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## (54) MACHINE GUN HAVING TRIGGER GROUP


(71) We, COLT INDUSTRIES OPERATING CORP., a Corporation organised and existing under the laws of the State of Delaware, United States of America, of 150 Huyshope Avenue, Hartford, Connecticut, United States of America, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—


This invention relates to machine guns, more particularly of the type referred to in United Kingdom Patent Specification No. 1,268,300 entitled "Improvements in Guns" published 29 March 1972 and assigned to the assignee of this invention, and particularly concerns gas operated machine guns of a type having a fire control or trigger group reciprocably mounted on a receiver for cocking the weapon.

A primary object of this invention is to provide an improved machine gun having an operating group, including bolt and bolt drive assemblies, and an associated fire control or trigger group incorporating a variety of improved safety features for fail-safe operation of the machine gun.

Another object of this invention is to provide an improved machine gun which can be readily cocked by reciprocating a pistol grip of the trigger group and wherein the pistol grip is mounted for sliding movement on the receiver for either left or right hand operation without need to change or vary the arrangement of the operating components.

A further object of this invention is to provide an improved machine gun which is particularly suited to prevent inadvertent release of the trigger group when the machine gun is cocked and the trigger group is in either a safety "on" or safety "off" condition.

A still further object of this invention is to provide a machine gun of significantly improved and simplified design for reliable operation under rugged conditions over an extended period of time and incorporates an improved arrangement of operating parts which minimizes repair and service requirements and also facilitates disassembly and reassembly of the machine gun without tools.

According to the present invention, there is provided a machine gun comprising a receiver, an integral operating group mounted for operation within the receiver and including a unitary bolt and bolt carrier assembly and a recoil buffer assembly, a single latch removably securing the operating group to the receiver in assembled relation, the operating group being removable from the receiver as a single separable unit, and a trigger group slidably mounted along the bottom of the receiver for cocking the bolt and bolt carrier assembly, the trigger group being movable manually between a forward cocking position and a rearward firing position, the trigger group in firing position overlying and covering said single latch to prevent unintended unlatching.

According to another aspect of the invention, there is provided a machine gun comprising a receiver, a bolt assembly reciprocable within the receiver, a trigger group mounted on the receiver for movement between a forward cocking position and a rear firing position, the trigger group including a latch for selectively locking the trigger group in firing position, sear means for releasably cocking the bolt assembly, a trigger for actuating the sear means, and a pivot shaft for the trigger, the pivot shaft being supported for movement laterally of the receiver, when the trigger group is in firing position, between a first locked position engaging the receiver and a second position wherein the pivot shaft is disengaged from the receiver to condition the trigger group for movement manually relative thereto, the pivot shaft in said first locked position preventing the sear means from being actuated by the trigger while permitting sear actuation in said second position.

According to a further aspect of the invention, there is provided a machine gun comprising a receiver, a bolt and bolt carrier assembly, a supporting mount including

guide means operatively connected to said assembly and supporting said assembly for operation within the receiver, releasable means detachably connecting the supporting mount to the receiver with the bolt and bolt carrier assembly in operative assembled relation to the supporting mount and the receiver, the releasable means including a single latch removably securing the supporting mount to the receiver and permitting separation of the supporting mount and the bolt and bolt carrier assembly as a unit from the receiver, and a trigger group slidably mounted along the bottom of the receiver for cocking the bolt and bolt carrier assembly, the trigger group being movable manually between a forward cocking position and a rearward firing position, the trigger group in firing position overlying and covering the latch to prevent unintended unlatching.

According to a still further aspect of the invention, there is provided a machine gun comprising a receiver, a bolt assembly mounted for reciprocation relative to the receiver between a forward battery position and a rear cocked position, a trigger group mounted on the receiver and including a sear for releasably engaging the bolt assembly, the trigger group being movable manually relative to the receiver between a forward cocking position and a rear firing position, the trigger group having a manually actuated latch for releasably securing the trigger group in its rear firing position, the latch being movable between a normal position and an unlocked position relative to the receiver for locking and releasing the trigger group in said rear firing position, and a movable interlock operatively connected to the latch and preventing latch movement from its normal position to its unlocked position when the bolt assembly is in its rear cocked position while permitting such latch movement into its unlocked position when the bolt assembly is in its forward battery position, thereby to release the trigger group from its rear firing position for movement relative to the receiver.

