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DRAWINGS ATTACHED

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(54) PISTOL

(71) We, COLT . INDUSTRIES OPERATING CORP, a corporation organised and existing under the laws of the State of Delaware, United States of America, of 430 Park Avenue, New York, New York 10022, 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 pistols.

According to the present invention there is provided an automatic pistol including a receiver, a barrel on the receiver, a reciprocable operating slide on the receiver for moving the barrel relative to the receiver between forward and rear limit positions, an en bloc fire control group removably secured to the receiver and having a housing and a hammer supported for pivotal movement in the housing between a fired position and a cocked position, the housing including an integral stabilizing entension having a portion in cooperative engagement with the receiver at a location spaced from the hammer pivot axis a sufficient distance to locate the en bloc fire control group in preselected operative position in the receiver while maintaining said en bloc fire control group against undesired rocking movements in directions of hammer pivoting.

Attention is directed to our copending application no 45738/72 (Serial No 1315864), divided out therefrom, which claims certain aspects of the pistol disclosed herein.

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

Figure 1 is a side view, partly broken away and partly in section, showing a preferred embodiment of a pistol according to this invention with the barrel guide and stop mechanism in a forward limit position;

Figure 2 is a side view, partly broken away and partly in section, similar to Figure 1, and showing the barrel guide and stop mechanism in a rear limit position;

Figure 3 is a side view, partly broken away, showing an en bloc fire control housing;

Figure 4 is a side view, partly broken away, showing a portion of the receiver forming a pocket for the fire control housing;

Figure 5 is an isometric view of a barrel guide and stop member in combination with a slide stop-open latch;

Figure 6 is an enlarged schematic view of a firing mechanism at the instant of hammer release; and

Figure 7 is an enlarged section view taken generally along line 7—7 of Figure 1.

Referring to the drawings in detail, an automatic pistol 10 according to this invention is shown generally comprising a frame or receiver 12, barrel 14 and operating slide 16 suitably supported for reciprocable sliding movement on the receiver 12. During manual cocking and during automatic recoil upon firing, the slide 16 moves rearwardly to an extent limited by an abutment wall 18 on the receiver 12. A shoulder 20 inside the slide 16 engages an enlarged rear barrel portion 22 to drive the barrel 14 rearwardly with the slide 16 from its forward position shown in Figure 1. The barrel 14 disengages from the slide 16 during its rearward movement and is arrested at an intermediate point in the travel of the slide 16 to provide for cartridge extraction and ejection and to strip a live round from a magazine (not shown) to be chambered within the barrel 14 upon the return forward movement of the slide 16 under the force of its action spring 24.

Illustration and detailed descriptions of known features such as the barrel chamber, extractor, slide ejection port, safety mechanisms, ejector and magazine have been omitted since they are not essential to an understanding of this invention.

A firing mechanism hammer 26 is cocked by the slide 16 during its rearward

movement. The pistol 10 utilizes a well-known firing operation wherein pivoting its trigger 28 rearwardly about a pivot pin 30 moves a trigger bar 32 forwardly for actuating the hammer 26. Both single and double action firing mechanism movements are provided for in the pistol 10. In a single action movement the hammer 26 is manually cocked by its thumbpiece 34 and then release from cocked position by a trigger squeeze. In a double action movement the hammer 26 is both cocked and fired by a single trigger squeeze.

The trigger bar 32 has an inwardly directed rare finger 36 suitably stepped and configured to form a double action shoulder 38 and a sear engaging face 40 (Figure 6). During a double action movement, the double action shoulder 38 engages a double action hammer sear 42 to pivot hammer 26 from its at rest position (Figure 1) into a fully cocked position, such that upon further trigger pull, a tail of the finger 36 contacts the hammer 26 inside its double action notch 44 to disengage the trigger bar 32 to drop the hammer 26.

Coincidentally with the disengagement of the trigger bar 32 at the instant of release (shown in Figure 6), the sear engaging face 40 of the trigger bar 32 engages a single action sear 46, pivoting it clockwise out of the path of movement of the hammer 26 to avoid unintended engagement with its full cock and half cock notches 48, 50. The hammer 26 falls freely into fired position, pivoting about its fixed pin 52 under the force of its main spring 54 and strikes the firing pin 56 to fire a cartridge. During such hammer drop, a projecting disconnector hammer surface 58 engages the trigger bar 32 to drive it downwardly to automatically disengage the bar 32 from the single action sear 46.

