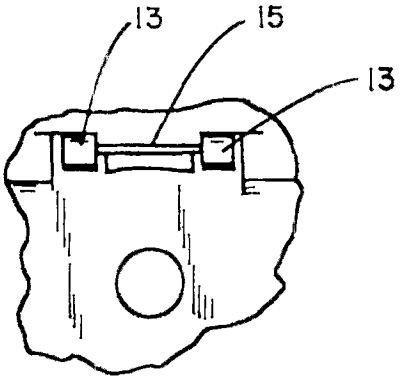


FIG. 8A

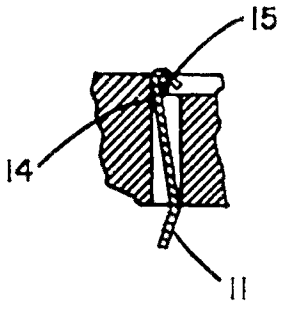


FIG. 8B

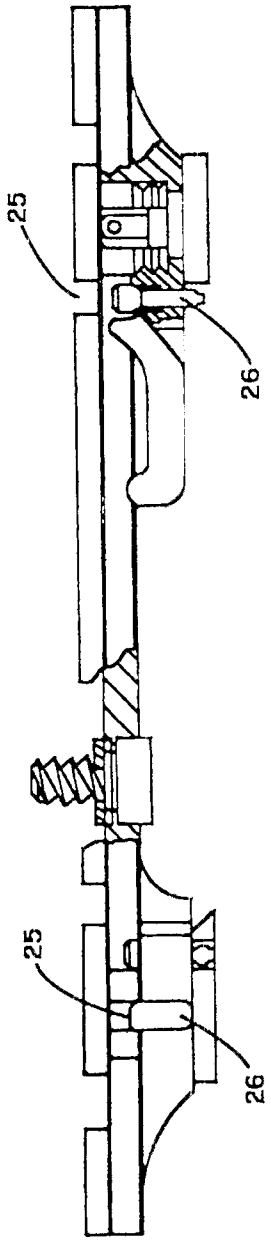


FIG. 10

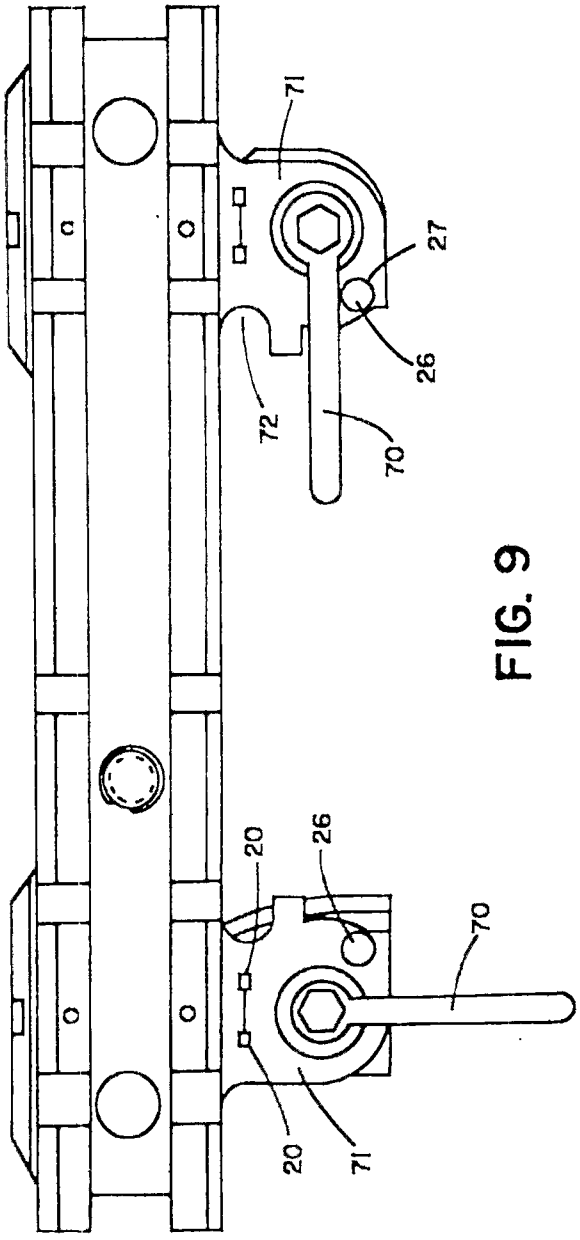


FIG. 9

BUFFERED ATTACHMENT DEVICE

BACKGROUND OF THE INVENTION

This invention relates to attachment means and more particularly to a buffered means for attaching a device to a weaver or angled railing.

In applicant's U.S. Pat. No. 4,845,871, issued on Jul. 11, 1989, for an "Attachment Device", and incorporated herein by reference, (hereinafter: '871 Attachment Device), there was disclosed a fastening device comprising a locking means and an actuating means. The locking means included a base portion with first and second camming areas

The '871 attachment device is used to provide a portable integrator for various add on devices, such as the locking weaver interface 33 of the '871 patent onto a first weaver interface 28 or onto a receiver sleeve as disclosed in applicant's copending application, Ser. No. 07/763,966, now U.S. Pat. No. 5,142,806, incorporated herein by reference, or directly onto the upper receiver of a firearm. The '871 attachment device is also sometimes referred to as a "throw lever", and may be used in tandem as seen in the '871 patent or singularly for applications like optics ring holders.

The limitation of the '871 Attachment Device and similar type devices lies in the camming areas. Weaver interfaces, receiver sleeves and upper receivers are generally made of aluminum or other light weight material. These materials are softer than the steel used for and necessary to make the camming areas of the '871 Attachment Device and similar type devices. Thus, over time and after repeated use, the '871 attachment device continuously scratches, cuts and erodes the area to which the '871 attachment device is affixed.

SUMMARY OF THE INVENTION

In view of the foregoing disadvantage inherent in the '871 Attachment Device, the present invention provides an improved attachment device. As such, the general purpose of the present invention, which will be described subsequently in greater detail, is to provide a new and improved fastening device which eliminates the problem of the '871 Attachment Device and similar type devices cutting into the softer material of the area to which the '871 attachment device is affixed.

To attain this result, the present invention provides a buffer element between the attachment device camming surfaces and the area to which the attachment device is affixed.

This together with other objects of the invention, along with various features of novelty which characterize the invention, are pointed out with particularity in the claims annexed hereto and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and the specific objects attained by its uses, reference should be had to the accompanying drawings and descriptive matter in which there is illustrated a preferred embodiment of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a first weaver interface;

FIG. 2 is a top plan view of a weaver rail with a buffered attachment device constructed according to the present invention integrated therein;

FIG. 3 is a side elevational view of the rail of FIG. 2;

FIG. 4 is a bottom plan view of the rail shown in FIG. 2;

FIG. 5A is a front elevational view of the buffered attachment device attached to the weaver rail shown in FIG. 2 without the actuating means attached thereto;

FIG. 5B is a front elevational view of the buffered attachment device of FIG. 5A with magnetized locking means;

FIG. 6A is a front elevational view of the buffered attachment device attached to the weaver rail shown in FIG. 2 with the attachment means attached thereto;

FIG. 6B is a front elevational view of the buffered attachment device of FIG. 6A with magnetized locking means;

FIGS. 7A and 7B are front and side elevational views of a buffer element according to the present invention;

FIGS. 8A and 8B are top and side elevational views of the invention used in conjunction with a spring wire;

FIG. 9 is a top plan view of a weaver rail with a buffered attachment device constructed according to the present invention integrated therein and having a spring loaded pin; and

FIG. 10 is a side elevational view of the rail of FIG. 9.

DETAILED DESCRIPTION OF THE INVENTION

For purposes of illustration, it will be assumed that the buffered attachment device of the present invention will be integrated with a locking weaver interface 33 for attachment to a first weaver interface or similar type device. Notwithstanding this, it must be emphasized that the buffered attachment device is designed for use with any angled railing.

Referring to the drawings in detail wherein like elements are indicated by like numerals, there is shown extending from said locking weaver interface 33 a buffered attachment device 64 comprised of a locking means 68, actuating means 70 and, as used in the example disclosed therein, a support 71. The locking means 68 includes a base portion 72 and a shaft 74 interconnecting the locking means 68 with said actuating means 70. The base portion 72 is defined by first and second edges 72*a*, 72*b* which are in spaced parallel relation to each other and connected at one end by a first arced portion 75 and at the other end by a second arced portion 77. The upper surface of the first arced portion 75 of the base portion 72 includes a camming area 79 and the upper surface of the second arced portion 77 of the base portion 72 includes a second camming area 81. The first and second camming area 79, 81 each have at least two portions beginning with the one nearest the first edge 72*a* of increasing sharpness of slope.

The support 71 is integral with an interface device, such as the locking weaver interface 33 of the '871 patent. The locking weaver interface 33 has an engagement portion 58 extending from a portion of one 31 of the long side edges of the support portion 34*a* in close proximity to one end thereof and beyond the area defined by the support portion 34*a* and lies on a horizontal plane below the bottom surface of the portion 52. The engagement portion 58 includes an inturned angular grip portion 62. The buffered attachment device 64 extends from a portion of the other long side edge 30 of the support portion 34*a* in close proximity to one end thereof and in opposed relation to the engagement portion 58. The support 71 is integral with the long side edge, and includes an uppermost surface 95, a lower-

most surface 96 and has a first aperture 90 formed there through and in right angle relation thereto. The shaft 74 is attached to the base 72 and protrudes through the support aperture 90.

Referring to the drawings in general, and particularly FIGS. 7A–8B, there is shown a generally U-shaped buffer element 10 having a flat horizontal base portion 11 with an arm 12 at each end of the base 11 extending upwardly at an oblique angle of 135 degrees. The free end 13 of each arm is curved forward toward the plane of the base portion 11 approximately 150 degrees.

Two side-by-side openings 20, corresponding in separation to the separation between buffer element arms 12, are formed in the fastening device support 71 between the support aperture 90 and the side edge 30 in parallel relationship to said side edge 30. The buffer element 10 is slid through the openings 20, vertical arm free ends 13 first, from lowermost surface 96 through to uppermost surface 95, said arm free ends 13 curving toward said aperture 90.

Engagement of the interface device 33 with a first weaver interface 28 or receiver with a universal receiver sleeve as described in applicant's copending application, Ser. No. 07/763,966, incorporated herein by reference, is accomplished by positioning the inturned angular grip portion 62 of the interface device 33 under and in abutting relationship with the engagement surface of the second rail 38 of said first weaver interface 28 or receiver sleeve. The first edge 72*a* of the base portion 72 is positioned in close proximity to the engagement surface 35 of the first rail 36 of said first weaver interface 28 or receiver sleeve. The buffer element base portion 11 is positioned between said first edge 72*a* and said engagement surface 35. Rotation of the throw lever 70 in a clockwise direction causes the first camming area 79 to press the buffer element base portion 11, in abutting relation, under the engagement surface 35 of the first rail 36. The configuration of the buffered interface device 33 causes the interface to be drawn vertically downward onto the first weaver interface 28. The buffer element 10 prevents the cam 72 from directly touching and thereby scratching the engagement surface 35.

To prevent the loose fitting buffer element 10 from interfering with the initial positioning of the interface 33 onto the weaver interface 28, a spring wire 15 is installed to hold the buffer element base portion 11 against the cam 72. The uppermost support surface 95 has a horizontal groove 97 formed between the openings 20. The groove 97 interconnects the openings 20 near to the side edge 30. A short length of 30/1000 inch piano wire 15 is inserted into the groove 20 on the aperture 90 side of the buffer element arms 12 at the beginning portion 14 of the curved free ends 13. Positioning of the spring 15 in this manner, holds the buffer element base portion 11 toward the cam 72. Rotation of the throw lever 70 and the consequent movement of the first camming area 79 against the buffer element base portion 11 overcomes the resistance of the spring 15 and moves the buffer element base portion 11 under and against the engagement surface 35 of the first rail 36.

In an alternative embodiment, as shown in FIGS. 5B and 6B, the spring 15 may be eliminated and the fastening device base portion 72 (hereinafter 72') magnetized. The buffer element base portion 11 (hereinafter 11') would then hold the buffer element to the cam 72 through magnetic attraction. Although this embodiment would not be used in applications where equipment sensitive to magnetic distortions was being integrated, for many other applications is would be useful.

In still another embodiment of the invention, a lever locking mechanism is integrated into the fastening device 64. A fourth opening 25 is formed in the fastening device support 71 on the throw lever 70 side of the aperture 90 mid way between the throw lever's open position A and the throw lever's closed position B. A spring loaded pin 26 is inserted into the opening 25. The fastening device base portion 72 has a notch 85 formed therein. When the throw lever 70 is in position A, the notch fits around the protruding portion 27 of the pin 26. When the throw lever 70 is moved from position A to position B, the pin 26 is depressed so that the throw lever 70 may pass by the pin 26. The pin 26 springs back when the throw lever 70 is moved into position B. The throw lever 70 is held in position B by the pin 26 and cannot be moved back to position A until the pin 26 is depressed again.

It is understood that the above-described embodiment is merely illustrative of the application. Other embodiments may be readily devised by those skilled in the art which will embody the principles of the invention and fall within the spirit and scope thereof.

I claim:

1. In a fastening device for attaching a first device to a second device, said fastening device being integrated with said first device and having a support interconnecting said fastening device with said first device, said fastening device having a locking means with a camming surface adapted to engage said second device, and an actuating means attached to said locking means, said actuating means having a normally open position and a normally closed position, said support holding said locking means and said actuating means by means of a shaft attached to said locking means and positioned through a first aperture in said support to said actuating means, a buffer comprising:

a generally U-shaped buffer element having a flat base portion with an arm at each end of the base, said arms being in parallel with each other and formed transverse to the longitudinal axis of said base, said arms extending away from said base at an oblique angle;

wherein said fastening device support has two side-by-side openings formed therein near to said first device, corresponding in separation to the separation between buffer element arms; and

wherein said buffer element is attached to said support by means of said element arms being fitted into and through said openings; and

wherein said flat base portion is positioned between said locking means camming surface and said second device.

2. A fastening device in accordance with claim 1, wherein:

said buffer element unattached arm ends are positioned through said side-by-side support openings from lowermost surface through to uppermost surface, said arm free ends curving toward said first aperture and said buffer element flat horizontal base portion being positioned below the support lowermost surface.

3. A buffered attachment device in accordance with claim 2, further comprising:

a magnetized locking means base portion for holding the buffer element base against a camming area.

4. A fastening device in accordance with claim 2, further comprising:

a horizontal groove formed on the uppermost support surface between and interconnecting the side-by-side openings;

a short length of spring wire inserted into said groove;

wherein the curved free ends of the buffer element unattached arm ends are positioning over the spring wire thereby holding the buffer element base portion toward the camming surfaces; and

wherein rotation of the actuating means and the consequent movement of a camming area against the buffer element base portion overcomes the resistance of the spring and moves the buffer element base portion along with the camming area.

5. A fastening device in accordance with claim 4, further comprising:

a fourth opening formed in the fastening device support away from said first device mid way between said actuating device normally open and normally closed positions;

a spring loaded pin with a protruding portion fitted into said fourth opening;

a notch formed in said fastening device base portion, wherein when the actuating device is in a normally open position, the notch fits around the protruding portion of the pin and when the actuating device is moved from a normally open to a normally closed position, the pin is depressed so that actuating means may pass by the pin;

wherein the pin springs back when the actuating means is moved into a normally closed position.

6. A buffered attachment device extending from an angled/railing, comprising:

a support integral with said railing, and having an uppermost surface, a lowermost surface and a first aperture formed therethrough and in right angle relation thereto;

an actuating means having a normally open position and a normally closed position;

a locking means having a base portion and a shaft attached to said base portion, said shaft protruding through said support first aperture and interconnecting said locking means at the support lowermost surface with said actuating means at the support uppermost surface, wherein said locking means base portion is defined by first and second edges which ar in spaced parallel relation to each other and connected at one end by a first arced portion and at the other end by a second arced portion, the upper surface of the first arced portion of the base portion including a camming area and the upper surface of the second arced portion of the base portion including a second camming area; and

a generally U-shaped buffer element having a flat horizontal base portion with an arm attached at each end of the base extending upwardly at an oblique angle, the unattached end of each arm being curved toward the plane of the base, wherein said flat base is positioned adjacent said camming surfaces.

7. A buffered attachment device in accordance with claim 6, further comprising:

two side-by-side openings, corresponding in separation to the separation between buffer element arms, formed in the said support between the first support aperture and the angled railing.

8. A buffered attachment device in accordance with claim 7, wherein:

said buffer element unattached arm ends are positioned through said side-by-side support openings from lowermost surface through to uppermost surface, said arm free ends curving toward said first aperture and said buffer element flat horizontal base portion being positioned below the support lowermost surface.

9. A buffered attachment device in accordance with claim 8, further comprising:

a magnetized locking means base portion for holding the buffer element base against a camming area.

10. A buffered attachment device in accordance with claim 8, further comprising:

a horizontal groove formed on the uppermost support surface between and interconnecting the side-by-side openings;

a short length of spring wire inserted into said groove;

wherein the curved free ends of the buffer element unattached arm ends are positioning over the spring wire thereby holding the buffer element base portion toward the camming surfaces; and

wherein rotation of the actuating means and the consequent movement of a camming area against the buffer element base portion overcomes the resistance of the spring and moves the buffer element base portion along with the camming area.

11. A buffered attachment device in accordance with claim 10, further comprising:

a fourth opening formed in the fastening device support away from said first device mid way between said actuating device normally open and normally closed positions;

a spring loaded pin with a protruding portion fitted into said fourth opening;

a notch formed in said fastening device base portion, wherein when the actuating device is in a normally open position, the notch fits around the protruding portion of the pin and when the actuating device is moved from a normally open to a normally closed position, the pin is depressed so that actuating means may pass by the pin;

wherein the pin springs back when the actuating means is moved into a normally closed position.

* * * * *

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United States Patent [19]

LaRue

[11] Patent Number: 6,026,580

[45] Date of Patent: Feb. 22, 2000

[54] AIMING SIGHT MOUNT

[76] Inventor: Mark C. LaRue, 14800 Brown Bluff Cir., Leander, Tex. 78641

[21] Appl. No.: 09/012,834

[22] Filed: Jan. 23, 1998

Related U.S. Application Data

[60] Provisional application No. 60/034,078, Jan. 24, 1997.