The invention will now be described by way of example with reference to the accompanying drawings, in which:

Fig. 1 is a side view, partly broken away and partly in section, showing a machine gun incorporating the invention;

Fig. 2 is an exploded isometric view, partly broken away, of the machine gun of Fig. 1;

Fig. 3 is an enlarged sectional view, partly broken away, taken along line 3—3 of Fig. 1;

Fig. 4 is a side view of a trigger group safety embodied in the machine gun of this invention;

Fig. 5 is a side view, partly broken away and partly in section, of another embodiment of a fire control or trigger group incorporating this invention;

Fig. 6 is an opposite side view of the trigger group of Fig. 5, partly broken away and partly in section, with a sear of the trigger group shown engaging a bolt carrier with the machine gun conditioned to be fired;

Fig. 7 is an enlarged isometric view, partly broken away, showing latch components of the trigger group of Figs. 5 and 6 in disassembled relation; and

Fig. 8 is an enlarged isometric view of a trigger group safety embodied in the trigger group of Figs. 5 and 6.

Referring to the drawings in detail, a barrel 10 of the machine gun embodying this invention is shown mounted on an elongate, hollow sheet metal receiver 12. A cylinder 14 of a gas recoil system is fitted into a gas porting head 16 shown fixed to the barrel 10. The gas cylinder 14 is removably locked to the receiver 12 by a forward hand grip 20 mounted by a suitable tongue and groove connection to a portion 22 of the cylinder 14 protruding downwardly through a bottom opening 24 in the receiver 12.

To simplify construction, reduce manufacturing costs and also ensure quick and easy field stripping and maintenance, a unitary bolt and bolt drive assembly together with a recoil buffer has been provided in a single operating group 50 which is easily removed as a separate unit from the receiver 12. Moreover, the operating group 50 not only functions to carry a bolt 52 between open bolt and locked battery positions but additionally controls feeding of live rounds into the barrel 10 and the ejection of spent cartridges through the receiver 12. By virtue of such construction, the interior receiver walls 54, 56 are particularly suited to be substantially free of expensive machining normally required to provide such multiple functions whereby the receiver 12 essentially serves as a simple cover for the operating components.

More specifically, a supporting mount including a recoil buffer 58 is secured to a buttstock 60 in operative alignment behind a bolt assembly 62. The recoil buffer 58 is preferably of a hydraulic type. A plunger 64 is provided having an apertured piston 66 received within a liquid filled chamber 68, and an exposed end portion of the plunger 64 is continuously urged by a return spring 70 to project forwardly out of the buffer 58 to absorb shock loading imposed on the gun during recoil of the bolt assembly 62.

To provide a balanced drive system for reciprocating the bolt assembly 62 within the receiver 12 for reliable high performance operation under adverse conditions while at the same time minimizing close tolerance

requirements, the bolt assembly 62 is provided with a balanced bearing support arrangement along three symmetrically spaced axes of bearing support. Specifically, the bolt assembly 62 is supported for reciprocating movement on two simple guide rods 72, 74 mounted within outwardly projecting side wall portions 76, 78 of the receiver 12 in outboard parallel relation to the buffer plunger 64. The bolt assembly 62 also includes a gas piston 80 suitably secured to extend forwardly of a bolt carrier 82 of the assembly 62 for reciprocating movement within the gas cylinder 14 which serves to provide a third bearing support means for the bolt assembly 62.

The guide rods 72, 74 extend through apertured side lugs (only one shown at 84 in Fig. 2) in the bolt carrier 82 which is maintained in assembly on the rods 72, 74 by an enlarged forward end portion (shown at 86) on each rod, 72, 74 suited to be received in an opening such as at 88 formed in a barrel bearing block 32. A driving spring 90 is coiled about each guide rod 72, 74 between its respective lug 84 and the recoil buffer 58 to which the guide rods 72, 74 are secured.

By virtue of the outboard parallel mounting arrangement of the guide rods 72, 74 relative to the buffer plunger 64, a buffer return spring of lower stiffness may be used and only a minimal amount of energy has to be returned by the buffer plunger 64, sufficient to fully return the plunger for engaging the bolt assembly 62 during its next recoil cycle. Accordingly, shock loading on recoil is reduced and the service life of other associated parts is correspondingly increased.

In the specific illustrated embodiment, each guide rod 72, 74 (Fig. 3) is preferably necked down by a groove 92 adjacent its rear end which is received in a suitable opening 94 in the buffer 58. An apertured plate 96 is fitted into a lateral slot 98 in the buffer 58 communicating with its openings 94 such that opposite side edges of the retaining plate 96 are disposed in interfering relation within the grooves 92 of the rods 72, 74 to lock the same into operative position. The retaining plate 96 may be removably fixed within the buffer 58 by a spring-biased plunger 100 mounted in the buffer 58 to extend through the central opening 102 in the retaining plate 96. The bolt assembly 62 thus may be disassembled from its drive and buffer systems by the simple expedient of merely removing the retaining plate 96.