Thereafter the single action sear 46 is automatically returned to engage the hammer 26 under the biasing force of its torsion spring 60, and the trigger 28 and its bar 32 are returned to their illustrated at rest positions (Figure 1) under the bias of a common torsion return spring 62 which continuously urges the trigger 28 forwardly and the trigger bar 32 upwardly into contact with the hammer 26.

The hammer 26 also may be manually cocked to engage the single action sear 46 in the full cock hammer notch 48. (As previously noted, the hammer 26 is also placed in this condition by recoil operation of the slide 16 upon firing.) The trigger bar 32 then moves forwardly responsive to trigger actuation to engage the single action sear 46. During trigger pull the bar 32 moves in a path generally parallel to the hammer surface in its double action notch 44 to drive the single action sear 46 out of engagement with the hammer 26. Upon release, hammer 26 drops responsive to a positive force applied along the length of its strut 64 under the bias of the compressed main spring 54 shown coiled about a plunger 66 having a recessed head 68 forming a seat for the hammer strut 64.

Various firing mechanism components mentioned above have been incorporated in a unitary fire control group 70 of an en bloc type particularly suited to be quickly and easily assembled and removed for facile field maintenance as a single-piece unit relative to the receiver 12.

A characteristic problem with en bloc type fire control groups concerns their fitting with the receiver. Simply stated, en bloc fire control groups of the known prior art are either too tightly wedged or too loosely seated in the receiver. If the en bloc fire control group is too tightly fitted, anticipated advantages desired in quick and easy disassembly and reassembly are replaced by frustration. In the absence of a construction permitting a relatively loose fit, close manufacturing tolerances must be adhered to or hand fitting must be employed, approaches which are neither practical or desirable in a mass production operation and which have a tendency to become loosened and unstable. Loosely fitted en bloc fire control groups exhibit a characteristic rocking action in directions of hammer pivoting, and it may be necessary to resort to an undesired double military pull to take up slop and play in the firing mechanism through a substantial portion of the trigger squeeze before a crisp trigger pull is reached just before firing. In addition, attempts to precisely locate en bloc fire control groups by the use, e.g., of cross pin connections extending laterally of the receiver have resulted in undesirably increasing the size of the firing mechanism components to an unmanageably large extent, particularly when the versatility of both single and double action movements of the above-described firing mechanism is desired.

To overcome such problems while providing a crisp single stage trigger pull to release the hammer and yet maintaining the flexibility of both single and double action movements in an exceptionally compact design, the en bloc fire control group 70 is particularly suited to be positively located in the receiver 12 with a relatively loose fit while stabilizing the fire control group 70 a sufficient distance from its hammer pivot axis X-X to minimize or eliminate any tendency toward unintended movement of the fire control group 70. The latter is provided a housing 72 having pins 52, 74 and 76 fixed therein for supporting the hammer 26, single action sear 46 and its spring 60 for

pivotal movement, and additionally supporting the hammer strut 64, main spring 54 and its associated plunger 66 in a compact unitary assembly for quick and easy insertion and removal relative to the receiver 12 of the pistol 10.

More specifically, an elongated downwardly projecting housing extension is shown including a plug 80 and a tubular portion 82 within which the main spring 54 is received with one end seated against a bottom shoulder of the head 68 of the plunger 66. An opposite end of the main spring 54 seats against the housing extension plug 80. The main spring 54 is preloaded and exerts a continuous force on the plug 80 to maintain its radial pin 84 against unintended movement relative to an L shaped slot 86 formed in the end of the tubular housing portion 82.

To locate the fire control group 70 within the receiver hand grip 88, the free rear finger 36 of the trigger bar 32 need only be positioned within a window (not shown) in the housing 72, and the fire control housing 72 is then simply inserted into its pocket 90 within the receiver 12. A rear wall 92 of the housing 72 and a front face 94 of a side projection 96 on the housing 72 are provided bearing support by surfaces 98, 100, respectively, within the pocket 90 of the receiver 12, and the plug 80 projecting downwardly beyond the end of the tubular portion 82 is fitted within a bottom opening 102 in the hand grip 88. Thus, the plug 80 not only serves as a pilot to precisely locate the fire control group 70 within the receiver 12, but also serves to restrain the fire control group 70 against unintended fore and aft oscillatory movement within the receiver 12. Upward movement of the fire control group 70 is restrained by the slide 16.