[51] Int. Cl.[7] F41G 1/38

[52] U.S. Cl. 33/250; 42/101

[58] Field of Search 42/101; 33/250

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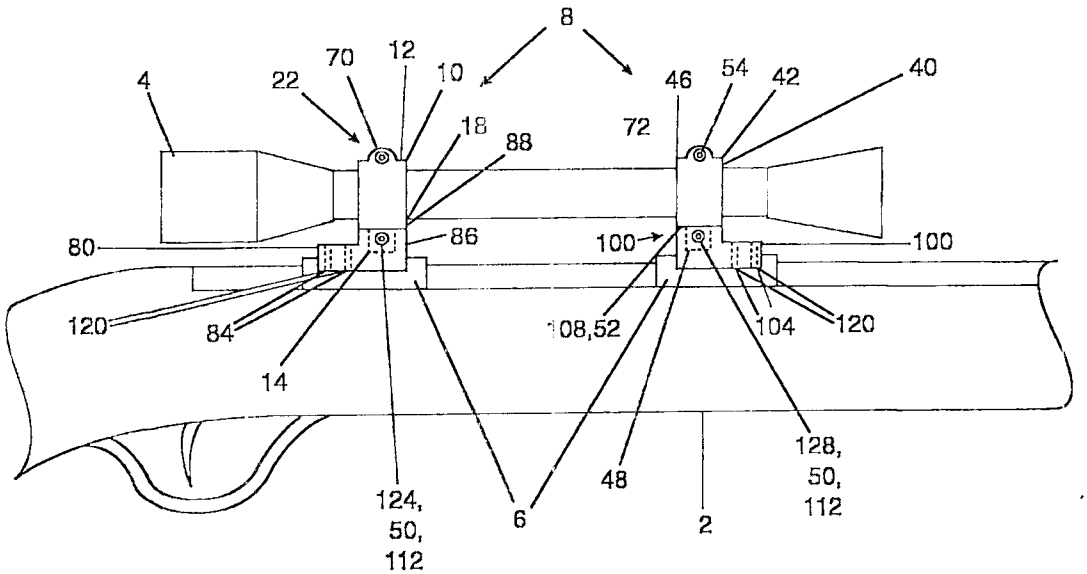
Primary Examiner—Charles T. Jordan
Assistant Examiner—Denise J Buckley
Attorney, Agent, or Firm—James J. Leary; Patrick T. Reilly; Carol D. Titus

[57] ABSTRACT

A gun sight mount is provided that enables the accurate and secure positioning of an optical sighting device onto a weapon or other equipment. The mount includes a base and a front and rear ring assemblies. The base is attached at at least two points to the weapon or equipment. The separate front and rear ring assemblies capture the weapon or equipment. The ring assemblies are secured to the base, whereby a secure mounting is acheived.

7 Claims, 9 Drawing Sheets



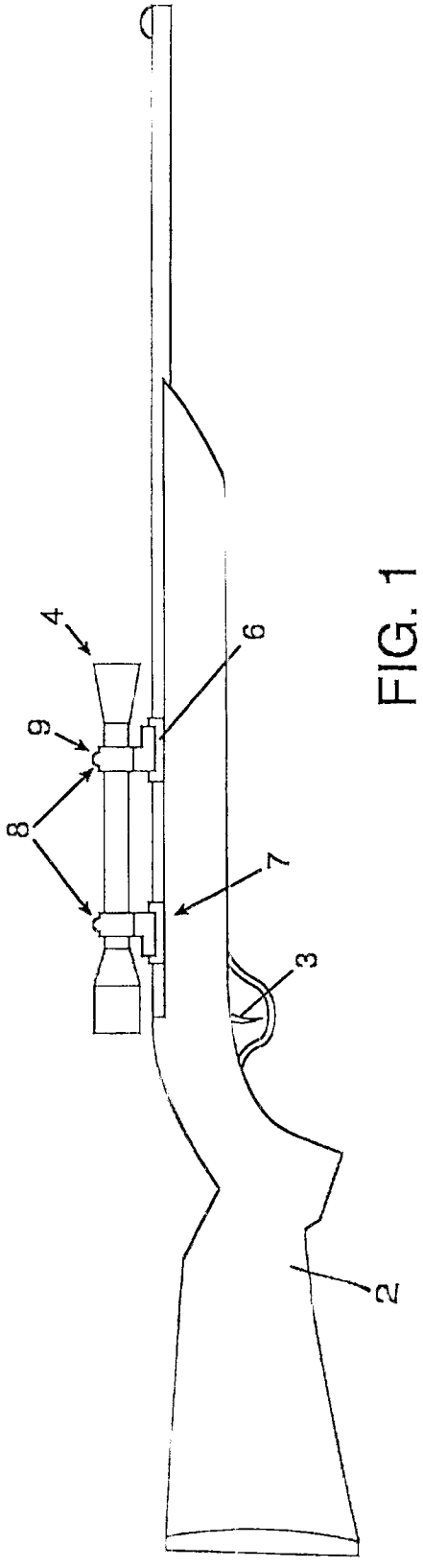


FIG. 1

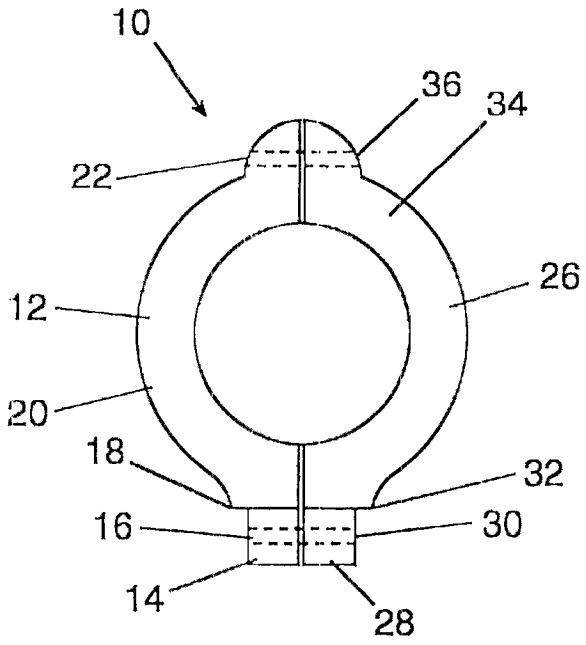

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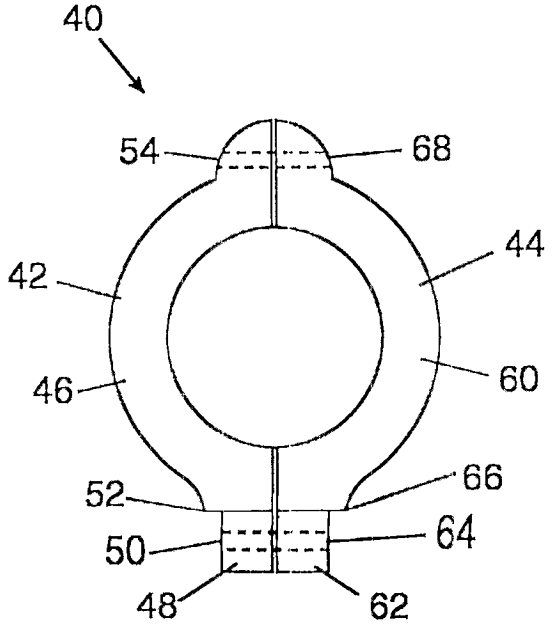
FIG. 2A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48
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FIG. 2B

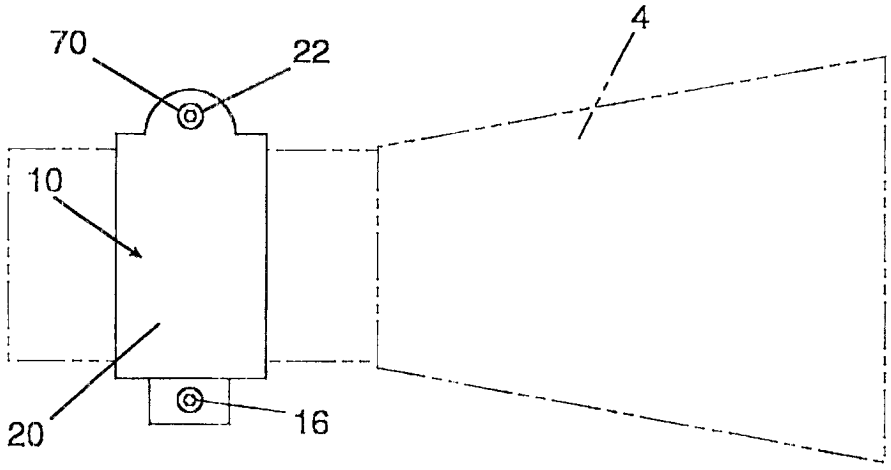


FIG. 3A

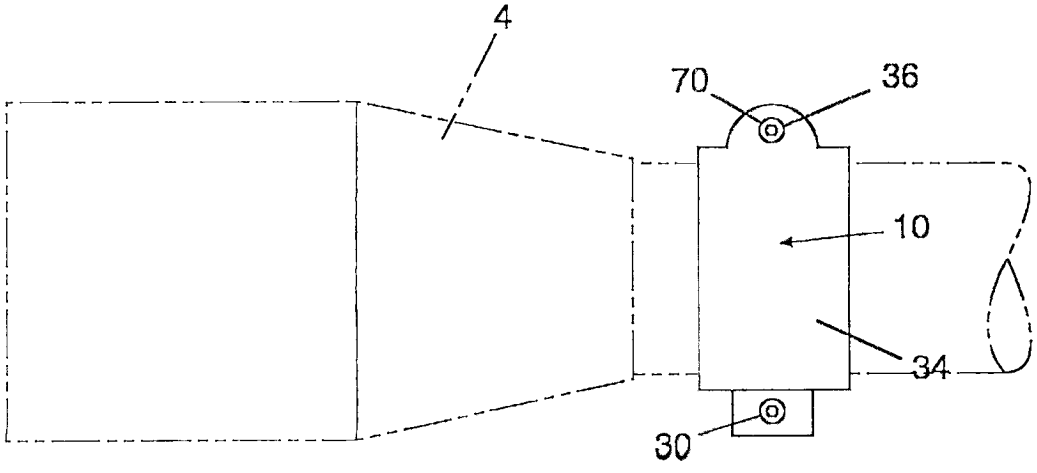


FIG. 3B

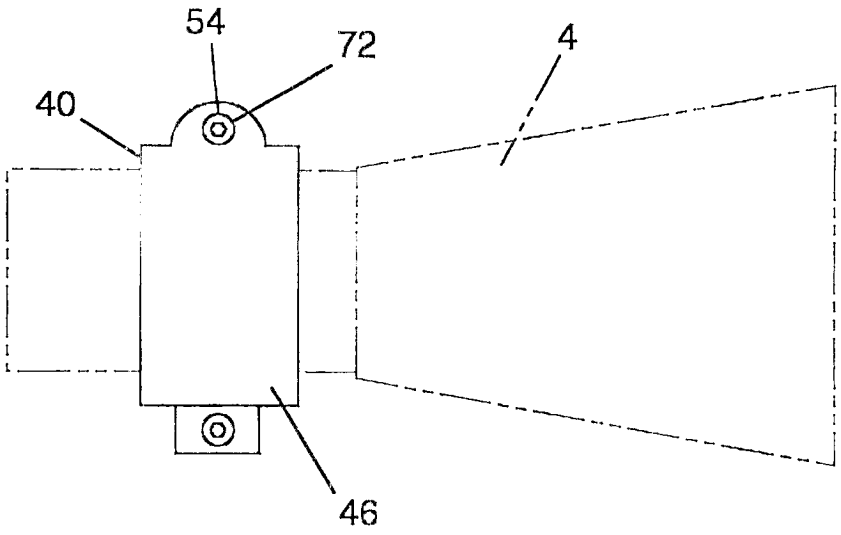


FIG. 4A

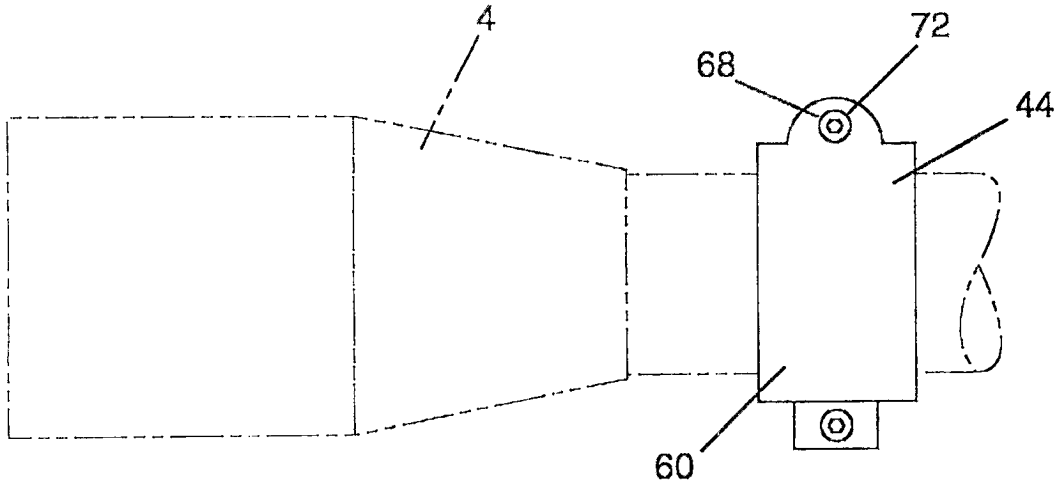


FIG. 4B

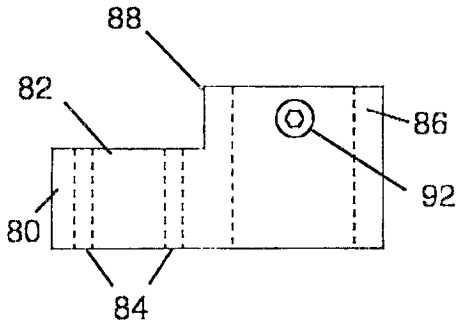


FIG. 5A

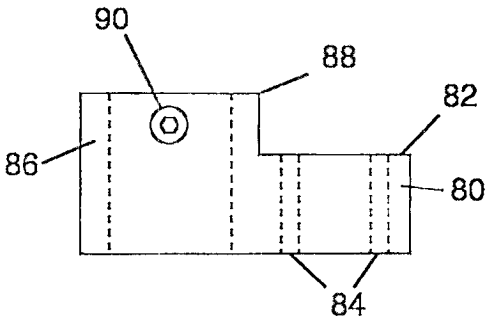


FIG. 5B

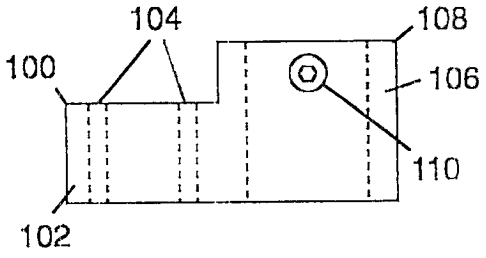


FIG. 6A

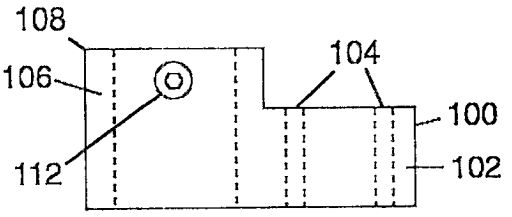
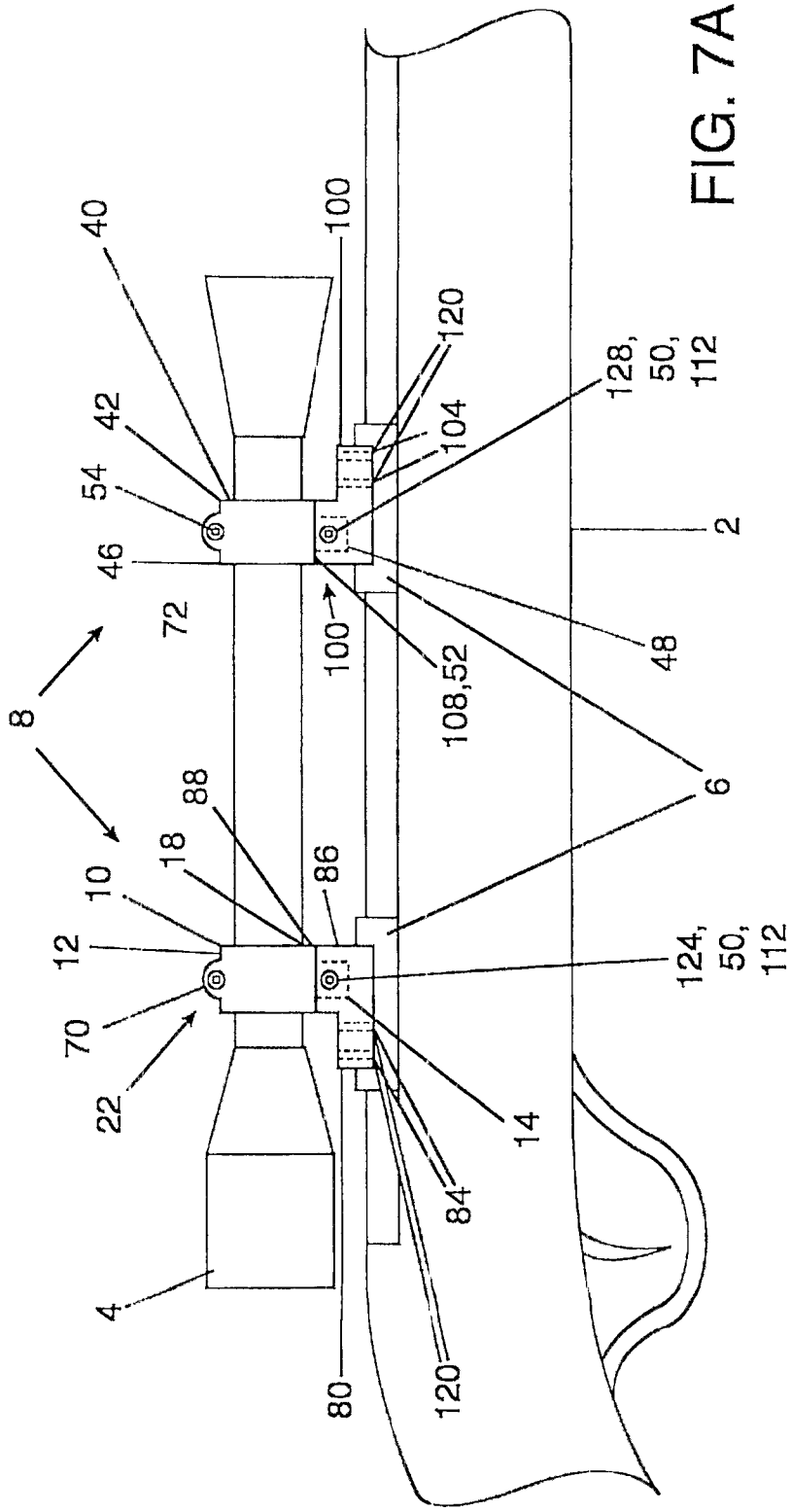