Another feature embodied in this invention is the provision of a single latching means for maintaining the operating group 50 in its entirety in fixed operative position within the receiver 12. For this purpose a cavity 104 in Fig. 1 is formed in the buffer 58 in communication with a bottom opening 106 at the rear of the receiver 12. A push-button latch 108 is fitted for pivotal movement within a groove 110 at the forward end of the cavity 104. The latch 108 is suitably dimensioned and configured to bottom against the buffer 58 with a lower portion of the latch 108 protruding outwardly into engagement with the receiver 12 under the force of a leaf spring 112. Rearward movement of the operating group 50 relative to the receiver 12 is thus effectively blocked unless the latch 108 is first pressed inwardly to clear the receiver 12.

Accordingly, only one latch need be depressed to permit the entire operating group 50 to be removed as a separable unit. No further take down of the operating group 50 is required for field maintenance and lubrication.

For cocking the machine gun, a fire control or trigger group 114 is provided having a housing 116 in Fig. 2 mounted for a sliding movement within a channel 118 along the bottom of the receiver 12 with a manual pistol grip 120 fixed to project downwardly from the housing 116. The trigger housing 116 has a fixed pin 122 serving as a pivot for a sear 124 biased upwardly by a spring 126 in Fig. 1 to engage a shoulder 128 on the bottom of the bolt carrier 82 for cocking it against the biasing force of the driving springs 90, 90 in Fig. 2 upon drawing the pistol grip 120 rearwardly and compressively loading the springs 90, 90.

For safety, the gun is normally handled and carried with the pistol grip 120 in a forward cocking position indicated by broken lines 130 in Fig. 1. In this position an elongate ejection port 132 in the bottom of the receiver 12 is covered by the trigger group 114 and an attached stop plate 134 is slidably received within the channel 118. The stop plate 134 abuts against the buttstock 60 upon drawing the pistol grip 120 rearwardly to additionally limit its movement and establish a rear firing position for the trigger group 114. A latch 136 engages the receiver 12 to fix group 114 in firing position.

To prevent unintended release of the operating group 50 from the receiver 12 when the bolt carrier 82 is in sear and the driving springs 90, 90 are compressively loaded, the latch 108 for the operating group 50 is located in the receiver 12 so as to be entirely covered by the trigger group 114 in firing position.

Further economies are realized in the provision of a common shaft 138 in Fig. 4 to serve as a trigger pivot as well as a cross-bolt safety. A trigger 140 in Fig. 1 is pivotally supported on the shaft 138 with a finger 142 extending forwardly for engagement with a rearwardly extending finger

144 on the sear 124. A trigger squeeze thus tends to pivot the sear 124 downwardly to ride off the shoulder 128 of the bolt carrier 82 and snap release it from its cocked position. The full diameter portion of the shaft 138, however, additionally serves as a cross-bolt safety to normally engage a rear dog 146 on the sear 124 upon squeezing the trigger 140 whereby only limited sear movement is permitted, and such limited movement is insufficient to disengage the sear 124 from the bolt carrier 82. Upon pressing the shaft 138 to move laterally of the trigger housing 116, a relieved portion 148 (Fig. 4) of the shaft 138 is brought into alignment with the path of travel of the sear dog 146 whereby trigger actuation will permit free movement of the sear 124 to release the bolt carrier 82.

Still another safety function is performed by the shaft 138 while being held in its "safety" position by a spring-biased detent 150 engaging a cutout 152 in the shaft 138. While in "safety" position, an end of the shaft 138 protrudes through a half moon-shaped opening 154 in the side wall of the receiver 12 to secure the trigger group 114 in firing position even though its latch 136 might be inadvertently released. Accordingly, the shaft 138 must be laterally offset, not only to condition the trigger 140 to disengage the sear 124 from the bolt carrier 82, but also to align slots 155, 155 in opposite end portions of the shaft 138 with bottom channel rails 118A, 118A to clear the receiver 12 for unlatching the trigger group 114 to permit cocking.

Release of the bolt carrier 82 in Fig. 1 results in it being thrust forward under the driving force of the springs 90, 90 in Fig. 2 whereby a stripping and locking lug 156 on the bolt 52 housed in the bolt carrier 82 passes a cartridge stripping station to strip a round from a disintegrating link cartridge belt, not shown, prior to the round being chambered and fired after the bolt 52 is locked in closed battery position in a socket 28 of the barrel 10.