Any tendency of the fire control group 70 to rock during hammer cocking, e.g., thus will be effectively restrained by the engagement of the housing extension plug 80 and the receiver 12 to minimize any free trigger travel. By stabilizing the lower extremity of the housing extension at the bottom of the receiver 12, the effective lever arm to the hammer pivot axis X-X is of maximum length and only a minimal amount of force is transmitted between the housing extension plug 80 and the receiver 12 which additionally minimizes any parts wear and limits any angular motion of the housing 72 in directions of hammer pivoting to an absolute minimum for a given tolerance.

In addition to providing both single and double action movements, the described en bloc fire control group 70 is of exceptionally compact construction permitting use of a minimum number of working parts and a large capacity magazine of, say, fifteen rounds to be loaded in the magazine well 104 of the hand grip 88. Moreover, the pistol 10 can be provided an all steel frame in a large caliber such as a 9 mm or a .45 caliber and yet be of relatively light weight, in the order of thirty-five ounces or less. Due to the provision of the en bloc fire control group 70, no need exists for a separate wall defining the magazine well 104 within the hand grip 88. Further cost and weight reductions are achieved by utilizing the forwardmost surface 106 of the fire control housing 72 (extending downwardly along the housing extension to the bottom of the hand grip 88) to define a rear wall of the magazine well 104 when the fire control group 70 is located within the receiver 12.

The en bloc fire control group 70 additionally fastens grip panels 108, 108 in place on the hand grip 88 without any need whatsoever for screws or similar known fasteners. Dovetailed channels are formed on opposed edges of the hand grip 88, such as at 110,112, and along opposed lower hand grip edges as shown at 114 for positioning the grip panels 108, 108 which then can be simply slid into the dovetailed channels which maintain the grip panels against forward and downward movement. The grip panels 108, 108 are removably fastened in position and limited against rearward movement by outwardly projecting ribs 116, 116 on opposed sides of the tubular portion 82 of the housing extension, simply upon positioning the fire control group 70 within the receiver 12.

For precisely locating the barrel 14 during reciprocation of its slide 16 for continuously reliable high performance operation, a positive barrel guide and stop mechanism 120 is provided of a significantly improved construction particularly suited for quick and easy mass production and free of manufacturing difficulties even though extremely close tolerance requirements are established for precision barrel movement between limit positions.

More specifically, a barrel lug 122 projects downwardly from the enlarged rear barrel portion 22 in a vertical plane, extending through the longitudinal centre line of the barrel 14, for limited captured movement between a pair of camming pins 124, 126 operatively fixed to extend laterally in longitudinally spaced relation across the receiver 12. The barrel lug 122 has front and rear abutments 128, 130 of arcuate shape conforming to confronting peripheral surfaces of the front and rear camming pins 124, 126 which are of circular cross section. The rear camming pin 126 is fixed rearwardly of the lug 122 and offset slightly downwardly of the conforming rear lug abutment 130 in its forward barrel position,

shown in Figure 1, in interfering relation to its path of rearward movement.

Upon movement of the slide 16 retracting the barrel 14, the forward camming pin 124 supports a flat contact face 134 on the barrel lug 122 extending between its front abutment 128 and a forwardly and upwardly extending inclined shoulder 136 on the leading face of the barrel lug 122. After the contact face 134 clears the forward pin 124, the rear abutment 130 engages a lower portion of the rear pin 126 which cams the barrel 14 downwardly to an extent limited by full contact engagement between the confronting surfaces of the rear abutment 130 and rear camming pin 126, thereby establishing a lowered rear limit position (Figure 2) for the barrel 14 in disengaged relation to the slide 16 to permit its continued uninterrupted rearward movement to its rearward limit position for cartridge extraction, ejection and chambering. Accordingly, the rear camming pin 126 not only serves to guide the barrel 14 downwardly to disengage the slide 16, but also assists receiver rails 138 in stopping rearward barrel movement.

The forward camming pin 124 is fixed forwardly of and below the rear pin 126 to provide a relatively large area of intersurface contact with the barrel lug 122 to positively guide and stop the barrel 14 in a raised forward limit position, shown in Figure 1, in fastened engagement with the slide 16.

The forward pin 124 guides the barrel 14 upwardly into reengagement with the slide 16 upon its return forward movement. As the slide 16 moves forwardly, engaging the rear of the barrel 14, the forward pin 124, which is in interfering relation to the path of forward travel of the barrel lug shoulder 136, cams the barrel 14 upwardly in timed relation to the forward movement of the slide 16 to position the enlarged rear barrel portion 22 between slide shoulders 20, 140. Thus, the forward camming pin 124 not only guides forward barrel movement by its engagement with the shoulder 136 and the contact face 134, but also effectively stops forward movement of both the barrel 14 and slide 16 in operative position with the pistol 10 conditioned for the firing of the next live round.