FIG. 6B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80
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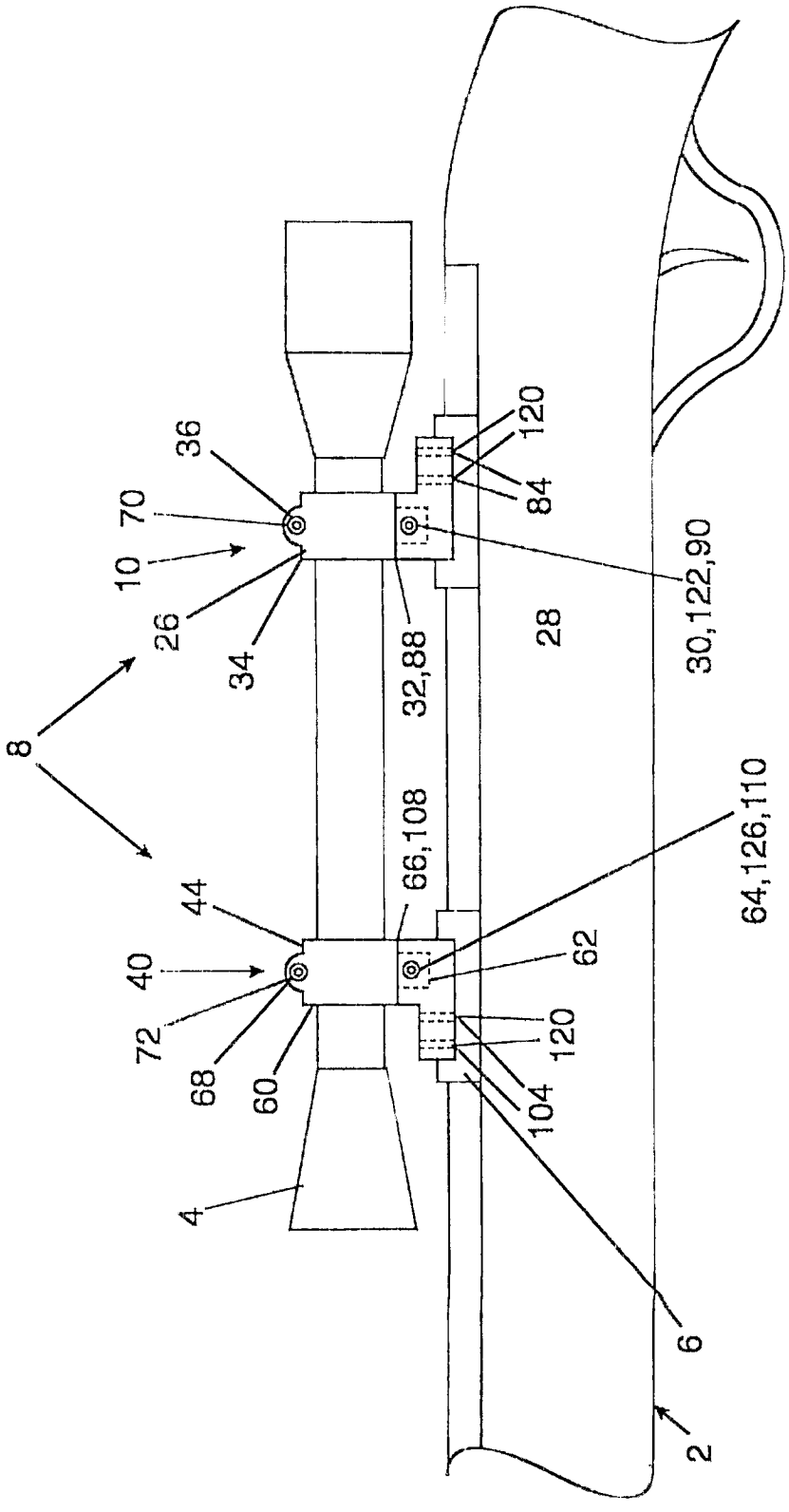
FIG. 7A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120
104
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FIG. 7B

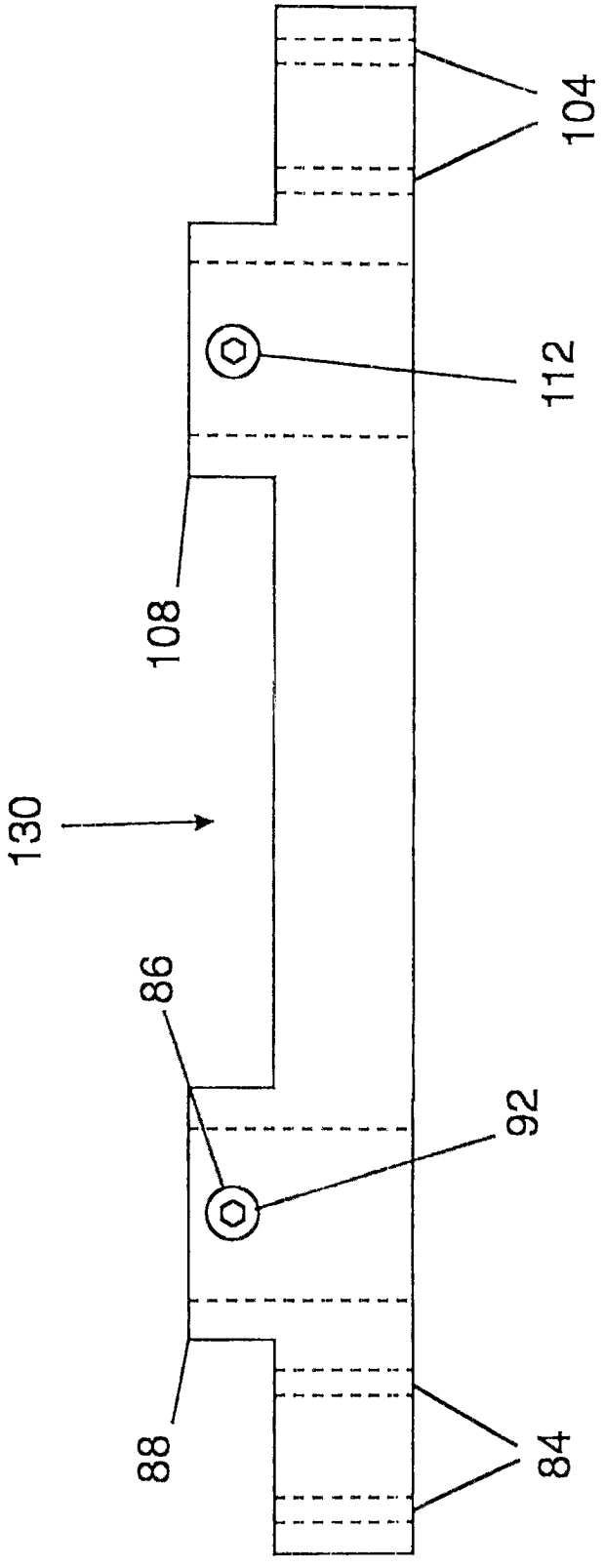
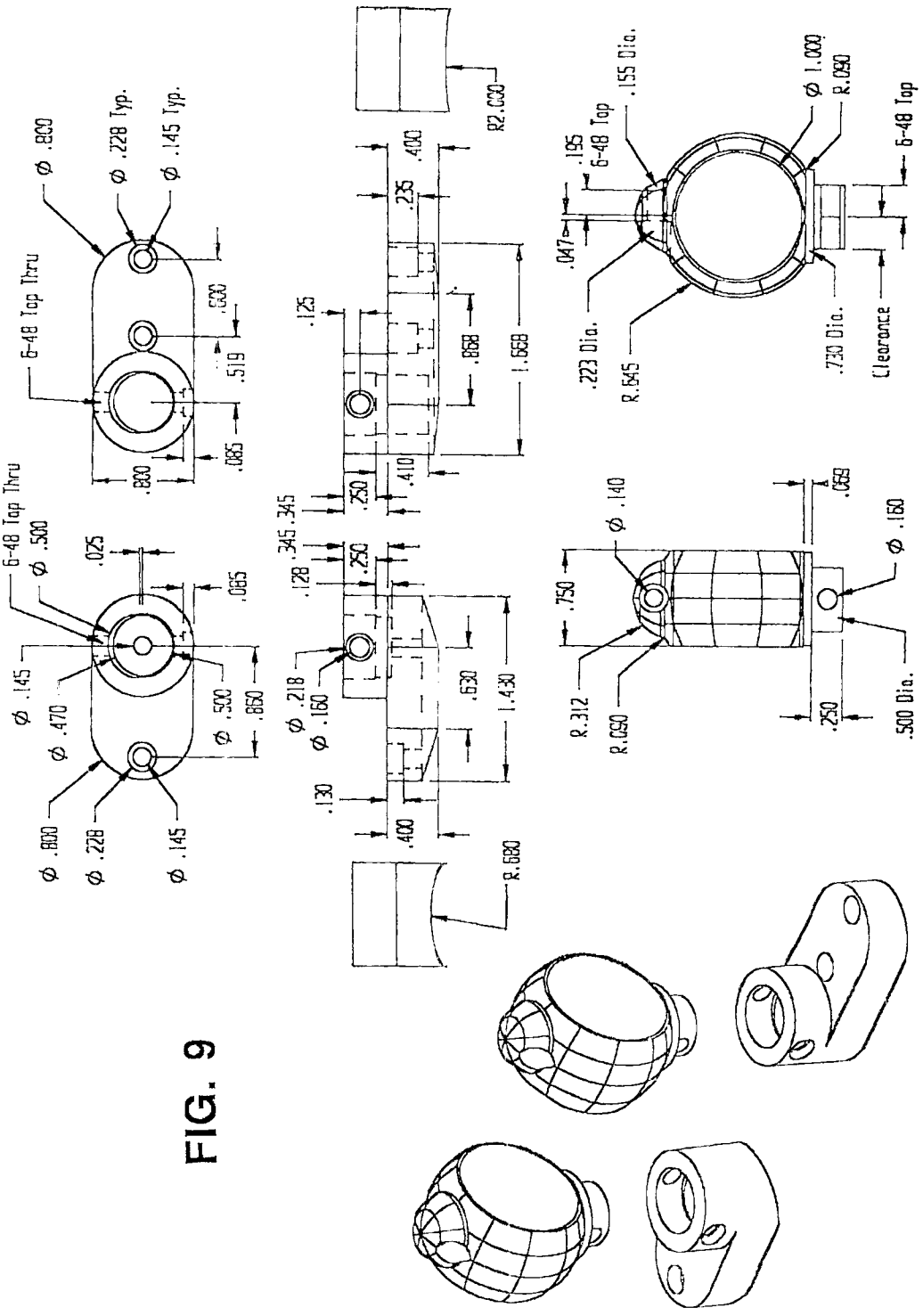


FIG. 8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Ø .145
R2.020
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R.090
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.750
R.312
R.090
.250
.500 Dia.

FIG. 9

AIMING SIGHT MOUNT

CROSS REFERENCE TO OTHER APPLICATIONS

The application claims the benefit of U.S. Provisional Patent Application No. 60/034,078 filed Jan. 24, 1997.

FIELD OF INVENTION

The present invention relates to the design and implementation of devices used to mount and secure telescopic and laser sights to firearms, measuring systems, parametric data collection systems, navigation systems, locating systems and other direction orientable equipment.

BACKGROUND OF INVENTION

The development of reliable and convenient devices for mounting telescopic, laser and other sights onto firearms and various scientific and military equipment is of interest to a wide section of the public. A great deal of attention has been paid in particular to the mounting of telescopic sights onto firearms. The invention of Lapier et al., U.S. Pat. No. 4,756,111, is offered as being representative of general trends found in the prior art.

Much of the conventional art in the field of telescopic mounts has clearly been driven in view of a need for simplicity in device design, as made explicit in both Zeh, U.S. Pat. No. 5,353,539, and in Williams, U.S. Pat. No. 4,862,624.

Commercially available telescopic sight mounts are often frustrating to install for a novice weapons user. It is not unusual for a weapons user to actually damage a telescopic sight by undisciplined manipulation of the sight itself during installation onto a weapon.

Police force, military personnel and numerous civilian and scientific agencies view improvements in the convenience, ease and speed of the installation of reliable and accurate telescopic or directional mounts onto firearms and measuring or beam generating equipment to be of significant value.

Furthermore, devices used to mount telescopic sights onto weapons are often especially adaptable to wider applications in the areas of scientific, medical, police and military equipment.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a device that mounts a sighting mechanism onto direction specific equipment. In keeping with this objective, the present invention provides a rear assembly and a front assembly.

The rear assembly comprises a rear base and a rear assembly ring. The rear base is attached to a direction specific equipment, and the rear assembly ring secures a sight. The rear assembly ring is detachable from the rear base. The rear assembly ring splits into two parts that are used to capture the body of the sight. The two parts of the rear assembly ring are attached together around the sight.

The front assembly comprises a front base and a front assembly ring. The front base is attached to the direction specific equipment, and the front assembly ring secures the sight. The front assembly ring is detachable from the front base. The front assembly ring splits into two parts that are used to capture and secure the body of the sight. The two parts of the rear assembly ring are attached together around the sight.

The rear and front assembly rings are respectively inserted into the rear and front bases. In certain preferred embodiments of the present invention set screws are used to rigidly secure the rear and assembly rings to the rear and front bases.

In alternate preferred embodiments of the present invention the rear and front assembly rings are of identical manufacture. This design feature, when implemented, reduces the costs of manufacture, distribution and maintenance.

In alternate preferred embodiments of the present invention the entire rear and front assemblies are of identical manufacture. The costs of manufacture, distribution and maintenance are thus even further reduced in those preferred embodiments wherein this design feature implemented.

Certain alternate preferred embodiments of the present invention comprise a single unified base wherein all of the key features of the rear and front bases are included and provided.

The preferred embodiment is constructed of stainless steel, plastic, metal or metal alloy, or other suitable material known in the art.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 illustrates a preferred embodiment of the present invention installed onto a receiver of a rifle and securing a telescopic site.

FIGS. 2A and 2B depicts individual front views of a preferred embodiment of a rear assembly ring and a front assembly ring of the preferred embodiment of FIG. 1.

FIGS. 3A and 3B disclose two sides views of the rear assembly ring of the preferred embodiment of FIG. 1 attached to the telescopic sight and unattached to a rear base.

FIGS. 4A and 4B present two sides views of the front assembly ring of the preferred embodiment of FIG. 1 attached to the telescopic sight and unattached to a front base.

FIGS. 5A and 5B illustrate two side views of the rear base of the preferred embodiment of FIG. 1.

FIGS. 6A and 6B depict two side views of the front base of the preferred embodiment of FIG. 1.

FIG. 7 is a detailed illustration of the preferred embodiment of the present invention of FIG. 1 installed onto the receiver of the rifle and securing the telescopic site.

FIG. 8 discloses an alternate preferred embodiment of the rear and front bases wherein the key features of the two bases are provided by means of a single unified base.

FIG. 9 is a CAD generated description of a preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

FIG. 1 illustrates a preferred embodiment of the present invention **8** installed onto the receiver **6** of a rifle **2** and securing a telescopic site **4**. The preferred embodiment of FIGS. 1 through 7 includes a rear assembly **7** and a front assembly **9**. The rear assembly **7** is mounted onto the receiver **6** closer to the trigger **3**, and the front assembly **9** is mounted further away from trigger **3**. As shown in the Figures, the rear assembly comprises a rear base **80** and a rear assembly ring **10**. The front assembly **9** includes a front base **100** and a front ring assembly **40**.

FIG. 2A depicts a front view of a preferred embodiment of a rear assembly ring **10** of the preferred embodiment of

FIG. 1. The rear assembly ring 10 comprises a first side 12 and a second side 26.

The first side 12 of the rear assembly ring 10 comprises a body 20, a tongue 14, a set screw hole 16, a ledge 18, and a top tapped hole 22.

The second side 26 of the rear assembly ring 10 comprises a body 34, a tongue 28, a tapped hole 30, a ledge 32, and a top tapped hole 36.

FIG. 2B depicts a front view of a front assembly ring 40 of the preferred embodiment of FIG. 1. The front assembly ring 40 comprises a third side 42 and a fourth side 44.

The third side 42 of the front assembly ring 40 comprises a body 46, a tongue 48, a set screw hole 50, a ledge 52, and a top tapped hole 54.

The fourth side 44 of front assembly ring 40 comprises a body 60, a tongue 62, a tapped hole 64, a ledge 66, and a top tapped hole 68.

FIGS. 3A and 3B disclose two sides views of the rear assembly ring 10 of FIG. 2A attached to a telescopic sight and unattached to a rear base. The top tapped holes 22 and 36 are attached together by means of a screw 70. The body 20 of the first side 12 and the body 34 of the second side 26 fit snugly around the telescopic sight 4.

FIGS. 4A and 4B present two sides views of the front assembly ring 40 of FIG. 2B attached to the telescopic sight 4 and unattached to a front base. The top tapped holes 54 and 68 are attached together by means of a screw 72. The body 46 of the third side 42 and the body 60 of the fourth side 44 fit snugly around telescopic sight 4.

FIGS. 5A and 5B illustrate two side views of the rear base 80. The rear base 80 comprises a body 82, threaded holes 84, a bushing 86, a shoulder 88, a thru hole 90 and a threaded set screw hole 92.

Threaded holes 84 are used to attach rear base 80 to the rifle receiver 6. The bushing 86 accepts the rear assembly ring tongues 14 and 28. The shoulder 88 presents a reliable support plane for the ledges 18 and 32 of the rear assembly ring 10.

The shoulder 88, the thru hole 90 and the threaded set screw hole 92 are used to repeatably, reliably and rigidly maintain the desired orientation of the rear assembly ring 10 when the rear assembly ring 10 is mounted into the rear base 80.

FIGS. 6A and 6B illustrate two side views of a front base 100. The front base 100 comprises a body 102, threaded holes 104, a bushing 106, a shoulder 108, a thru hole 110 and a threaded set screw hole 112.

The threaded holes 104 are used to attach the front base 100 to the rifle receiver 6. The bushing 106 accepts the rear assembly ring tongues 48 and 62 of the front assembly ring 40. The shoulder 108 presents a reliable support plane for the ledges 52 and 66 of front assembly ring 40.

The shoulder 108, the threaded hole 110 and the threaded set screw hole 112 are used to repeatably, reliably and rigidly maintain the desired orientation of the front assembly ring 40 when the front assembly ring 40 is properly mounted into the front base 100.