As fully described in our above referenced United Kingdom Patent Specification No. 1,268,300, gas pressure buildup in chamber 161 in Fig. 1 via conduit 164 and inlet port 162 imparts a driving force to piston 80 to thrust the bolt assembly 62 rearwardly during its recoil cycle, and the bolt assembly 62 strikes the recoil buffer 58 and compressively loads the buffer spring 70 while the energy is being dissipated. Assuming the trigger 140 has been released, shoulder 128 of the bolt carrier 82 sets up on the sear 124 to condition the gun to fire the next round. If the trigger 140 has not been released, the bolt carrier 82 clears the sear 124 during a forward or counter-recoil movement, and the springs 90, 90 drive the bolt assembly 62 forwardly again to repeat the operation of chambering and firing whereby a continuous burst of fire occurs until trigger release or until there are no more rounds to be fired, whichever first occurs.

Another embodiment of a fire control or trigger group for the above described machine gun is shown in Figs. 5—8 wherein like numbers followed by "B" or a prime (') mark designate components corresponding to those previously described in the first embodiment of Figs. 1—4.

In the second embodiment of Figs. 5—8, a manually actuatable latch lever 168 is pivotally supported on a side wall of housing 116B and is provided with an externally located thumbpiece 169 and an inwardly projecting pivot shaft 170. Pivot shaft 170 has a pair of parallel flat shoulders 171, 172 formed adjacent a radial flange 173 with the shaft 170 being coaxially received within an opening 174 of a trigger group latch or fire control group latch 136B. Opening 174 has an enlarged compartment 175 of an hourglass cross-sectional shape defining contact surfaces 176, 178 for driving engagement with the parallel flat shoulders 171, 172 within the hourglass compartment 175 while permitting limited freedom of angular movement of the latch 136B relative to the latch lever 168 in opposite angular directions. A suitable spring 179 biases latch 136B into a normal locked position, best seen in Fig. 5, wherein latch 136B is received within an opening 180 in Fig. 6 in the bottom of receiver 12B and engages an abutment wall 182 of the opening 180 for latching the fire control group 114B in a rear firing position in fixed relation to the receiver 12B.

Trigger pivot shaft 138B functions, as in the first embodiment, as a pivot support for trigger 140B and also as a cross bolt safety when the fire control group 114B is in a "safety on" position. In "safety on" position, shaft 138B is disposed relative to fire control housing 116B such that a notch 188 (which is of relatively shallow depth compared to an adjacent notch 190) receives spring biased detent 150B to position trigger pivot shaft 138B in interfering relation to sear 124B to prevent its being moved sufficiently to disengage shoulder 128B of bolt carrier 82B of the bolt assembly 62A. With shaft 138B in "safety on" position, its opposite end portions are disposed, in interfering relation to bottom channel rails 118A' of receiver 12B, within half moon shaped cut-out channel portions, not shown, such as that illustrated at 154 in Fig. 4.

To further assure that manual actuation of latch lever 168 will not inadvertently release fire control group 114B relative to receiver 12B when shaft 138B is in "safety on" position, detent 150B has an integral,

rearwardly projecting spring guide and stop pin 192 which is received in a hole 194 in housing 116B to protrude into a latch chamber 196 in underlying relation to a forwardly projecting lip 198 on the latch 136B when it is in its illustrated locked position and the detent 150B is disposed in notch 188 in "safety on" position. A further advantage of this construction is that lip 198 is engageable with an abutment 204 within housing 116B to serve as a stop for latch 136B in its illustrated locked position wherein it is normally maintained by the biasing force of latch spring 179.

Lateral displacement of the shaft 138B is facilitated by its thumbpiece 199 whereby the shaft 138B may be quickly and easily moved laterally of housing 116B to position detent 150B in the other notch 190 to condition trigger pivot shaft 138B in a detented "safety off" position for firing the weapon as seen in Fig. 5. In "safety off" position, pin 192 is retracted from chamber 196 under the force of spring 200 in noninterfering relation to lip 198 of latch 136B, and it will be understood that relieved portion or clearance notch 148B in shaft 138B (Fig. 8) is in alignment with the path of travel of rear dog 146B of sear 124B. In "safety off" position, clearance slot 155B on shaft 138B and its relieved flat shoulder 201 above thumbpiece 199 are respectively aligned with bottom channel rails 118A[1] whereby the entire fire control group 114B is conditioned for movement between a forward charging position and a rear firing position, as described in the previous embodiment, upon moving latch 136B into an unlocked position (indicated by broken lines 202 in Fig. 6).

To ensure against inadvertent release of fire control group 114B when the weapon is cocked and shaft 138B is in "safety off" position, an elongate interlock 210 is supported within housing 116B for pivotal movement on trigger pivot shaft 138B with shaft 138B being axially movable relative to the interlock 210. A swinging forward end 212 of interlock 210 is positioned in adjacent underlying relation to carrier 82B in its rear cocked position. A bifurcated rear end 214 of the interlock 210 receives, for driving engagement, a swinging forward end 216 of a connector 218 fixed to the latch lever 168 in engagement with its flat shoulders 171, 172 (Fig. 6).