The circular cross-sectional construction of the camming pins 124, 126 enhances their being very accurately and easily positioned in place during a simplified mass production operation virtually free of any manufacturing difficulties while yet meeting critical tolerance requirements. Two precisely located holes are simply drilled in the receiver 12 for placement of the pins, an operation which can be repeatedly performed rapidly and accurately.

In addition to stopping and maintaining the slide 16 with the barrel 14 in its raised forward limit position, the camming pin 124 also may provide additional functions, e.g., as a pivot for a slide stop-open latch 142. The forward pin 124 is shown detented in the receiver 12 against undesired lateral and pivotal movement by a spring-biased plunger 144 projecting rearwardly from the hollow guide rod 146 to engage a recessed seat 148 in the pin 124 to continuously bias a rearwardly extending arm 150 of the slide stop-open latch 142 counterclockwise, urging the latch 142 into a lowered position against a bottom surface 152 of a window 154 in the receiver 12. Upon extraction and ejection of the last cartridge, the latch 142 is actuated by a magazine follower 156 to move the latch 142 upwardly to engage a notched surface 158 in the slide 16 to prevent its return forward movement under empty magazine conditions.

It will be understood that a suitably spring-biased, slide stop-open latch could also be provided on the rear camming pin 126 if desired.

The forward pin 124 additionally may be used to serve as a takedown pin to permit quick and easy disassembly and reassembly of the barrel 14 from the slide 16. An intermediate portion of the pin 124 is shown partially cut away to form a recessed shoulder 160 of about the width of the barrel lug 122. The shoulder 160 would normally face forwardly in operative position. When it is desired to disassemble the slide 16 and barrel 14 from the receiver 12, the latch thumbpiece is simply pulled laterally outwardly to unseat the detent plunger 144, and the arm 150 is rotated to position the recessed shoulder 160 to provide clearance for the barrel lug 122 and permit removal of the barrel 14 and slide 16.

WHAT WE CLAIM IS:—

1. An automatic pistol including a receiver, a barrel on the receiver, a reciprocable operating slide on the receiver for moving the barrel relative to the receiver between forward and rear limit positions, an en bloc fire control group removably secured to the receiver and having a housing and a hammer supported for pivotal movement in the housing between a fired position and a cocked position, the housing including an integral stabilizing extension having a portion in cooperative engagement with the receiver at a location spaced from the hammer pivot axis a sufficient distance to locate the en bloc fire control group in preselected operative position in the receiver while maintaining said en bloc fire control group against undesired rocking movements in directions of hammer pivoting.

2. A pistol as claimed in claim 1 wherein

shown in Figure 1, in interfering relation to its path of rearward movement.

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2. A pistol as claimed in claim 1 wherein

* C L M S *

the en bloc fire control group includes main spring means continuously biasing the hammer toward its fired position, and wherein the housing stabilizing extension comprises an elongate hollow member receiving the main spring means.

3. A pistol as claimed in claim 1 or claim 2 wherein the receiver includes a hand grip, the stabilizing extension being received within the hand grip and engaging a bottom portion thereof for locating and restraining the en bloc fire control group relative to the receiver.

4. A pistol as claimed in any one of claims 1 to 3 wherein the hammer of the en bloc fire control group includes trigger actuated single action sear means and double action sear means.

5. A pistol as claimed in any one of claims 1 to 4 wherein the receiver includes a hand grip having panel positioning means, a pair of grip panels on opposite sides of the hand grip engageable with its panel positioning means, and a pair of ribs on opposed sides of the stabilizing extension respectively engageable with the grip panels for releasably fastening the same in engagement with the hand grip.

6. A pistol as claimed in claim 2 wherein a plug forming a removable seat for the main spring means is removably secured in an end of the hollow extension member, wherein the receiver includes a hand grip having a bottom opening, and wherein the plug is received in the bottom opening of the hand grip.

7. A pistol as claimed in claim 3 wherein the stabilizing extension forms a magazine-well wall within the hand grip.

8. A pistol as claimed in claim 6 further including a pin and slot connection between the plug and the hollow extension member, the main spring means continuously exerting a force maintaining the plug against unintended movement relative to the hollow extension member.

9. A pistol substantially as described herein with reference to the accompanying drawings.

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