FIGS. 7A and 7B are detailed side views of a preferred embodiment of the present invention 8 installed onto the receiver 6 of the rifle 2 and securing the telescopic site 4. The attachment screws 120 thread directly through threaded holes 84 and 108, and thereby mount and secure the rear and front bases 80 and 100 to the receiver 6.

Tongues 14 and 28 of the rear assembly ring 10 are inserted into the bushing 86. The ledges 18 and 32 of the rear assembly ring 10 are resting against the shoulder 88 of the rear base 80.

Attachment screw 122 secures the second side 26 of the rear assembly ring 10 to the rear base 80 by threading through the thru hole 90 and into the tapped hole 30 of the second side 26. Furthermore, set screw 124 is threaded into the threaded set screw hole 92 of rear base 80 and fully towards the set screw hole 16 of the first side 12 of the rear assembly ring 10.

The additional pressure applied by the set screw 124 against the first side 12 increases the ruggedness and effectiveness of the present invention 8. In certain alternate preferred embodiments of the present invention the set screw hole 16 of the first side 12 is intentionally located slightly off center from set screw hole 92 so as to cause a slight jamming between set screw 124 and first side 12.

The first and second sides 12 and 22 fit snugly around the telescopic sight 4 and are secured together by the attachment screw 70, and as described above in reference to FIGS. 3A and 3B.

The tongues 48 and 62 of the front assembly ring 40 are inserted into the bushing 106. The ledges 52 and 66 of the front assembly ring 40 are resting against shoulder 108 of front base 100.

An attachment screw 126 secures the fourth side 44 of the front assembly ring 40 to the front base 100 by threading through the thru hole 110 and into the tapped hole 64 of the fourth side 44. Furthermore, a set screw 128 is threaded into the threaded set screw hole 112 of the front base 100 and fully towards the set screw hole 50 of the third side 42 of the front assembly ring 40.

The additional pressure applied by the set screw 128 against the third side 42 increases the ruggedness and effectiveness of the present invention 8. In certain alternate preferred embodiments of the present invention set screw hole 50 is intentionally located slightly off center from the threaded set screw hole 112 so as to cause a slight jamming between the set screw 128 and the third side 42.

The third and fourth sides 42 and 44 fit snugly around the telescopic sight 4 and are secured together by the attachment screw 72, and as described above in reference to FIGS. 4A and 4B.

FIG. 8 presents a view an alternate preferred embodiment of the rear and front bases 80 and 100 wherein the key features of the two bases are provided by means of a single unified base 130.

FIG. 9 is a CAD generated description of a preferred embodiment of the present invention.

I claim:

1. A sight mount for mounting a sight to a weapon, said sight mount comprising:

a rear assembly ring having a first side and a second side, said first side having a first body, a first tongue, a first set screw hole within said first tongue, a first ledge, and a first top hole, said second side having a second body, a second tongue, a second tapped screw hole within said second tongue, a second ledge, and a second top hole, said rear assembly ring configured to be detachably secured to the sight by fitting said first body and said second body around the sight and securing said first side to said second side with a top screw placed through said first top hole and said second top hole;

a front assembly ring having a third side and a fourth side, said third side having a third body, a third tongue, a third set screw hole within said third tongue, a third ledge, and a third top hole, said fourth side having a fourth body, a fourth tongue, a fourth tapped screw hole

within said fourth tongue, a fourth ledge, and a fourth top hole, said front assembly ring configured to be detachably secured to the sight by fitting said third body and said fourth body around the sight and securing said third side to said fourth side with a top screw placed through said third top hole and said fourth top hole;

a rear base configured to be detachably secured to the weapon, said rear base having a rear base body with a rear bushing, a rear shoulder atop said rear bushing, a through hole and a threaded set screw hole; said rear bushing configured to accept said first tongue and said second tongue of said rear assembly ring within said first ledge and said second ledge with said first ledge and said second ledge resting against said rear shoulder, said rear shoulder providing a support plane for said first ledge and said second ledge;

wherein said rear assembly ring is configured to be detachably secured to said rear base by inserting said first tongue and said second tongue of said rear assembly ring into said rear bushing with said first ledge and said second ledge resting against said rear shoulder, securing said second side of said rear assembly ring to said rear base with an attachment screw inserted through said through hole and threaded into said second tapped screw hole in said second side, and securing said first side of said rear assembly ring to said rear base with a set screw threaded through said threaded set screw hole and into said set screw hole of said first side; and

a front base configured to be detachably secured to the weapon, said front base having a front base body with a front bushing, a front shoulder atop said front bushing, a through hole and a threaded set screw hole; said front bushing configured to accept said third tongue and said fourth tongue of said front assembly ring within said third ledge and said fourth ledge with said third ledge and said fourth ledge resting against said front shoulder, said front shoulder providing a support plane for said third ledge and said fourth ledge;

wherein said front assembly ring is configured to be detachably secured to said front base by inserting said third tongue and said fourth tongue of said front assembly ring into said front bushing with said third ledge and said fourth ledge resting against said front shoulder, securing said fourth side of said front assembly ring to said front base with an attachment screw inserted through said through hole and threaded into said fourth tapped screw hole in said fourth side, and securing said third side of said front assembly ring to said front base with a set screw threaded through said threaded set screw hole and into said set screw hole of said third side.

2. The sight mount of claim 1, wherein said threaded set screw hole of said rear base is located slightly off center from said set screw hole of said first side of said rear assembly ring.

3. The sight mount of claim 1, wherein said threaded set screw hole of said front base is located slightly off center from said set screw hole of said third side of said front assembly ring.

4. The sight mount of claim 1, wherein said rear base and said front base are joined together in a single unified piece.

5. The sight mount of claim 1, wherein said rear base and said front base are separate from one another.

6. The sight mount of claim 1, wherein said rear base includes a plurality of threaded holes for detachably securing said rear base to the weapon with a plurality of attachment screws.

7. The sight mount of claim 1, wherein said front base includes a plurality of threaded holes for detachably securing said front base to the weapon with a plurality of attachment screws.

* * * * *

EXHIBIT K

[redacted]

US007272904B2

(12) **United States Patent**
Larue

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(54) **ADJUSTABLE THROW-LEVER PICATINNY RAIL CLAMP**

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(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 420 days.

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(51) **Int. Cl.**
F41G 1/38 (2006.01)

(52) **U.S. Cl.** 42/127; 42/124; 42/125; 292/43; 292/145; 292/155; 292/176

(58) **Field of Classification Search** 42/111–148; 292/43, 145, 155, 176
See application file for complete search history.

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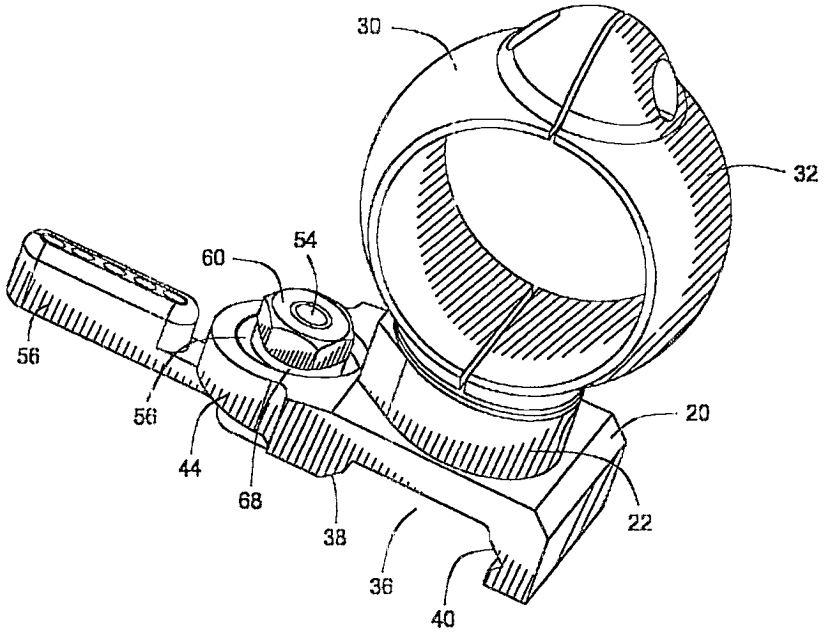
(57) **ABSTRACT**

A throw-lever releasable mounting system for mounting a device in quick-release relation to a support member has a mounting base having a configuration fitting opposed angulated rail surfaces and having a locator key engaging a positioning slot of the rail. Each mounting base provides for mounting and stabilization of optics mounting rings. A locking platform projects from the mounting base and defines a locking opening having a circular hard metal insert therein that defines a receptacle receiving a resilient member and providing for location of the spline/spindle shaft of a rotatable locking plate. A locking plate of a throw-lever that is rotatable between locking and unlocking positions has angulated and curved cam surfaces for forcibly engaging correspondingly angulated surfaces of the rail to achieve cam energized precision locating and locking engagement with the rail. A non-circular section of a spline/spindle shaft of the throw-lever is receives a drive member in non-rotatable and linearly moveable relation. Resilient members are interposed between the drive member and the hardened insert and prevent free throw-lever movement at the release position thereof.

21 Claims, 16 Drawing Sheets



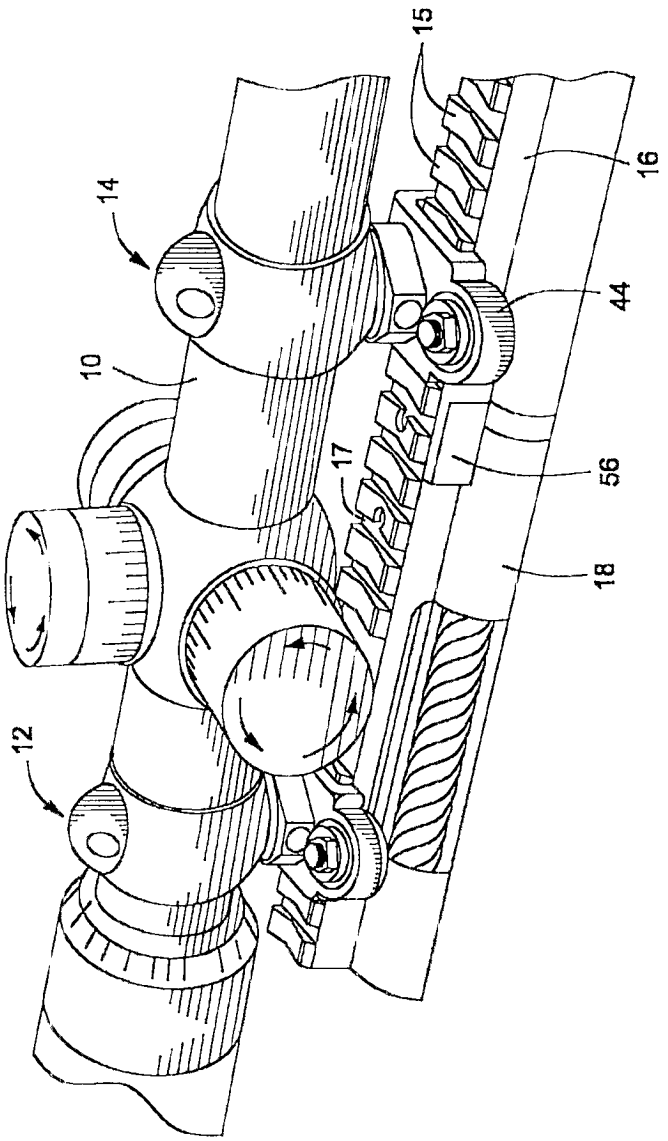


FIG. 1

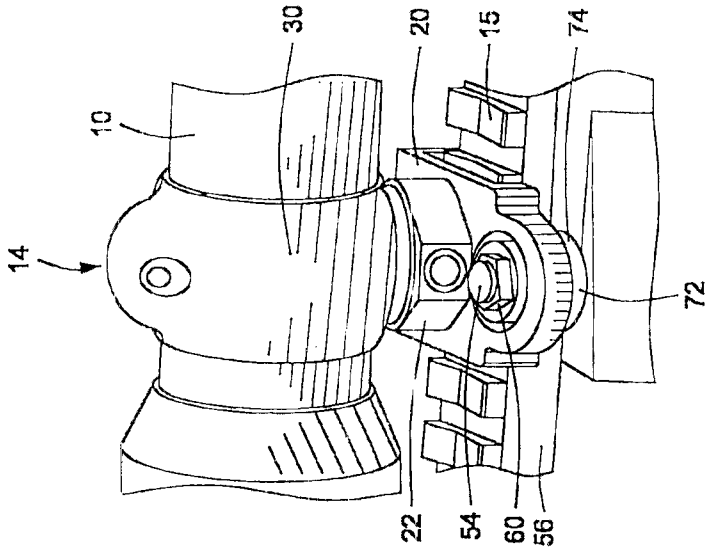


FIG. 3

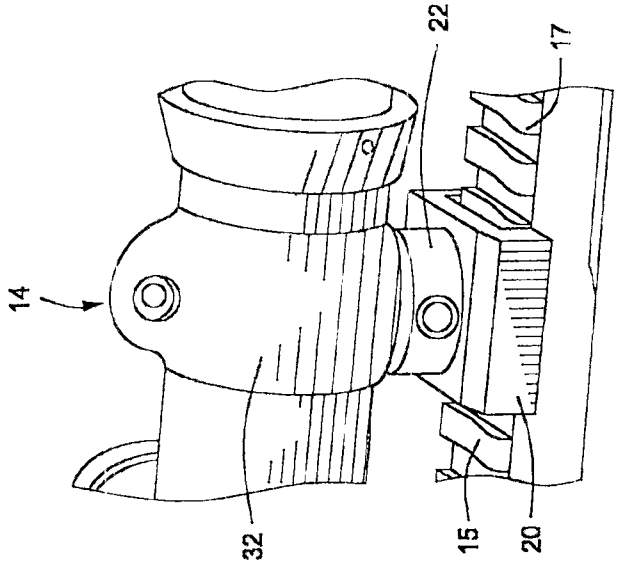
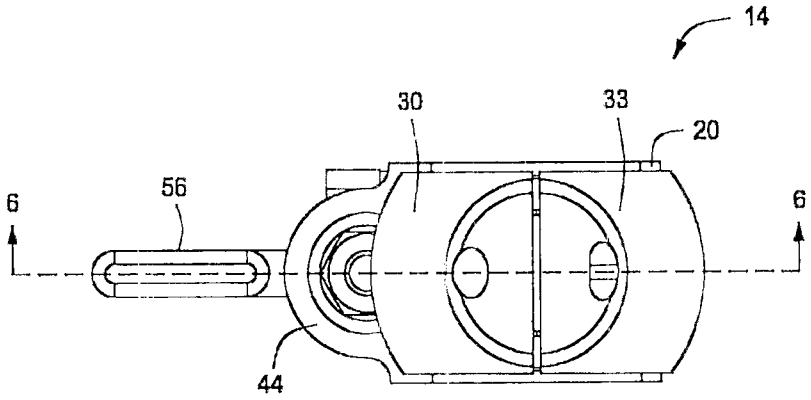


FIG. 2



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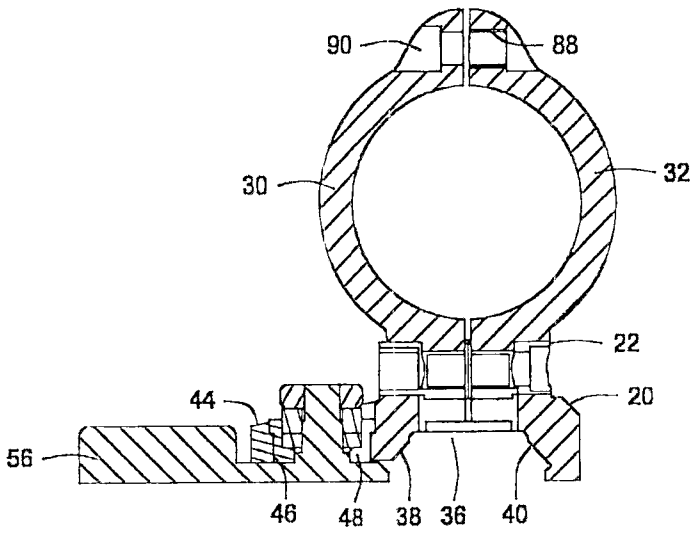
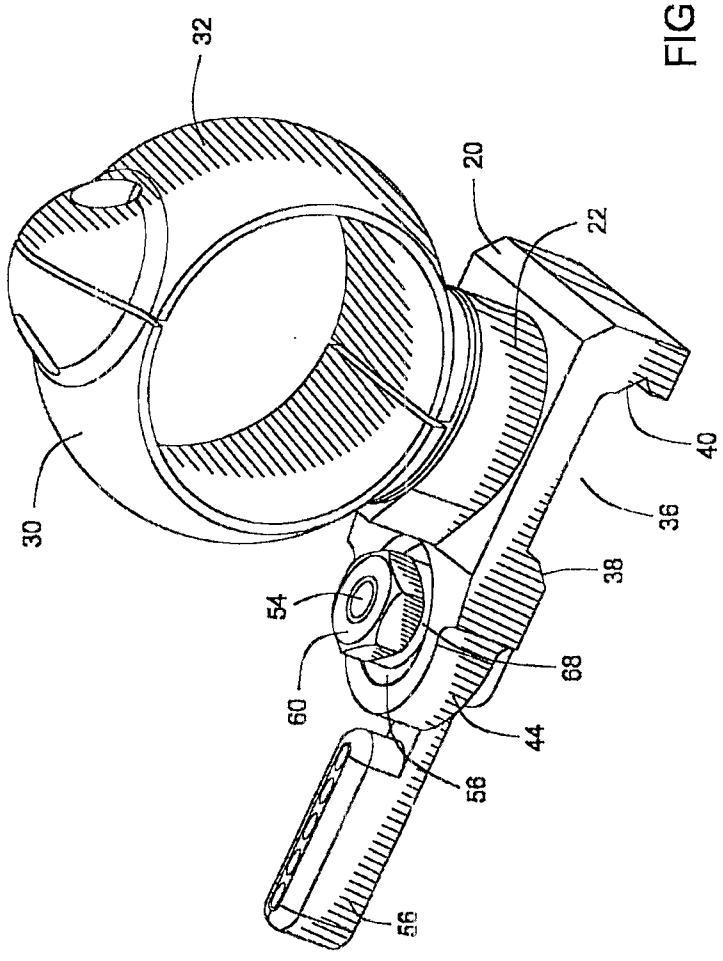