By virtue of the above described construction, even upon attempting to actuate latch lever 168, the interlock 210 prevents latch 136B from being disengaged from receiver 12B. That is, upon pressing thumbpiece 169 of latch lever 168 downwardly from its normal position (shown in broken lines at 219 in Fig. 6), the swinging end 212 of interlock 210 would be rotated upwardly from its normal illustrated position a discrete distance to engage the bottom of bolt carrier 82B responsive to limited rotation of the swinging end 216 of the connector 218 in a downward angular direction as viewed in Fig. 6. However, the engagement of the interlock 210 with bolt carrier 82B limits connector movement to a preselected angular displacement which is insufficient to operate latch 136B and move it into its unlocked position at 202. Moreover, the thumbpiece 169 is not fully depressed into its actuated position (shown in broken lines at 220) due to the engagement of interlock 210 with the bolt carrier 82B. Consequently, fire control group 114B cannot be inadvertently released when the weapon is cocked, even under "safety off" conditions.

However, if it is desired to charge the uncocked weapon when its fire control group 114B is in rear firing position and its bolt carrier 82B is in forward battery position, the forward swinging end 212 of interlock 210 can pivot freely upwardly into ejection port 132B upon actuating thumbpiece 169, permitting latch lever 168 to be fully depressed from normal position (broken lines 219 in Fig. 6) into actuated position (broken lines 220). Latch contact surfaces 176, 178 are then drivingly engaged by flat shoulders 171, 172 of the latch lever pivot shaft 170, to disengage latch 136B from receiver 12B to move latch 136B from its normal position (illustrated in full lines in Fig. 6) into its unlocked position at 202. The fire control group 114B may then be slid forwardly along channels 118B to charge or recock the weapon.

As fire control group 114B is slid forwardly toward the bolt carrier 82B (which is now in forward battery position) for recocking the weapon, the latch lever 168 is released and latch spring 179 returns interlock 210, connector 218 and latch 136B to normal position shown as in Fig. 6 but with the upper portion of latch 136B being received in ejection port 132B. Should the latch lever 168 not be fully released and with continued thumb pressure exerted on the latch lever thumbpiece 169, a chamfer 222 at the bottom rear end of bolt carrier 82B will engage and cam the swinging end 212 of the interlock 210 downwardly to return the components to normal position just prior to the fire control group 114B reaching its forward charging position, whereupon the sear spring 126B moves the sear 124B into seared up engagement with shoulder 128B on bolt carrier 82B.

As the fire control group 114B is manually returned rearwardly during cocking or charging of the weapon, the limited rotary movement of latch 136B relative to its latch lever 168 and connector 218, permitted by the previously described interlocking driv-

ing connection, additionally allows latch 136B to be cammed downwardly by a rear wall 224 of the ejection port 132B independently of the interlock 210 which is then disposed immediately below the bolt carrier 82B. The latch spring 179 then returns latch 136B upwardly into locked position in engagement with abutment wall 182 when the latch 136B is returned into a position underlying the receiver opening 180 to secure the fire control group 114B in its rear firing position relative to receiver 12B with the bolt carrier 82B cocked and ready to fire.

To facilitate assembly and also to permit fire control group 114B to be eased into a forward charging position against the force of its compressed driving springs such as at 90, 90 (as described in the previous embodiment), fire control group release under "safety off" cocked conditions is permitted only by intentional actuation of an auxiliary latch release button 226 mounted on an upper rear portion of housing 116B. The button 226 has an actuator shaft 228 shown in Fig. 5 as projecting forwardly and upwardly into a conforming opening 230 in latch 136B and fixed to the latch by the pivot shaft 170 of latch lever 168, the pivot shaft 170 being mounted for pivotal movement relative to the actuator shaft 228. The auxiliary latch release button 226 is accordingly linked directly to latch 136B and operates independently of latch lever 168. Such construction thus permits bolt carrier 82B to be slid forwardly under "safety off" conditions from a rear cocked position into forward battery position when the weapon is empty rather than requiring that trigger 140B be squeezed and allowing bolt carrier 82B to slam forwardly against barrel 10 or bearing block 32 when the barrel 10 is removed.

The described structural components not only are quick and easy to assemble but are maintained in assembled relation without requiring known retaining rings, crosspins, etc. normally associated with weapons of this type. Channel rails 118A[1] normally confine opposite end portions of sear pin 122B as well as the radial flange 173 of the latch shaft 170 to also maintain these parts in assembled relation without requiring any additional fasteners. Moreover, the spring biased detent 150B has an enlarged knurled circumferential surface shown at 234 which significantly facilitates positioning the detent 150B in the notches 188, 190 of shaft 138B during assembly against the bias of the detent spring 200.

A weapon incorporating the above described interlock 210 accordingly will be completely locked up against inadvertent release with the fire control group 114B in rear firing position when the shaft 138B is in "safety on" position. Under such conditions, the trigger 140B, sear 124B, latch 136B, latch lever 168, auxiliary latch release button 226, connector 218 and interlock 210 will each be in a locked condition relative to receiver 12B. With the shaft 138B in its "safety off" position and with the bolt carrier 82B seared up by the fire control group 114B in rear firing position, the only way the fire control group can be released for forward movement relative to receiver 12B is for an operator to intentionally actuate the auxiliary latch release button 226 which is an unnatural movement requiring a conscious decision on the part of the operator.

WHAT WE CLAIM IS:—

1. A machine gun comprising a receiver, an integral operating group mounted for operation within the receiver and including a unitary bolt and bolt carrier assembly and a recoil buffer assembly, a single latch removably securing the operating group to the receiver in assembled relation, the operating group being removable from the receiver as a single separable unit, and a trigger group slidably mounted along the bottom of the receiver for cocking the bolt and bolt carrier assembly, the trigger group being movable manually between a forward cocking position and a rearward firing position, the trigger group in firing position overlying and covering said single latch to prevent unintended unlatching.

2. A machine gun according to claim 1 wherein the trigger group includes a pivotable trigger and a pivot shaft for the trigger, the trigger shaft being movable laterally of the receiver when the trigger group is in firing position for selective locking engagement and disengagement with the receiver, the trigger shaft permitting trigger actuation only when it is disengaged from the receiver.

3. A machine gun according to claim 1 wherein the trigger group includes a downwardly extending pistol grip serving as a cocking handle for the gun.

4. A machine gun comprising a receiver, a bolt assembly reciprocable within the receiver, a trigger group mounted on the receiver for movement between a forward cocking position and a rear firing position, the trigger group including a latch for selectively locking the trigger group in firing position, sear means for releasably cocking the bolt assembly, a trigger for actuating the sear means, and a pivot shaft for the trigger, the pivot shaft being supported for movement laterally of the receiver, when the trigger group is in firing position, between a first locked position engaging the receiver and a second position wherein the pivot shaft is disengaged from the receiver to condition the trigger group for movement manually relative thereto, the pivot shaft in said first locked position preventing the

ing connection, additionally allows latch 136B to be cammed downwardly by a rear wall 224 of the ejection port 132B independently of the interlock 210 which is then disposed immediately below the bolt carrier 82B. The latch spring 179 then returns latch 136B upwardly into locked position in engagement with abutment wall 182 when the latch 136B is returned into a position underlying the receiver opening 180 to secure the fire control group 114B in its rear firing position relative to receiver 12B with the bolt carrier 82B cocked and ready to fire.

To facilitate assembly and also to permit fire control group 114B to be eased into a forward charging position against the force of its compressed driving springs such as at 90, 90 (as described in the previous embodiment), fire control group release under "safety off" cocked conditions is permitted only by intentional actuation of an auxiliary latch release button 226 mounted on an upper rear portion of housing 116B. The button 226 has an actuator shaft 228 shown in Fig. 5 as projecting forwardly and upwardly into a conforming opening 230 in latch 136B and fixed to the latch by the pivot shaft 170 of latch lever 168, the pivot shaft 170 being mounted for pivotal movement relative to the actuator shaft 228. The auxiliary latch release button 226 is accordingly linked directly to latch 136B and operates independently of latch lever 168. Such construction thus permits bolt carrier 82B to be slid forwardly under "safety off" conditions from a rear cocked position into forward battery position when the weapon is empty rather than requiring that trigger 140B be squeezed and allowing bolt carrier 82B to slam forwardly against barrel 10 or bearing block 32 when the barrel 10 is removed.

The described structural components not only are quick and easy to assemble but are maintained in assembled relation without requiring known retaining rings, crosspins, etc. normally associated with weapons of this type. Channel rails 118A[1] normally confine opposite end portions of sear pin 122B as well as the radial flange 173 of the latch shaft 170 to also maintain these parts in assembled relation without requiring any additional fasteners. Moreover, the spring biased detent 150B has an enlarged knurled circumferential surface shown at 234 which significantly facilitates positioning the detent 150B in the notches 188, 190 of shaft 138B during assembly against the bias of the detent spring 200.