FIG. 6



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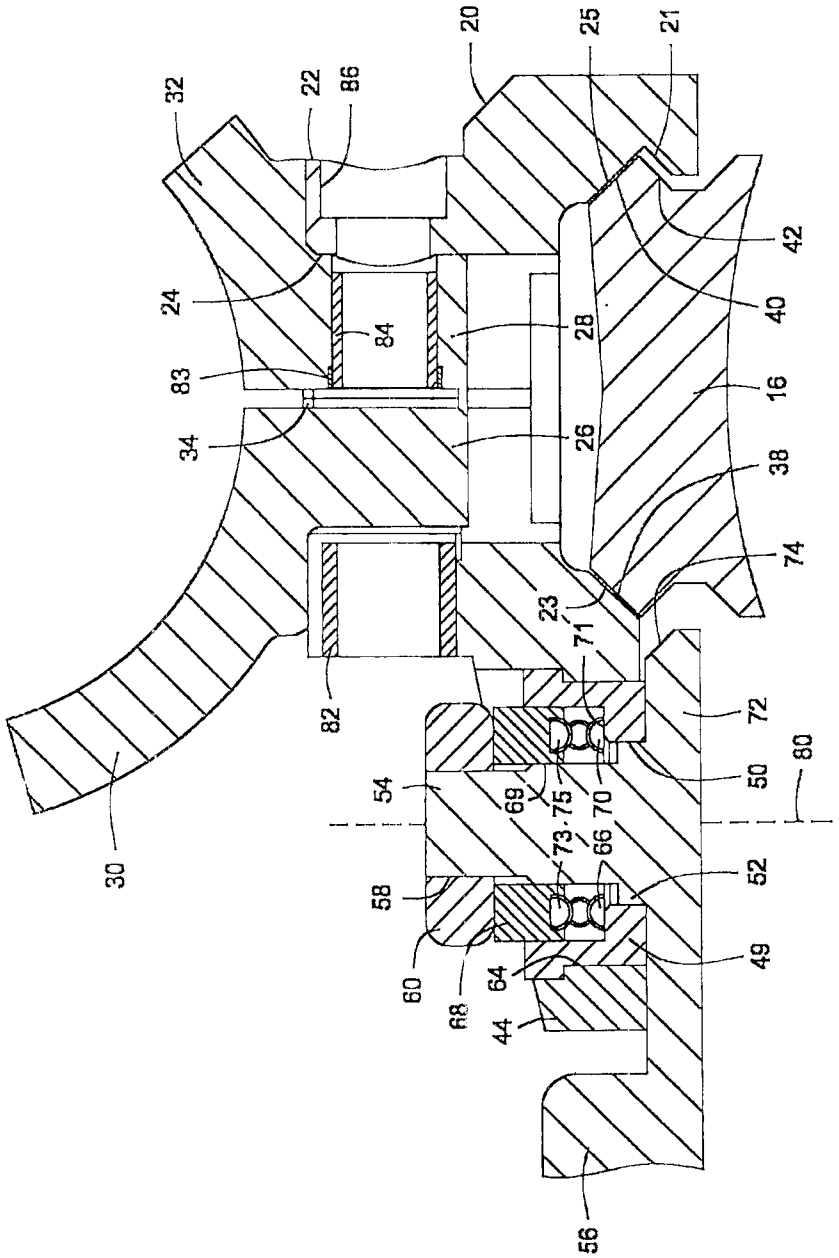
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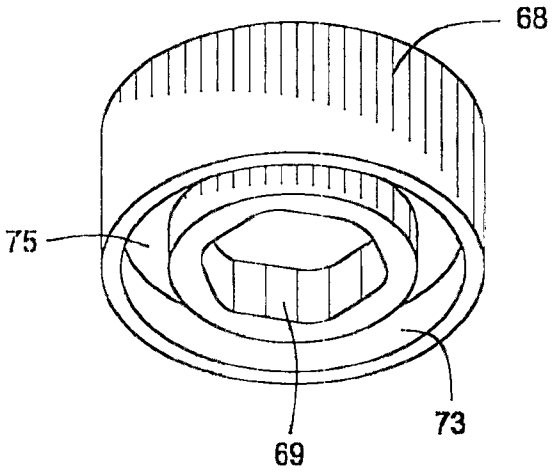
FIG. 7



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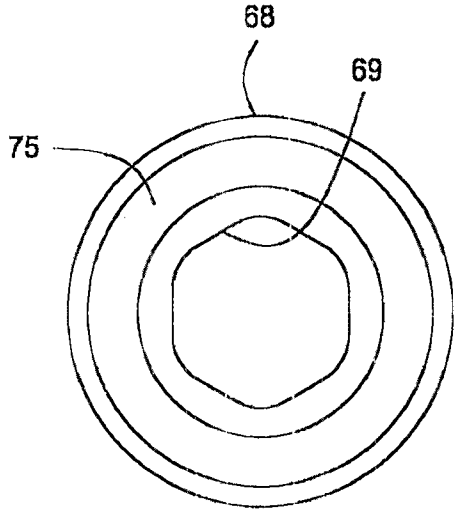


FIG. 9

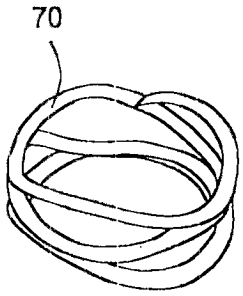
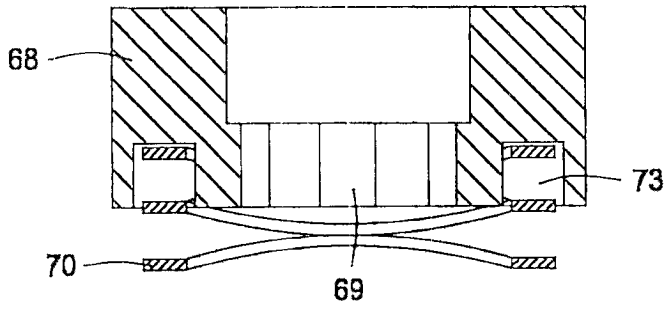


FIG. 10



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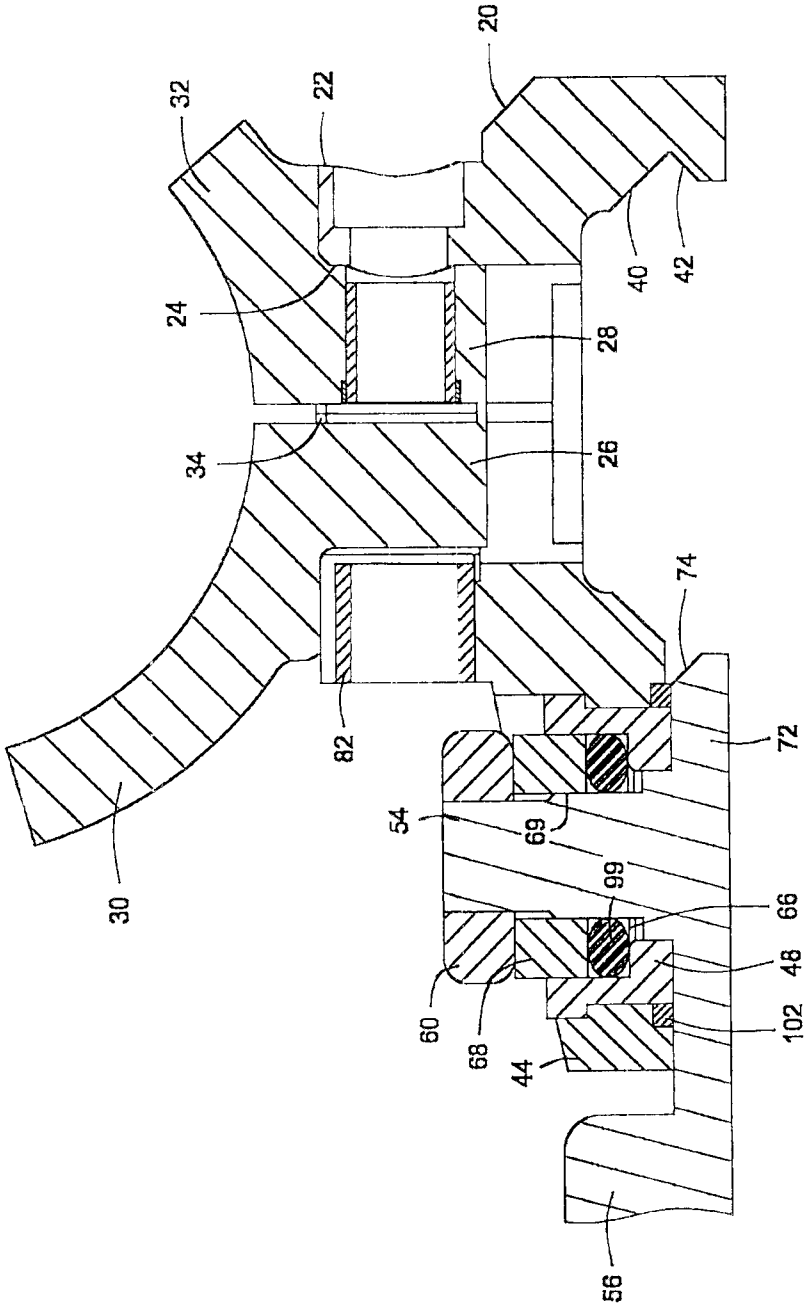

FIG. 12

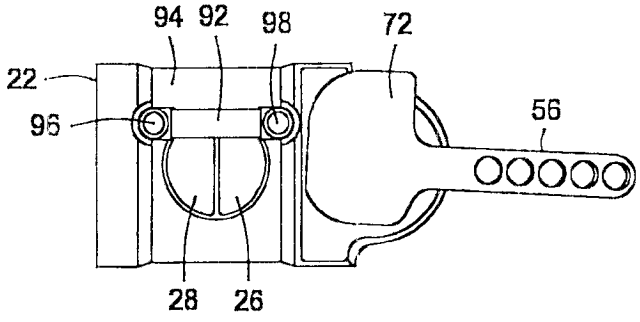

FIG. 13

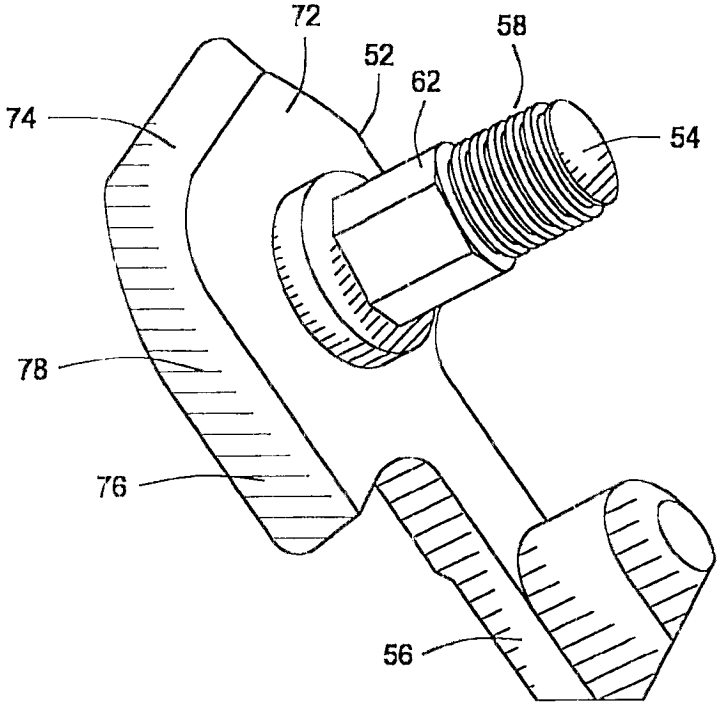

FIG. 14

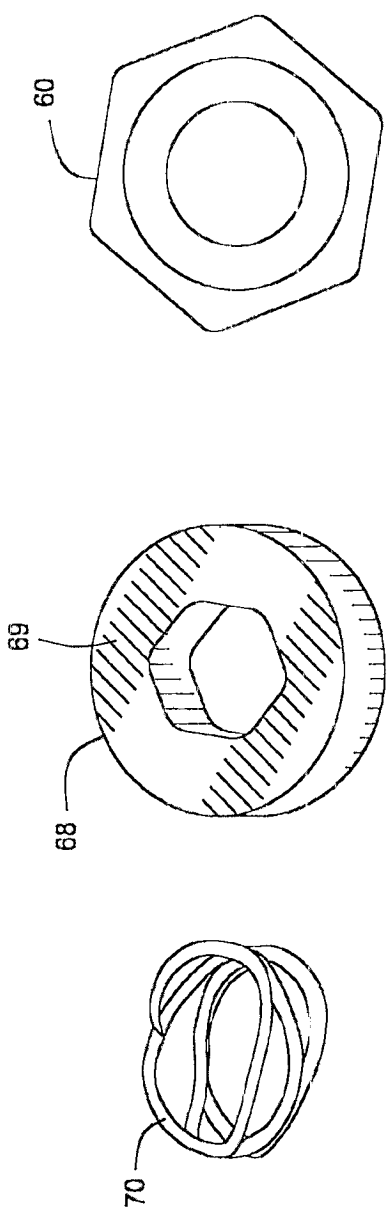

FIG. 15

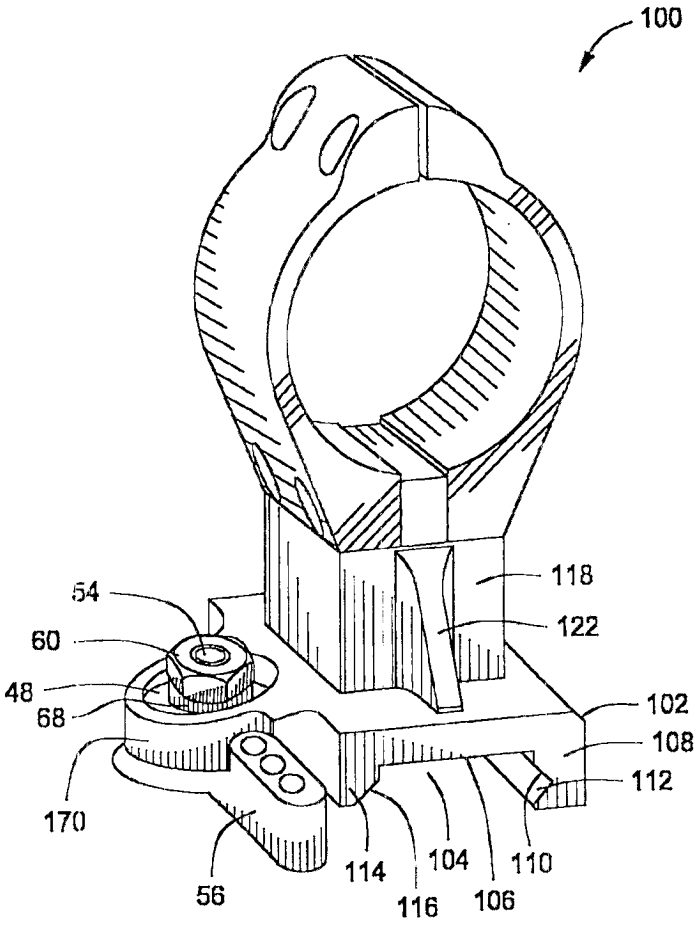

FIG. 16

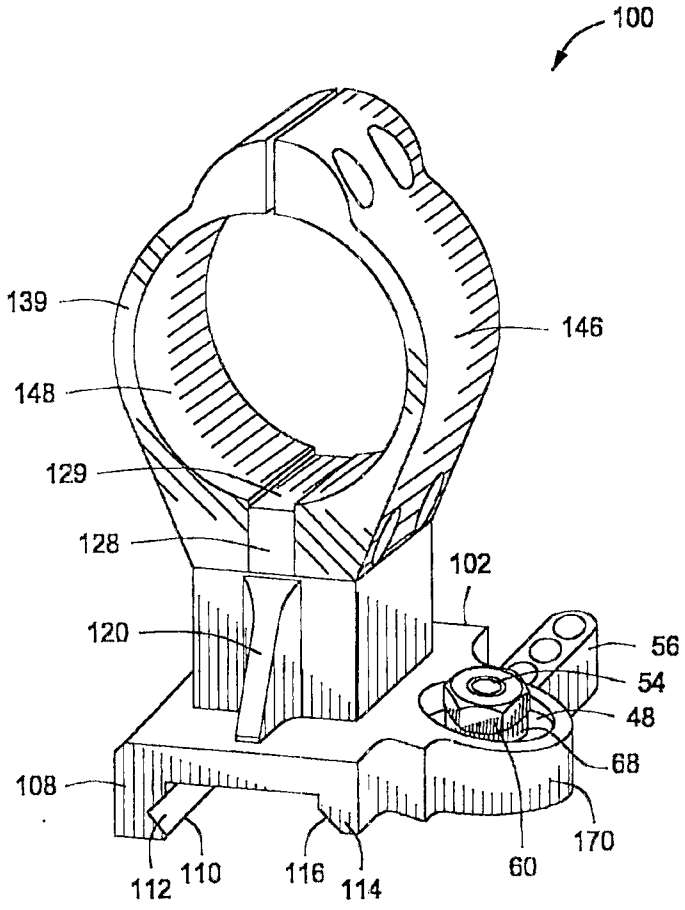
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FIG. 17