A weapon incorporating the above described interlock 210 accordingly will be completely locked up against inadvertent release with the fire control group 114B in rear firing position when the shaft 138B is in "safety on" position. Under such conditions, the trigger 140B, sear 124B, latch 136B, latch lever 168, auxiliary latch release button 226, connector 218 and interlock 210 will each be in a locked condition relative to receiver 12B. With the shaft 138B in its "safety off" position and with the bolt carrier 82B seared up by the fire control group 114B in rear firing position, the only way the fire control group can be released for forward movement relative to receiver 12B is for an operator to intentionally actuate the auxiliary latch release button 226 which is an unnatural movement requiring a conscious decision on the part of the operator.

## WHAT WE CLAIM IS:—

1. A machine gun comprising a receiver, an integral operating group mounted for operation within the receiver and including a unitary bolt and bolt carrier assembly and a recoil buffer assembly, a single latch removably securing the operating group to the receiver in assembled relation, the operating group being removable from the receiver as a single separable unit, and a trigger group slidably mounted along the bottom of the receiver for cocking the bolt and bolt carrier assembly, the trigger group being movable manually between a forward cocking position and a rearward firing position, the trigger group in firing position overlying and covering said single latch to prevent unintended unlatching.

2. A machine gun according to claim 1 wherein the trigger group includes a pivotable trigger and a pivot shaft for the trigger, the trigger shaft being movable laterally of the receiver when the trigger group is in firing position for selective locking engagement and disengagement with the receiver, the trigger shaft permitting trigger actuation only when it is disengaged from the receiver.

3. A machine gun according to claim 1 wherein the trigger group includes a downwardly extending pistol grip serving as a cocking handle for the gun.

4. A machine gun comprising a receiver, a bolt assembly reciprocable within the receiver, a trigger group mounted on the receiver for movement between a forward cocking position and a rear firing position, the trigger group including a latch for selectively locking the trigger group in firing position, sear means for releasably cocking the bolt assembly, a trigger for actuating the sear means, and a pivot shaft for the trigger, the pivot shaft being supported for movement laterally of the receiver, when the trigger group is in firing position, between a first locked position engaging the receiver and a second position wherein the pivot shaft is disengaged from the receiver to condition the trigger group for movement manually relative thereto, the pivot shaft in said first locked position preventing the

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sear means from being actuated by the trigger while permitting sear actuation in said second position.

5. A machine gun according to claim 4 further including a movable interlock operatively connected to the latch and preventing latch movement when the bolt assembly is in its rear cocked position while permitting latch movement to a position in unlocked relation to the receiver when the bolt assembly is in its forward battery position, thereby to release the trigger group from its rear firing position for movement relative to the receiver.

6. A machine gun according to claim 4 further including detent means for selectively maintaining the trigger pivot shaft in said first locked position and said second position.

7. A machine gun according to claim 6 wherein the detent means includes a latch locking portion which is disposed in the path of movement of the latch when the detent means is maintaining the trigger pivot shaft in said first locked position, thereby to positively lock the latch and secure the trigger group in firing position.

8. A machine gun comprising a receiver, a bolt and bolt carrier assembly, a supporting mount including guide means operatively connected to said assembly and supporting said assembly for operation within the receiver, releasable means detachably connecting the supporting mount to the receiver with the bolt and bolt carrier assembly in operative assembled relation to the supporting mount and the receiver, the releasable means including a single latch removably securing the supporting mount to the receiver and permitting separation of the supporting mount and the bolt and bolt carrier assembly as a unit from the receiver, and a trigger group slidably mounted along the bottom of the receiver for cocking the bolt and bolt carrier assembly, the trigger group being movable manually between a forward cocking position and a rearward firing position, the trigger group in firing position overlying and covering the latch to prevent unintended unlatching.

9. A machine gun comprising a receiver, a bolt assembly mounted for reciprocation relative to the receiver between a forward battery position and a rear cocked position, a trigger group mounted on the receiver and including a sear for releasably engaging the bolt assembly, the trigger group being movable manually relative to the receiver between a forward cocking position and a rear firing position, the trigger group having a manually actuated latch for releasably securing the trigger group in its rear firing position, the latch being movable between a normal position and an unlocked position relative to the receiver for locking and releasing the trigger group in said rear firing position, and a movable interlock operatively connected to the latch and preventing latch movement from its normal position to its unlocked position when the bolt assembly is in its rear cocked position while permitting such latch movement into its unlocked position when the bolt assembly is in its forward battery position, thereby to release the trigger group from its rear firing position for movement relative to the receiver.

10. A machine gun according to claim 9 wherein the bolt assembly is disposed in interfering relation to movement of the latch interlock when the bolt assembly is engaged by the sear such that the latch interlock engages the bolt assembly to prevent movement of the latch into unlocked position upon its being manually actuated.

11. A machine gun according to claim 9 further including a housing for the trigger group, and a manual latch operator mounted on the housing and drivingly connected to the latch interlock.

12. A machine gun according to claim 11 wherein the latch is supported on the trigger group housing for pivotal movement in opposite angular directions between said normal and unlocked positions, wherein a driving connection is provided between the latch operator and the latch for driving it in one angular direction from normal position to unlocked position, wherein biasing means urges the latch in an opposite angular direction toward its normal position, and wherein the driving connection between the latch operator and the latch permits limited latch movement in said one angular direction independently of the latch operator and latch interlock.

13. A machine gun according to claim 11 wherein the latch operator is supported on the housing for pivotal movement, wherein the latch operator includes a manual actuator positioned externally of the housing and a pivot shaft integral with the manual actuator and disposed within the housing, the latch being mounted on the pivot shaft of the latch operator, and wherein a connecting link drivingly engages and interconnects the latch interlock and the pivot shaft of the latch operator.

14. A machine gun according to claim 13 wherein the latch includes an opening for receiving the pivot shaft of the latch operator, the latch opening having an enlarged compartment, the pivot shaft having a radially enlarged driving portion formed thereon for engagement with the latch surrounding its enlarged compartment for positively driving the latch in at least one angular direction from its normal position to unlocked position, the enlarged compartment providing an angular clearance for the flat

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shoulders of the driving portion of the pivot shaft to permit limited freedom of angular movement of the latch relative to the latch operator and latch interlock.

15. A machine gun according to claim 11 further including an auxiliary latch operator drivingly connected to the latch for operating the latch and moving it into its unlocked position independently of the first latch operator and the latch interlock.

16. A machine gun according to claim 15 wherein the housing of the trigger group includes a downwardly extending pistol grip serving as a cocking handle for the gun, and wherein the auxiliary latch operator is located on a portion of the housing in remote relation to a hand engaging portion of the pistol grip to necessitate an unnatural hand movement relative to the pistol grip to operate the auxiliary latch.

17. A machine gun according to claim 15 wherein the auxiliary latch operator includes a manual actuator mounted externally of the housing and having an integral pin fixed to the latch for moving the latch into unlocked position independently of the first latch operator and the latch interlock.

18. A machine gun according to claim 17 wherein the first latch operator includes a pivot shaft extending inwardly of the housing and supporting the latch, and wherein the pin of the auxiliary latch operator is fixed to the latch by the pivot shaft of the first latch operator, the auxiliary latch operator and the latch being pivotable about the pivot shaft of the first latch operator.

19. A machine gun according to claim 15 wherein the trigger group further includes a pivotable trigger and a pivot shaft for the trigger mounted on the housing to extend transversely of the path of movement of the housing, the trigger pivot shaft being movable laterally of the housing, when the trigger group is in its rear firing position, between a first locked position engaging the receiver and a second position wherein the trigger pivot shaft is disengaged from the receiver to condition the trigger group for movement relative thereto, the trigger pivot shaft permitting trigger actuation for actuating the sear only when the trigger pivot shaft is in said second position.

20. A machine gun according to claim 19 wherein the trigger group further includes detent means for selectively maintaining the trigger pivot shaft in said first and second positions, the detent means including a latch locking portion which is disposed in interfering relation to movement of the latch when the detent means is maintaining the trigger pivot shaft in said first locked position, thereby to prevent actuation of the latch by both the first latch operator and the auxiliary latch operator.

21. A machine gun according to claim 9 further including a driving connection between the latch interlock and the latch, the driving connection including a manual latch operator movable between a normal position and an actuated position for locking and releasing the trigger group relative to the receiver, the bolt assembly, upon being engaged by the sear, being disposed in interfering relation to movement of the latch interlock and preventing movement of the latch operator to its actuated position.

22. A machine gun according to claim 21 wherein the driving connection further includes a connecting link fixed to the latch operator and drivingly engaging the latch interlock.

23. A machine gun according to claim 22 wherein the trigger group includes a pivotable trigger and a pivot shaft for the trigger, the trigger pivot shaft being mounted on the housing and movable laterally thereof when the trigger group is in firing position for selected locking engagement and disengagement with the receiver, the trigger shaft permitting trigger actuation only when it is disengaged from the receiver.

24. A machine gun according to claim 23 wherein the latch interlock is supported for pivotable movement about the trigger pivot shaft, wherein the latch operator is mounted for pivotal movement on the trigger group housing and has a pivot shaft disposed therein in laterally extending relation to the receiver, and wherein the latch is mounted on the latch operator pivot shaft and the connector is fixed thereto for movement in unison with the latch operator.

25. A machine gun substantially as hereinbefore described with reference to the accompanying drawings.

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