FIG. 18

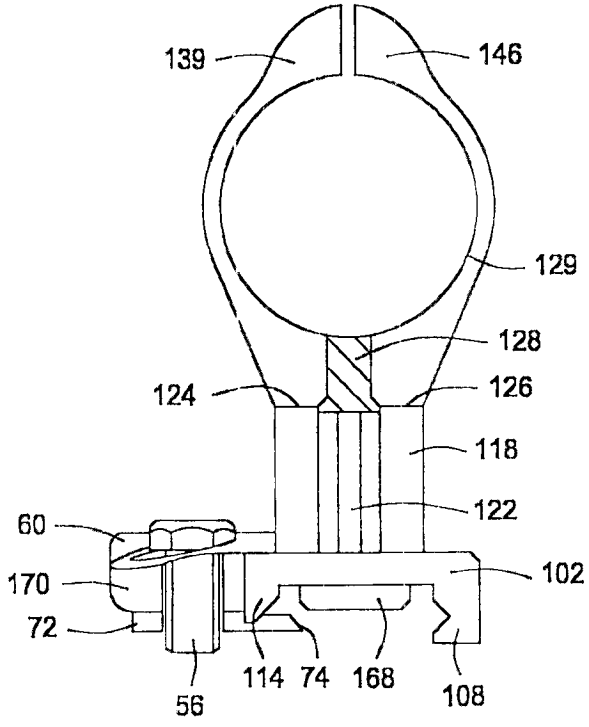
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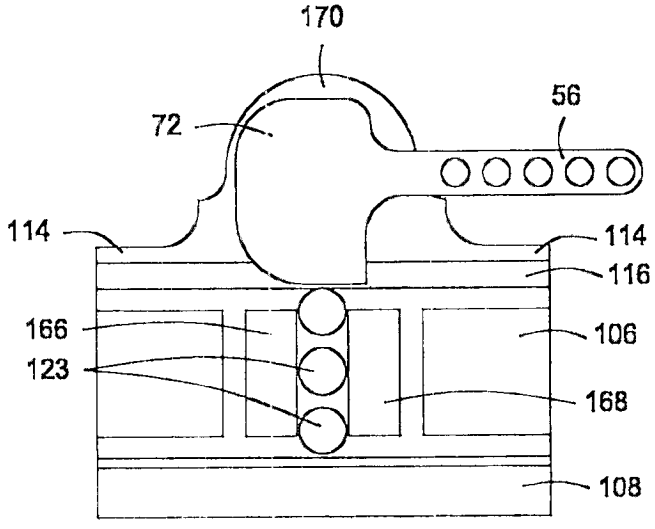
FIG. 19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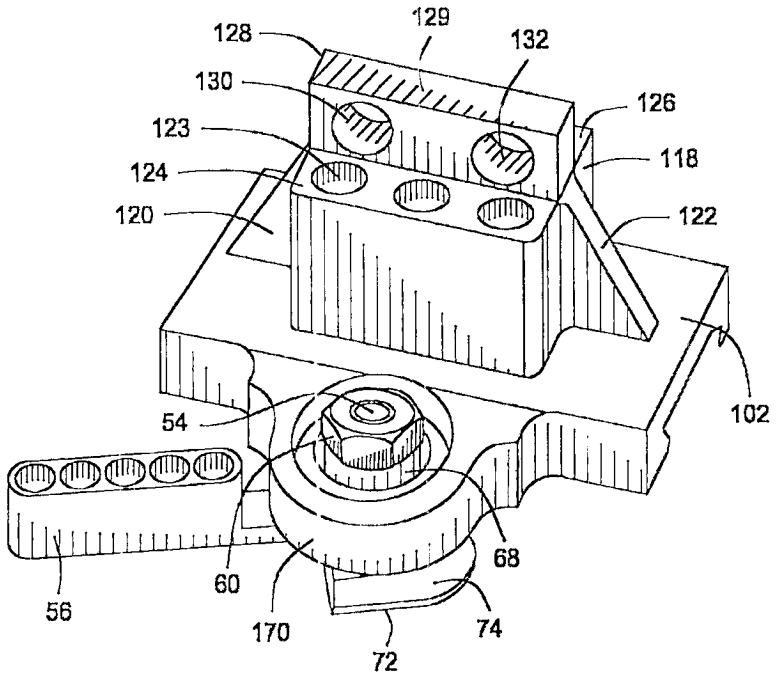
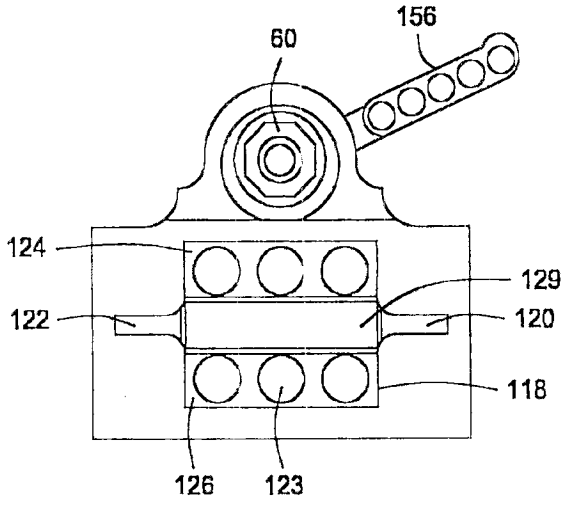


FIG. 20



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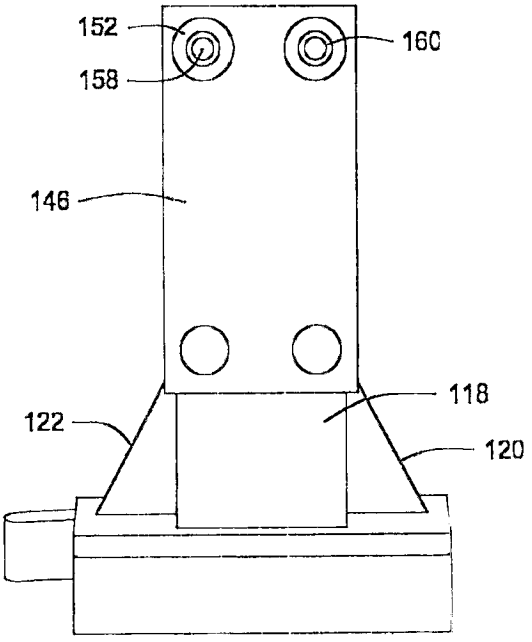

FIG. 22

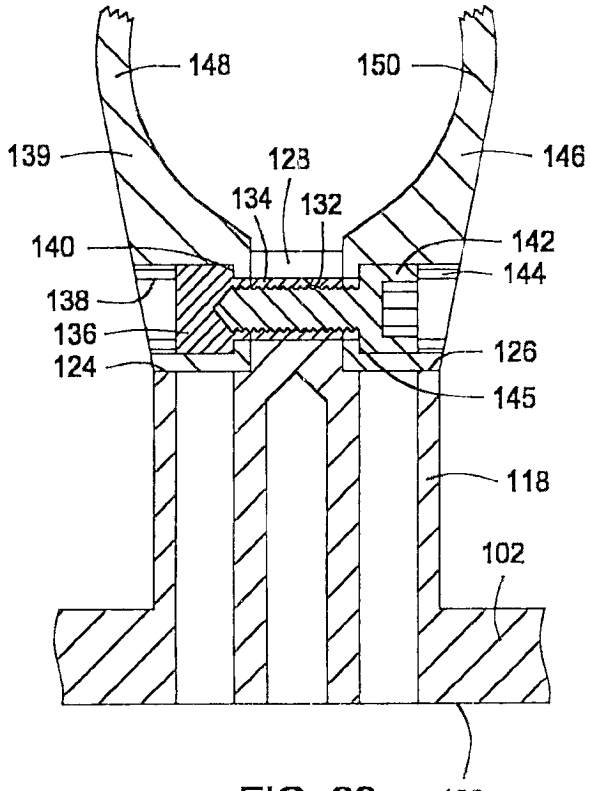
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FIG. 23

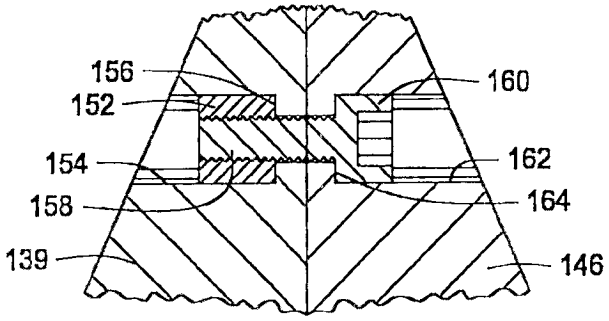
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FIG. 24

ADJUSTABLE THROW-LEVER PICATINNY RAIL CLAMP

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to quick-release mounting devices for releasably mounting various devices on a support structure. The present invention also relates to firearms and more particularly to releasable sighting or aiming devices for rifles. More particularly, the present invention concerns mounting devices having adjustable locking mechanisms and mounting rings for releasably securing aiming devices, such as the sighting telescopes of rifles and similar firearms and for maintaining optimum sighting accuracy even when the firearm is subjected to repeated heavy recoil when firing high velocity, large bore ammunition. Even more particularly, the present invention concerns locking type mounting rings that enable rifle sighting devices to be simply and efficiently removable and replaceable under field conditions while maintaining a preset zero when replaced.

2. Description of the Prior Art

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. The throw-lever of Swan is not adjustable, though the patent makes incorrect assumptions of its adjustability. A subsequently developed throw-lever actuated releasable optical sight mount system is set forth in U.S. Pat. No. 5,276,988 of Swan, which compensates for the inability of the throw lever to accomplish repeatability of precision positioning over extended periods of repeated firing of tactical rifles. This later patent of Swan discloses a throw-lever actuating mechanism of similar nature as set forth in U.S. Pat. No. 4,845,871, with the exception that the optical sight mount incorporates a buffer element in the form of a shim between the attachment device camming surface and the area to which the attachment device is affixed. U.S. Pat. No. 6,026,580 of Mark C. LaRue, the inventor of the present invention, discloses a self-centering and self-aligning optical sight mounting system, including front and rear mounting ring assemblies and mounting bases for mounting an optical sighting device on a firearm such as a rifle or on other devices.

SUMMARY OF THE INVENTION

It is a primary feature of the present invention to provide novel mounting rings for retaining sighting devices, such as telescopes, low light optical devices, mechanical sighting devices on firearms such as rifles and to permit removal and replacement of the sighting devices, even under field conditions, without losing the preset zero of the sighting device;

It is another feature of the present invention to provide a novel optical sight mounting system which permits one or several daylight, night or close combat optical sighting devices to be selectively interchanged on a firearm in a manner that maintains the preset sighting zero of each of the optical sighting devices with respect to the firearm that is involved; and

It is also a feature of the present invention to provide a novel optical sight mounting system that employs self-centering and self-aligning optical sight mounting rings that eliminates the need for lapping for achieving a close fit with the tube of an optical sighting device and prevents damage to an optical sighting device by tube distortion from clamping force.

Though the present invention is discussed herein particularly with its application to adjustable quick-release mounting devices for firearm optical sighting devices, it should be borne in mind that it is not intended to limit the spirit and scope of the present invention solely to use in conjunction with firearms. The present invention clearly has a wide range of application in circumstances where a device is intended to be releasably mounted in stable fashion to a supporting structure. For example, the present invention has application to camera and spotting scope mounts that are used in connection with various sporting events and commercial activities. Many other uses of the present invention will become obvious to one skilled in the art upon acquiring a thorough understanding of the present invention.

Briefly, the various objects and features of the present invention are realized by a sighting device mounting system that is designed particularly for mounting to Picatinny rails, Weaver rails or other similar mounting base rail systems. Front and rear, substantially identical throw-lever actuated mounting ring assemblies are provided, each having a base structure having a portion thereof configured for fitting opposed angulated rail surfaces and having a locator element that is received within one of the multiple positioning slots of the rail. The base structures each receive a self-centering and self-aligning tube mounting ring for retaining the tube of an optical sighting device or engaging a circular portion of any supported device.

The base structures are each provided with integral laterally projecting lock supports, each defining a receptacle receiving the spline/spindle shaft of a rotatable locking plate. The rotatable locking plate has angulated cam surfaces merging with a central curved cam surface for forcibly engaging correspondingly angulated rail surfaces to achieve cam energized locking engagement with the angulated rail surfaces. Throw-levers project from each of the rotatable locking plates to provide for manual rotation of the rotatable locking plates during locking and unlocking. At least a portion of the spline/spindle shaft is of non-circular, typically hexagonal cross-sectional configuration and receives a generally circular drive washer member having a central opening of corresponding non-circular configuration so as to have non-rotatable and linearly moveable relation with the spline/spindle shaft. To provide a light weight optical sight mount for firearms, the mounting base and the support rings of the sight mounting system are preferably composed of a light-weight material such an aluminum alloy, hard polymer material or the like. The mounting base is drilled or otherwise formed to eliminate material and reduce the weight thereof. Since the light weight material are often quite soft and easily yielded by application of forces, hardened metal inserts composed of stainless steel, steel or other suitable hard materials are press-fitted or otherwise seated in appropriate openings or receptacles of the mount structure. These inserts are typically threaded so as to have threaded engagement with retainer elements such as Torx or Allen screws.

BRIEF DESCRIPTION OF THE DRAWINGS

So that the manner in which the above recited features, advantages and objects of the present invention are attained and can be understood in detail, a more particular description of the invention, briefly summarized above, may be had by reference to the preferred embodiment thereof which is

illustrated in the appended drawings, which drawings are incorporated as a part hereof.

It is to be noted however, that the appended drawings illustrate only a typical embodiment of this invention and are therefore not to be considered limiting of its scope, for the invention may admit to other equally effective embodiments.

In the Drawings:

FIG. 1 is a pictorial representation showing a sight mounting rail on a firearm and showing releasable, adjustable optical sight mounting rings embodying the principles of the present invention and being in locked assembly with the sight mounting rail and mounting an optical sighting device;

FIG. 2 is a pictorial representation of one of the optical sight mounting ring assemblies of FIG. 1 showing one side of the releasable and adjustable mounting ring assembly of the present invention;

FIG. 3 is a pictorial representation showing the opposite side of the releasable and adjustable mounting ring assembly shown in FIG. 2 and showing the lever actuated locking mechanism in the locked position thereof;

FIG. 4 is a plan view of the releasable and adjustable mounting ring assembly of FIGS. 1-3 and showing the locking lever thereof in its release position and with a wave spring providing an urging force on the locking lever assembly;

FIG. 5 is an isometric illustration of the releasable and adjustable mounting ring assembly of the present invention, again with the locking lever being shown in the release position thereof;

FIG. 6 is a sectional view of the releasable and adjustable mounting ring assembly taken along line 6-6 in FIG. 4, with the locking lever being shown in the release position thereof;

FIG. 7 is a partial sectional view of the releasable and adjustable mounting ring assembly of the present invention and with the locking lever being shown in the release position thereof;

FIG. 8 is an isometric illustration of a drive nut component of the locking lever assembly and showing a downwardly facing annular spring recess for receiving a wave spring or one or more O-ring type locking lever resistance members;

FIG. 9 is a bottom view of the drive nut component of FIG. 8;

FIG. 10 is a side elevational view showing a wave spring that is received by the downwardly facing annular spring recess of the drive nut member of FIG. 8;

FIG. 11 is a sectional view of the drive nut member of FIGS. 8 and 9;

FIG. 12 is a partial sectional view of an alternative embodiment of the releasable and adjustable mounting ring assembly of the present invention, showing the use of resilient O-ring members which retard inadvertent throw-lever movement at the unlocked position of the adjustable mounting ring assembly.

FIG. 13 is a bottom view of the releasable and adjustable mounting ring assembly of the present invention showing the bottom of the locking lever and showing the offset position of a rail slot engaging sight locator key element with respect to the pivot point of the locking lever;

FIG. 14 is a partial isometric illustration of the locking lever, showing the non-circular configuration of the lever spline/spindle post and showing the threaded terminal end of the lever pivot shaft or post;

FIG. 15 is an isometric illustration showing the disassembled components of the adjustment assembly of the adjustment mechanism of the locking lever and showing the wave spring and the non-circular opening that is defined by a spring urged drive washer member of the locking lever adjustment mechanism;

FIG. 16 is an isometric illustration showing a preferred embodiment of the present invention comprising a releasable, adjustable optical sight mounting ring assembly having a locking lever assembly of the nature shown in FIG. 1;

FIG. 17 is another isometric illustration showing the releasable, adjustable optical sight mounting ring assembly of FIG. 16;

FIG. 18 is a front elevational view of the releasable, adjustable optical sight mounting ring assembly of FIGS. 16 and 17;

FIG. 19 is a bottom view of the releasable, adjustable optical sight mounting ring assembly of FIGS. 16-18;

FIG. 20 is an isometric illustration showing the releasable, adjustable optical sight mounting ring assembly, with the sighting device mounting elements removed and showing the detailed structure of the mounting base;

FIG. 21 is a plan view of the mounting base structure of FIG. 20;

FIG. 22 is a elevational view showing the opposite side of the releasable, adjustable optical sight mounting ring assembly as compared with the views of FIGS. 16 and 17;

FIG. 23 is a partial transverse sectional view taken along line 23-23 of FIG. 22; and

FIG. 24 is a partial transverse sectional view taken along line 24-24 of FIG. 22.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENT

Though the present invention is discussed herein particularly as it relates to releasable mounts for firearms, particularly tactical rifles used by military and law enforcement personnel, it is to be understood that this invention has application for support of devices other than optical sighting devices on other objects. Referring now to the drawings and first to FIG. 1, an optical sighting device 10, such as a sighting telescope, is supported by front and rear mounting ring assemblies, shown generally at 12 and 14, that mount the sighting device on a mounting rail 16, such as a Picatinny rail or a Weaver rail or the like which is affixed to a firearm 18 or other object. The rail 16 defines a number of evenly spaced upwardly extending mounting projections 15 with evenly spaced transverse slots 17 therebetween to provide for selective location of an optical device on the firearm. As is evident in FIG. 7, each of the spaced upwardly extending mounting projections defines undercut parallel, oppositely angulated clamping surfaces 19 and 21 and oppositely angulated, typically upwardly facing support surfaces 23 and 25 that are disposed in angulated relation with one another. Each of the clamping surfaces 19 and 21 and the support surfaces 23 and 25 are initially formed by elongated surfaces, typically extending the length of the rail structure 16 and are interrupted by transverse slots 17 that are machined or otherwise formed in evenly spaced relation along the length of the rail.

Each of the mounting ring assemblies 12 and 14 incorporates a mounting base 20 having an integral, upwardly projecting member or boss 22 that is internally machined to define a receptacle 24 within which is received the depending mounting tongue elements 26 and 28 of mounting ring sections 30 and 32. The mounting ring sections 30 and 32 are secured together by fastener members, such as Torx screws, Allen screws or the like, to establish clamping retention of

the mounting ring sections **30** and **32** to a tubular housing member of a sighting device such as an optical sighting device or telescope or a laser sighting device. Where fastener members such as retainer screws and set screws are employed to secure soft metal members, such as aluminum members, in assembly, hard metal inserts, typically composed of steel, such as stainless steel, are press-fitted into drilled or bored openings in the soft metal members as shown in FIGS. **6** and **7** as well as FIGS. **23** and **24**. These hard metal inserts are typically internally threaded and provide the soft metal members with exceptional resistance to wear or thread damage by hard metal retainer screws and the like. The hard metal inserts may be seated on internal support shoulders of the mounting ring sections to ensure against movement thereof by the forces that are developed when screws are tightened by screwdrivers or by Allen or Torx wrenches.

In the embodiment of FIGS. **1-15**, as shown particularly in FIGS. **7** and **12**, one or more shims **34** are located between the mounting tongue elements **26** and **28**. The shims ensure proper spacing of the mounting ring sections **30** and **30** for optimum gripping relation with the tubular housing of the optical sighting device, without causing collapsing, excessive application of torque force or causing other damage to the tubular housing of the sighting device and the internal sighting mechanism thereof. The fastener screws of each of the mount bases are sequentially tightened to ensure even and efficiently controlled gripping of the tubular housing of the sighting device, without subjecting the tubular housing to torque forces during tightening. This feature ensures against mount tightening force deformation of tubular telescope sections and thus ensures protection of delicate internal telescope components from damage and accelerated wear.

The mounting base **20** is configured to define a rail receiving receptacle **36** with spaced, downwardly and oppositely angulated surfaces **38** and **40** which are oriented for contact with correspondingly angulated support surfaces **23** and **25** of the rail **16**. The mounting base **20** also defines an upwardly angulated surface **42** that is positioned for retaining engagement with a correspondingly angulated clamping surface **21** of the rail **16**.

A locking platform **44** is integral with and extends laterally from each of the mounting bases **20** and defines an opening **46** within which is seated an annular insert **48** that is composed of a suitable hard, wear and impact resistant metal material such as steel, stainless steel, titanium alloy or any suitable non-metal material having wear and impact resistance. The annular insert **48** defines a central opening **50** that receives an upwardly projecting circular shoulder **52** of a spline/spindle shaft or post **54** in rotatable relation therein. The spline/spindle shaft **54** is integral with and projects upwardly from a manually rotated cam plate of a locking lever structure **56**, also referred to as a "throw-lever", as shown in FIGS. **6** and **7**. The manually rotated locking lever structure **56** of each ring assembly **12** and **14** is manipulated, i.e., rotated, for locking and unlocking of the front and rear mounting bases **20** from the rail **16** when it is desired to remove and replace the optical sighting device **10**. Especially when the sighting device is being used on firearms under tactical circumstances, this feature permits the sighting device to be carried in protective fashion, such as in a pocket of a personnel pack, and when its use is needed, the user will simply and quickly clamp the sighting device to the rail device **16** of the firearm, with the sighting device being accurately positioned at its pre-set sighting position or zero. This feature permits a sighting device to be unlocked, removed and re-assembled and locked in place without losing its preset aim point or zero.

The outer or terminal extremity of the spline/spindle shaft **54** is threaded as shown at **58** for receiving an adjustment nut **60**. The threaded section **58** and the internal threads of the adjustment nut **60** are cut on a slightly different pitch to cause interference tightening of the nut on the threaded section **58** of the spline/spindle shaft **54** as the adjustment nut is rotated in the direction, typically clockwise, during assembly of the adjustment nut to the spline/spindle shaft **54**. This feature minimizes the potential for loosening of the adjustment nut **60** after it has been selectively positioned on the spline/spindle shaft **54**. However, if further tightening or loosening of the adjustment nut is needed, such as for increasing or decreasing the clamping force of the mounting base **20** on the rail **16** of a firearm, rotational movement of the adjustment nut **60** is easily accomplished through the use of a simple hex wrench. The interference tightening arrangement ensures that the adjustment nut **60** will remain in any pre-set position even when the mounting ring assembly of a sighting device is subjected to impacts, vibration or other rough treatment.

The spline/spindle shaft **54** is also provided with a shaft section **62** of non-circular cross-sectional configuration that may be hexagonal or may have any other non-circular cross-sectional configuration as desired. The shaft section **62** is also referred to herein as a "spline section", with the non-circular configuration or spline thereof extending longitudinally of the spline/spindle shaft **54** from the external y threaded section **58** to the circular shoulder **52**. The spline/spindle shaft **54** and the inner cylindrical surface **64** of the annular insert **48** are of significantly different dimensions, thus defining an annular space **66** therebetween within which a drive washer member **68** and one or more resilient members are received. The resilient member or members preferably comprise a single wave spring **70**, as shown in FIGS. **7** and. **15**, but may comprise one or more resilient O-rings as shown in FIG. **8** or may comprise one or more washer-like springs referred to as Belleville springs or washers. Typically, however, the spring forces achieved by one or more Belleville springs used in this fashion would be quite high and might add significantly and unnecessarily to the rotational force that is required to rotate the locking lever to and from its locking position and at its unlocked condition. Also, Belleville springs minimize permissible linear movement of the drive washer member **68** as the springs are subjected to compression force by tightening the adjustment nut **60**. Thus, Belleville springs are not considered preferred resilient components for the locking lever assembly. The annular insert **48** defines an upwardly facing internal shoulder surface **71** which serves to retain the lowermost portion or the lowermost one of the resilient member or members within the annular space **66**. A lower portion of the drive washer member **68** extends into the annular space **66** and defines an annular downwardly facing recess **73** within which the upper portion of the wave spring **70** is located to provide for spring centering and stabilization. The wave spring is maintained under compression between the upwardly facing annular surface **71** and an annular downwardly facing recess surface **75** of the drive washer member **68** and imparts a spring force to surfaces **71** and **75** that is only great enough to provide sufficient frictional resistance that prevents free rotational movement of the locking lever **56** when the locking lever is at its unlocked position as shown in FIGS. **7** and **12**. In other words, the wave spring **70**, or other resilient member or members **99**, prevent the locking lever from freely flopping about when it is unlocked.

Other resilient members discussed herein provide similar function. This feature is considered important to the tactical use of a firearm, especially in conditions of poor light, where the condition of the locking lever may need to be assured at any point in time, even in its unlocked condition. By minimizing the potential for locking lever movement when it is unlocked, the potential for undesired noise is minimized. This feature is quite important in tactical firearm use.

The drive washer member **68** defines a non-circular internal spline section **69** corresponding to the dimension and configuration of the non-circular external spline of the spline section **62** of the spline/spindle shaft **54**. The spline section **69** may be of hexagonal configuration or any other suitable non-circular configuration having mating, non-rotational relation with the non-circular external portion of the spindle/spline shaft **54**. This feature causes the drive washer member **68** to be non-rotatable and linearly moveable with respect to the spline/spindle shaft and rotatable along with the spline/spindle shaft as the locking lever **56** is manually rotated. Also, the axial length of the spline section **62** of the spline/spindle shaft **54** in comparison with the shorter axial length of the non-circular internal spline section **69** of the drive washer member **68** permits axial movement of the drive washer member by the adjustment nut **60** and the wave spring **70** for the purpose of increasing or decreasing the clamping force of the mounting base **20** with respect to the rail **16**. A firearm user is capable of achieving adjustment of the clamping force simply by rotating the adjustment nut with a simple hex wrench or other readily available adjustment tool.

The locking lever **56** is provided with an integral cam plate **72** from which the spline/spindle shaft **54** projects. Edge portions of the cam plate **72** define angulated, substantially straight tapered cam surface sections **74** and **76** that merge with an intermediate substantially curved tapered cam section **78** that is located eccentrically with respect to the longitudinal axis of the spline/spindle shaft **54**. Each of the tapered cam sections is inclined at an angle corresponding to the inclination and orientation of the undercut downwardly facing angulated clamping surface **19** of the rail **16**. Thus, manually energized rotation of the cam plate **72** by application of manual force to the locking lever **56** causes locking or unlocking movement of the mount assembly with respect to the sight mounting rail of the firearm.

During locking rotation of the cam plate the eccentric curved cam surface will engage the undercut downwardly facing angulated clamping surface **19**. As locking rotation continues, due to its eccentric orientation, the clamping force of the curved cam surface will increase as the distance of the curved cam surface from the pivot axis **80** increases until a maximum clamping force is reached at the merged juncture of the curved cam surface and the locking cam surface **76**. This maximum clamping force is easily controlled by selective rotation of the adjustment nut **60** so that metal deformation of the undercut downwardly facing angulated clamping surface **19** will not occur or will be minimized within acceptable limits. Further locking rotation of the cam plate by the locking lever **56** causes the substantially straight locking cam section **76** to move into face to face relation with the angulated clamping surface **19** of the rail **16**.

The cam surface sections **74**, **76** and **78** of the cam plate are positioned with respect to the pivot axis **80** of the spline/spindle shaft **54** so that engagement of the cam surface sections tighten on the corresponding angulated rail surfaces as the locking lever is rotated from the unlocking position to the locking position. At the unlocking position of the locking lever **56** the unlocking surface **74** is essentially clear of the angulated clamping surface **19** of the rail **16**, thus allowing lateral movement of the mounting base **20** to a position allowing separation of the mounting base from the rail structure. During locking rotation of the locking lever, the curved eccentric section **78** of the cam surface will engage the downwardly facing angulated surface **19** that extends along one side of the rail **16** and will cause forcible engagement of the angulated surfaces of the mounting base with corresponding angulated surfaces of the rail structure. After sufficient rotation of the locking lever has occurred, the substantially arcuate section **78** of the cam surface will have achieved desired clamping force and the substantially straight locking cam section **76** will move into locking engagement with the corresponding angulated rail surface **19**. Since the spacing of the locking cam section **76** from the axis **80** is slightly less than the maximum spacing of the curved cam surface from the axis **80** the force required for rotational locking movement of the locking lever **56** will decrease slightly when the locking position of the locking lever has been reached. This essentially over-center cam movement feature during locking movement causes the locking lever to remain at its locked position once the locking position has been achieved. When rotating the locking lever **56** from its locking position to its unlocked position the opposite over-center force transition occurs. During initial unlocking rotation of the cam plate **72** the curved cam surface section, being located eccentrically with respect to the axis of the spline/pivot shaft **80**, will cause slight tightening of the clamping force. During further unlocking rotation of the cam plate the curved cam surface section will move clear of the angulated rail surface **19**, thus releasing the clamping force completely. This feature ensures that the locking mechanism of the mount system remains either locked or unlocked unless manual force is applied to the locking lever by the user. This force enhancing rotary locking movement of the locking lever and the resistance of the locking lever **56** to be rotated to its unlocking position causes the locking lever to remain at its locked position and effectively prevents inadvertent unlocking movement of the locking lever **56** even during conditions of rough firearm handling in field conditions.

The desired cam-induced clamping force of the mounting ring assembly is achieved by rotation of the locking lever to its locked position and by controlled positioning of the locking nut **60** on the threaded portion of the pivot shaft **54**. The desired clamping force is typically achieved by controlled rotation of the locking nut **60** after the wave spring, or other resilient member has been substantially fully compressed or bottomed-out by downward movement of the drive washer member **68** responsive to adjustment rotation of the adjustment nut **60**. However, from a practical standpoint the user of the firearm will simply adjust the position of the adjustment nut to ensure positive clamping of the mount rings to the rail, without requiring excessive manual force for locking or unlocking movement of the locking lever **56**.

As mentioned above, one of the requirements for effective use of the releasable and adjustable sighting device ring mounts of the present invention by military and police personnel is the requirement that the mounting system be of light weight for ease of firearm handling and yet have sufficient structural integrity to minimize the potential for optics misalignment (loss of zero) by the repeated heavy impacts and vibration of weapon firing or by rough handling in field conditions. To accomplish these features the basic structure of the mounting base and optics mounting rings is

composed of a lightweight metal such as aluminum alloy, or a suitable non-metal material. Inserts of hardened material such as stainless steel are located within openings of the base material either by press-fit or by molding them in place. These hard metal inserts are typically internally threaded to receive fastening screws and positioning screws and thus readily accommodate the severe impacts of repeated rifle firing. The inserts protect the mounting base structure and the mounting ring structure from being deformed, and thus minimize the potential for loss of aiming zero as the result of the multiple impacts that occur during repeated rifle firing. As mentioned above, the annular insert **48** shown in FIGS. **6**, **7** and **8** is composed of any suitable wear and impact resistant material such as steel, stainless steel or a suitable hard polymer material. The upwardly projecting member or boss **22** is provided with a threaded insert **82** as shown in FIGS. **7** and **12** within which a set screw such as an Allen or Torx screw is received to establish retention of the mounting ring tongues **26** and **28**. The threaded inserts are preferably provided with annular flanges **83** which seat against soft metal shoulders or other structure and prevent the inserts from being extracted from their openings or receptacles by tightening of the retainer screws. A threaded hard metal insert **84** is located within the mounting ring tongue **28** and receives a mounting screw, which extends into screw receptacle **86** for retention of the mounting ring tongues in assembly within the circular receptacle **86**. Another threaded insert **88** is located within one of the ring assembly sections **30** and receives a retainer screw having a screw head that is located within a screw receptacle **90**.

A locator key element **92**, shown in the bottom view of FIG. **9**, is composed of hard wear and impact resistant material is secured to a bottom surface **94** of the mounting base **22** by retainer screws **96** and **98**. The locator key element **92** engages within a selected one of the multiple transverse slots **17** of a mounting rail structure to locate the rear portion of optical sighting device for desired eye relief, which is accomplished by positioning the rear lens of the optical sight device at a selected distance from the eye of the user.

During assembly of the lever mechanism, the adjustment nut **60** is tightened sufficiently to apply a desired force to the wave spring **70**. Thereafter, the preload force of the wave spring urges the locking lever upwardly and develops a friction force that prevents the locking from flopping back and forth when it is unlocked. For precision locking and clamping of the mounting base with respect to the angulated locking or clamping surfaces of the rail **16**, the adjustment nut **60** is rotated to a desired position on the threaded spindle/spline shaft **54** and thus maintains the angulated cam surface **76** in secure forcible clamping engagement with the angulated locking surface **19** of the mounting rail **16**. The splined engagement of the non-circular shaft section **62** and the internal non-circular section **69** of the drive washer member **68** causes the drive washer member to be rotated along with the spindle/spline shaft **54**. This feature also causes the adjustment nut **60** of be substantially free of any rotational force that might otherwise tend to loosen or tighten the adjustment nut when the locking lever **56** is rotated. The adjustment nut **60** simply rotates along with the spindle or pivot shaft **54** of the cam plate **72** and the drive washer member **68** during manually energized rotation of the locking lever **56**. The force of the wave spring **70** also retards inadvertent movement of the locking lever at its unlocked position. In the event that the mount locking system should become loosened by repeated heavy impact firing of the weapon or for any other reason the mounting system can be easily restored to its optimum stable precision positioning characteristics simply by rotating the adjustment nut only by a few degrees of clockwise rotation by using a small hex wrench. This can be easily accomplished in field conditions since no special adjustment tools are required. For example, from 5 degrees to 15 degrees of adjustment nut rotation will restore the locking mount to its proper locking position for support of an optical sighting device such as a rifle telescope.

An alternative embodiment of the present invention is shown in FIG. **12** and is different from that shown in FIG. **7** only in that one or more resilient O-rings **99** are shown to be located within the annular space **66** and are compressed to the extent desired by the adjustment nut **60** and the washer member **68**. The resilient O-ring **99** provides rotational resistance to the locking lever and thus prevents the rotatable locking lever **56** from being loose at its unlocked position, and thus prevents the locking lever from inadvertently moving about. This feature is particularly important when the quick-release mounting system is employed for mounting sighting devices to tactical firearms, where unnecessary lever movement or noise is a detriment to optimum use of the firearm. While one O-ring is shown in FIG. **12**, it is to be understood that two or more O-rings may be employed to accomplish the same purpose.

Referring now to FIGS. **16-24**, a mounting assembly is shown generally at **100** and represents the preferred embodiment of the present invention. However, it is to be borne in mind that many of the features of the mounting assembly of FIGS. **1-12** are incorporated within the mounting assembly of FIGS. **16-24**. The mounting assembly **100** incorporates a mounting base **102** having a downwardly facing mounting slot **104** which is defined by a downwardly facing surface **106** and by a downwardly extending base flange **108** having oppositely angulated rail clamping surfaces **110** and **112**. Opposite from the downwardly extending base flange **108** the mounting base **102** defines another downwardly extending base flange **114** having formed thereon an angulated clamping surface **116**. Typically, the downwardly facing mounting slot **104** is formed by a machining operation, such as by milling the slot in a metal mounting base workpiece.

A ring mounting member or pedestal **118** projects upwardly from the mounting base **102** and may be integral with the mounting base or fixed to it in any suitable manner. The joint of the pedestal **118** with the mounting base may be strengthened by structural web members **120** and **122** if desired, especially since it is desired that the mount assembly be as light weight as possible while maintaining sufficient structural integrity to ensure secure support of a firearm sighting device. The ring mounting member or pedestal **118**, as shown best in FIGS. **20** and **21**, defines opposed substantially co-planar ring support shoulders **124** and **126**, with a mounting projection **128** extending upwardly from the pedestal and between the ring support shoulders. To minimize the weight of the support pedestal and the mounting base **102**, as shown in FIGS. **20** and **21** the mounting base and support pedestal are drilled to remove metal and thus define drill openings **123**. As is evident from the bottom view of FIG. **19**, some of these metal removing drilled openings **123** extend upwardly into the central mounting projection **128**. None of the metal removing drilled openings extend completely through the base or mounting pedestal structures, though it is within the spirit and scope of the present invention to do so. The mounting projection **128** defines spaced transverse bores **130** and **132** as shown in FIGS. **20** and **23** that receive tubular internally threaded ring locator and connector members **134**. The

internally threaded ring locator and connector members extend from an form part of locator and connector inserts **136** that are received, such as by press fitting within openings **138** of a mounting ring section **139**. The inserts **136** are preferably composed of hard metal such as steel, stainless steel, titanium and the like, and are seated on internal support shoulders **140** of the openings **138** of the respective mounting ring section. Mounting screws **142**, such as Torx screws, Allen screws or the like, are inserted through openings **144** of the opposite mounting ring section **146**. Preferably, each mounting ring section **139** and **146** is provided with an insert having a tubular internally threaded ring locator and connector member to facilitate ease of assembly of the mounting ring sections to the upwardly extending mounting projection **128** and to ensure precise location of the mounting sections with respect to the mounting base **102** and the ring mounting pedestal. The mounting ring sections preferably define annular internal shoulder surfaces **145** thus enabling the heads of the retainer screws **142** to draw the lower portions of the mounting ring sections into tight engagement with respective sides of the central mounting projection **128**.

The mounting ring sections **130** and **146** define respective internal arcuate surfaces **148** and **150** that are accurately dimensioned to establish frictional retention with respect to a tubular section of an optical sighting device or any other at least partially cylindrical surface of an object that is to be supported in immoveable relation with respect to a firearm or other object to which a mounting rail is fixed. The upper planar surface **129** of the central mounting projection **128** is located below an imaginary arcuate surface that is defined by continuation of the arcuate surfaces **148** and **150**, thus ensuring that the optical device does not engage the central mounting projection **128** of the pedestal **118**. This feature ensures that the cylindrical tube or portion of the optical sighting device remains free of torque forces when the mounting ring sections **139** and **146** are tightened to the central mounting projection **128**.

As shown in detail in FIG. **24**, for securing the upper portions of the mounting ring sections in assembly, internally threaded hardened inserts **152** are press fitted or otherwise located within openings **154** of the respective mounting ring sections **139** and **146**. Preferably the internally threaded hardened inserts **152** are seated on annular internal shoulders **156** of the mounting ring sections to ensure that the inserts are not moved within the openings **154** by the force that is generated by tightening of the retainer screws. The externally threaded sections **158** of retainer screws **160** are threaded into the inserts and serve to secure the mounting ring sections **139** and **146** in friction retention with an optical sighting device or other object. The respective mounting ring sections **139** and **146** define retainer openings **162** and annular internal support shoulders **164** that are engaged by the heads of the retainer screws **160** and thus enable the retainer screws to tighten the upper portions of the mounting ring sections **139** and **146** together and establish fictional retention of the tubular section of the optical sighting device or other object being supported.

At least two spaced positioning projections **166** and **168** extend downwardly from the central portion of the mounting base **102**, as shown in FIGS. **18** and **19**, with the space therebetween being sufficient to receive one of the upwardly extending mounting projections **15**. A locking platform **170** projects laterally from the mounting base structure **102** and is preferably formed integrally with the mounting base though it may be fixed to the mounting base in any suitable fashion. The support platform is machined in the same manner as is discussed above in connection with the locking platform **44** of FIGS. **1-6** to form a mounting receptacle for a locking lever mounting assembly which is indicated by like reference numerals and is provided for the same purpose.

Situations will arise requiring only a single releasable mounting device or requiring more than two spaced releasable mounting devices for mounting optical sighting devices and other objects to firearms. Thus, it is not intended that the present invention be restricted solely to the use of two spaced quick-release mounting devices for mounting firearm optical devices. It is also intended that the present invention have application to a wide range of devices that are intended to be mounted in quick-release, stable fashion to a support structure. Thus, it is not intended to restrict the spirit and scope of the present invention to use in connection with the sighting devices of firearms. The discussion here, for purposes of simplicity, is intended only to be representative of a preferred embodiments of the present invention. Other and further embodiments of the present invention will become obvious and inherent to one skilled in the art upon a thorough understanding of the spirit and scope of the present invention.

In view of the foregoing it is evident that the present invention is one well adapted to attain all of the objects and features hereinabove set forth, together with other objects and features which are inherent in the apparatus disclosed herein.

As will be readily apparent to those skilled in the art, the present invention may easily be produced in other specific forms without departing from its spirit or essential characteristics. The present embodiment is, therefore, to be considered as merely illustrative and not restrictive, the scope of the invention being indicated by the claims rather than the foregoing description, and all changes which come within the meaning and range of equivalence of the claims are therefore intended to be embraced therein.

I claim:

1. An adjustable mounting system, comprising:

a mounting rail attached to a structure and defining a plurality of upwardly facing mounting projections each having oppositely angulated clamping surfaces;

at least one mounting base having an angulated clamp surface and defining a locking platform having a lock opening therein;

a locking lever having a rotary cam plate and a pivot shaft integral therewith, said pivot shaft being rotatable within said lock opening, said rotary cam plate having a peripheral angulated cam surface being moveable into force transmitting locking engagement with one of said oppositely angulated clamp surfaces upon rotation of said locking lever and cam plate from an unlocking position to a locking position; and

an adjustment nut being threaded to said pivot shaft and upon rotation on said pivot shaft adjusting the locking position of said rotary cam plate relative to one of said oppositely angulated clamp surfaces.

2. The adjustable mounting system of claim 1, comprising:

a drive member being received for linear movement on said pivot shaft; and

at least one resilient member being interposed between said drive member and said locking platform and providing resistance to free rotation of said locking lever at the unlocked position of said locking lever.

3. The adjustab e mounting system of claim 1, comprising:

said pivot shaft defining a threaded section receiving said adjustment nut and defining an external non-circular section;

a drive member having non-rotatable and linearly moveable relation with said external non-circular section; and

said adjustment nut having adjustment engagement with said drive member.

4. The adjustable mounting system of claim 3, comprising:

said at least one resilient member being interposed between said drive member and said locking platform and preventing free rotational movement of said locking lever at said unlocking position.

5. The adjustable mounting system of claim 1, comprising:

said pivot shaft defining a threaded section receiving said adjustment nut and having an external non-circular section;

a drive member being received in non-rotatable and linearly moveable relation by said external non-circular section;

said at least one resilient member being interposed between said drive member and said locking platform and developing a spring force retarding free rotation of said locking lever at the unlocking position thereof; and

said adjustment nut being received by said pivot shaft and being rotatable for adjustment of the locking position of said cam plate.

6. The adjustable mounting system of claim 5, comprising:

said at least one resilient member being an annular wave spring.

7. The adjustable mounting system of claim 5, comprising:

said at least one resilient member being at least one O-ring composed of resilient material.

8. The adjustable mounting system of claim 1, comprising:

one of said oppositely angulated clamping surfaces having a predetermined angle;

said rotary cam plate defining first and second substantially straight cam surfaces being joined by a curved cam surface; and

said first and second substantially straight cam surfaces and said curved cam surface each having a taper substantially corresponding to said predetermined angle.

9. The adjustable mounting system of claim 1, comprising:

said mounting rail defining spaced positioning receptacles and spaced upwardly extending mounting projections; and

said mounting base having at least one locator key having engagement within one of said spaced positioning receptacles and selectively locating said mounting base on said mounting rail.

10. The adjustable mounting system of claim 9, comprising:

said mounting base having a pair of downwardly projecting locator keys disposed in spaced relation and having locating engagement within two of said spaced positioning receptacles.

11. The adjustable mounting system of claim 1, comprising:

said mounting base defining a ring mounting receptacle;

a pair of mounting ring sections each defining arcuate internal surface sections and each having a mounting tongue being received within said ring mounting receptacle; and

retainer members securing said mounting tongues in fixed relation within said ring mounting receptacles and being selectively adjustable to position said arcuate internal surface sections in frictional retention with a supported device.

12. The adjustable mounting system of claim 11, comprising:

a plurality of connector receptacles being located within said mounting ring sections;

a plurality of hardened inserts being fixed within said plurality of connector receptacles and defining internally threaded connector sections; and

a plurality of retainer screws being in threaded connection within said internally threaded connector sections and retaining said mounting ring sections in friction supported engagement with a supported object.

13. The adjustable mounting system of claim 12, comprising:

said plurality of connector receptacles each defining internal insert support shoulders; and

said plurality of hardened inserts being seated on and supported by said internal insert support shoulders.

14. The adjustable mounting system of claim 1, comprising:

said mounting base having a mounting pedestal defining an upwardly extending mounting projection having transverse mounting openings therein, said mounting pedestal defining mounting ring support shoulders;

a pair of mounting ring sections being seated on said mounting ring support shoulders and defining internal arcuate surfaces for frictional retaining engagement with a supported device; and

retainer members extending through said mounting ring sections and through said transverse mounting openings of said upwardly extending mounting projection and retaining said mounting ring sections in immoveable assembly with said support pedestal.

15. The adjustable mounting system of claim 14, comprising:

said upwardly extending mounting projection defining at least one transverse bore extending therethrough;

at least one of said mounting ring sections having a hardened insert therein defining an internally threaded ring locator member projecting into said at least one transverse bore;

another of said mounting ring sections defining at least one mounting screw opening having an internal shoulder surface; and

a mounting screw being located within said mounting screw opening and being seated on said internal shoulder surface, said mounting screw having a threaded section having threaded engagement with said internally threaded ring locator member and securing said mounting ring sections in supported assembly with said upwardly extending mounting projection of said support pedestal.

15. An adjustable mounting system, comprising:

a mounting rail attached to a structure and defining a plurality of upwardly facing mounting projections each having oppositely angulated clamping surfaces;

at least one mounting base having an angulated clamp surface and defining a locking platform having a lock opening therein;

a locking lever having a rotary cam plate and a pivot shaft integral therewith and being rotatably moveable between locking and unlocking positions, said pivot shaft being rotatable within said lock opening, said rotary cam plate having a peripheral angulated cam surface being moveable into force transmitting locking engagement with one of said oppositely angulated clamp surfaces upon rotation of said locking lever and cam plate from an unlocking position to a locking position;

a drive member being received in non-rotatable linearly moveable relation on said pivot shaft;

an adjustment nut being threaded to said pivot shaft and providing for adjustment of the locking position of said rotary cam plate relative to one of said oppositely angulated clamp surfaces; and

at least one resilient member being interposed between said drive member and said locking platform and providing resistance to free rotation of said locking lever at the unlocked position of said locking lever.

17. The adjustable mounting system of claim 16, comprising:

an annular insert being seated within said lock opening and defining a circular pocket;

said drive member being at least partially located within said circular pocket; and

said at least one resilient member being located within said circular pocket and being engaged by said drive member and providing resistance preventing free rotation of said locking lever.

18. The adjustable mounting system of claim 16, comprising:

said peripheral angulated cam surface of said rotary cam plate having a pair of substantially straight cam sections disposed in angular relation and having a curved cam section merging with said substantially straight cam sections.

19. The adjustable mounting system of claim 16, comprising:

said pivot shaft defining a threaded section receiving said adjustment nut and having an external non-circular section;

a drive member being received in non-rotatable and linearly moveable relation by said external non-circular section;

said at least one resilient member being interposed between said drive member and said locking platform and developing a spring force retarding free rotation of said locking lever at the unlocking position thereof; and

said adjustment nut being received by said pivot shaft and being rotatable for adjustment of the locking position of said cam plate.

20. The adjustable mounting system of claim 16, comprising:

said mounting base having a mounting pedestal defining an upwardly extending mounting projection having transverse mounting openings therein, said mounting pedestal defining mounting ring support shoulders;

a pair of mounting ring sections being seated on said mounting ring support shoulders and defining internal arcuate surfaces for frictional retaining engagement with a supported device; and

retainer members extending through said mounting ring sections and through said transverse mounting openings of said upwardly extending mounting projection and retaining said mounting ring sections in immoveable assembly with said support pedestal.

21. The adjustable mounting system of claim 20, comprising:

said upwardly extending mounting projection defining at least one transverse bore extending therethrough;

at least one of said mounting ring sections having a hardened insert therein defining an internally threaded ring locator member projecting into said at least one transverse bore;

another of said mounting ring sections defining at least one mounting screw opening having an internal shoulder surface; and

a mounting screw being located within said mounting screw opening and being seated on said internal shoulder surface, said mounting screw having a threaded section having threaded engagement with said internally threaded ring locator member and securing said mounting ring sections in supported assembly with said upwardly extending mounting projection of said support pedestal.

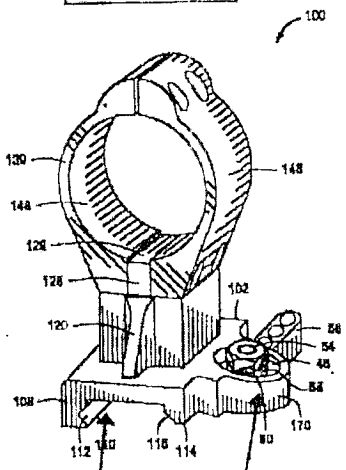
* * * * *

EXHIBIT L: PAGES 4 AND 5 FROM EXHIBIT J

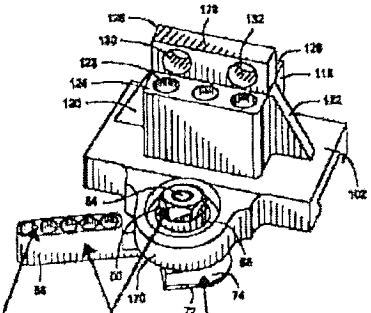
U.S. Patent No. 7,272,904

Side-by-Side Comparison with the Primary Reference:

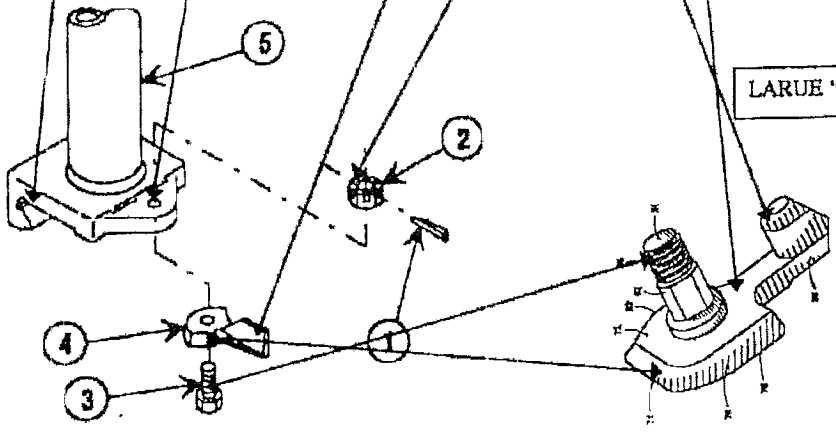
LARUE '904



LARUE '904



LARUE '904



M139 DEVICE

A. Independent Claim 1

Claim 1 is fully anticipated under 35 U.S.C. § 102 by the M139 Technical Manual. The attached chart sets forth how the M139 Technical Manual meets all of the recited features of the claim. Although Larue claims the locking lever, cam plate and pivot shaft are integral, combining multiple components into a single component is of ordinary skill in the art.

Larue '904 Claim 1	Notes
1. An adjustable mounting system, comprising:	
a mounting rail attached to a structure and defining a plurality of upwardly facing mounting projections each having oppositely angulated clamping surfaces;	M139 Technical Manual, Page 16 Section III 1-10 – Dovetail mounting rails are well known in the art and have a plurality upwardly facing mounting projections and oppositely angulated clamping surfaces.
at least one mounting base having an angulated clamp surface and defining a locking platform having a lock opening therein;	M139 Technical Manual, Page 5-8 and Fig. C-2, No. 20
a locking lever having a rotary cam plate and a pivot shaft integral therewith,	M139 Technical Manual. Page 5-8, Nos. 3 and 4, and Fig. C-2, No. 18 and 19.
said pivot shaft being rotatable within said lock opening, said rotary cam plate having a peripheral angulated cam surface being moveable into force transmitting locking engagement with one of said oppositely angulated clamp surfaces upon rotation of said locking lever and cam plate from an unlocking position to a locking position; and	M139 Technical Manual. Page 5-8, No. 3 and 4, and Fig. C-2, No. 18.
an adjustment nut being threaded to said pivot shaft and upon rotation on said pivot shaft adjusting the locking position of said rotary cam plate relative to one of said oppositely angulated clamp surfaces.	M139 Technical Manual. Page 5-8, No. 2 and 3, and Fig. C-2, No. 16.

EXHIBIT M

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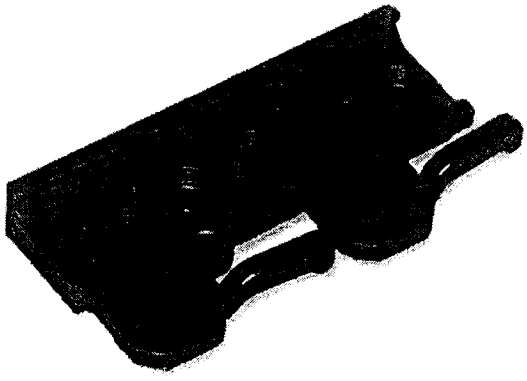

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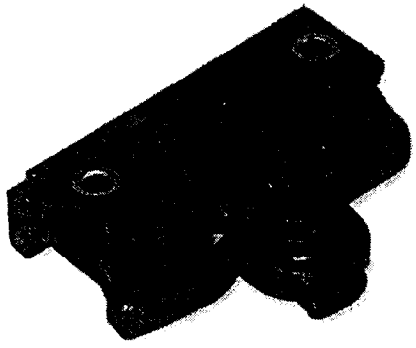

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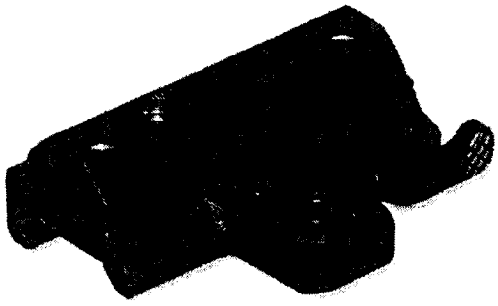

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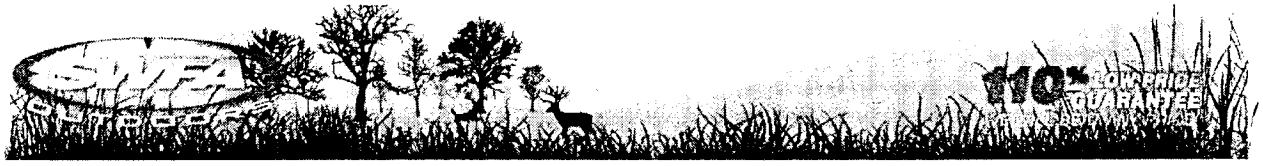

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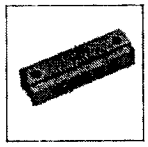

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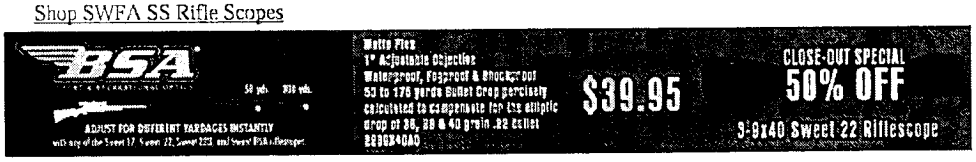

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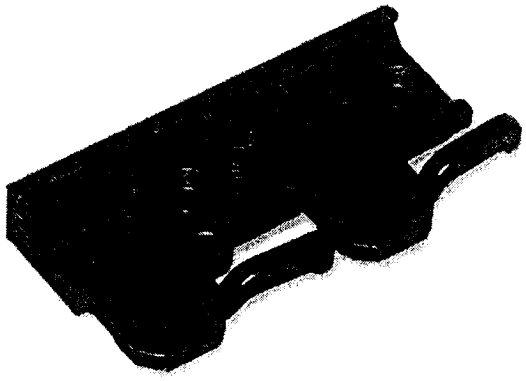

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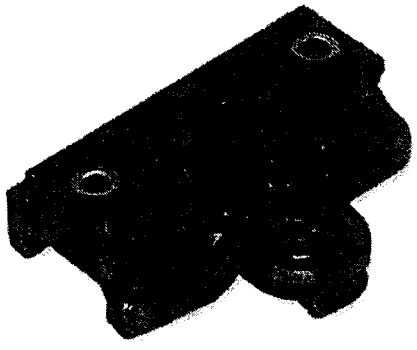

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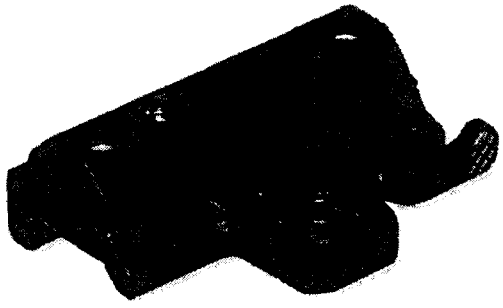

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