May 3, 1949. H. E. SEAGRAVES 2,468,784

AUTOLOADING PISTOL

Filed Sept. 2, 1944 4 Sheets-Sheet 1

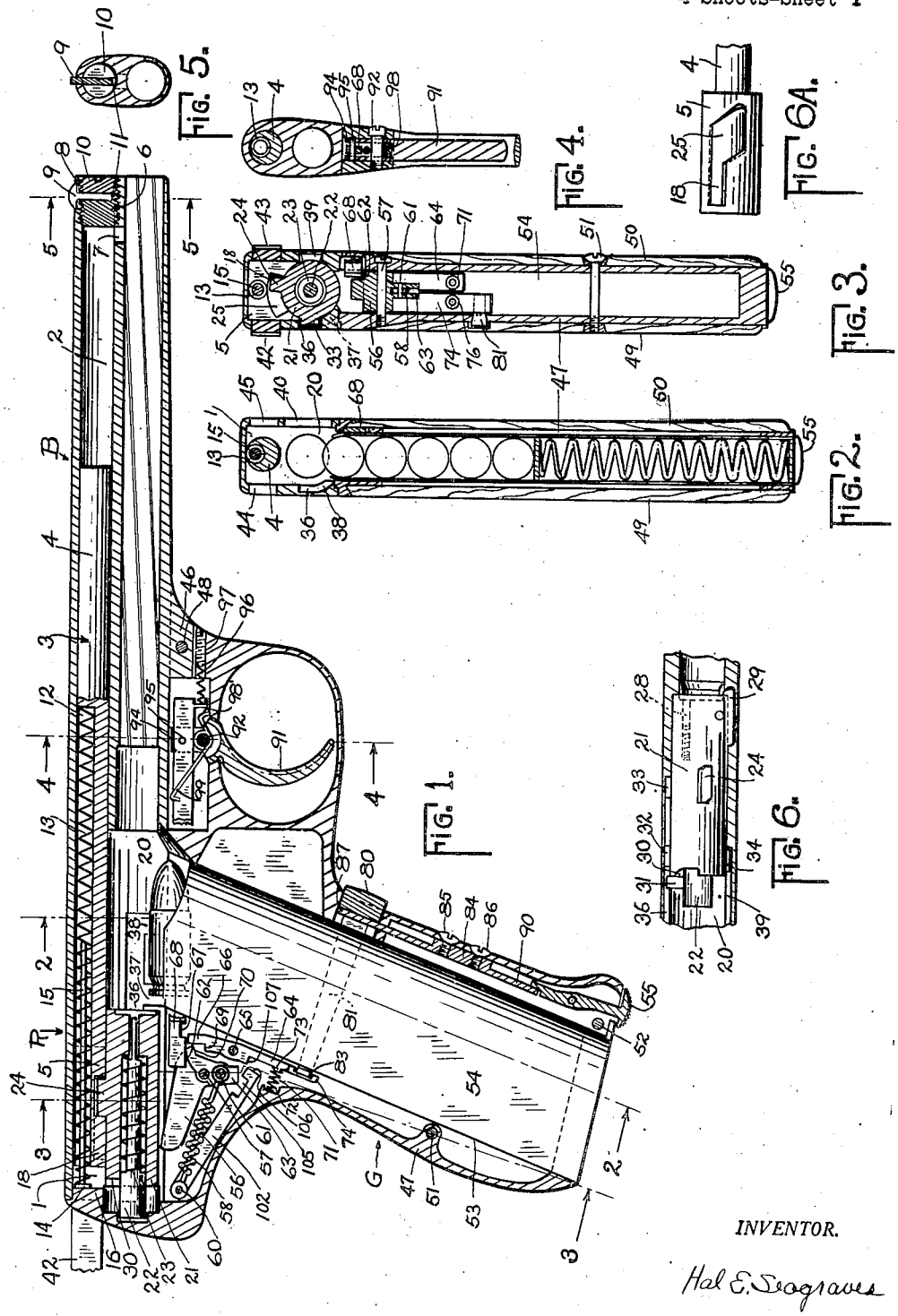


FIG. 5.

FIG. 4.

FIG. 6A.

FIG. 3.

FIG. 2.

FIG. 1.

FIG. 6.

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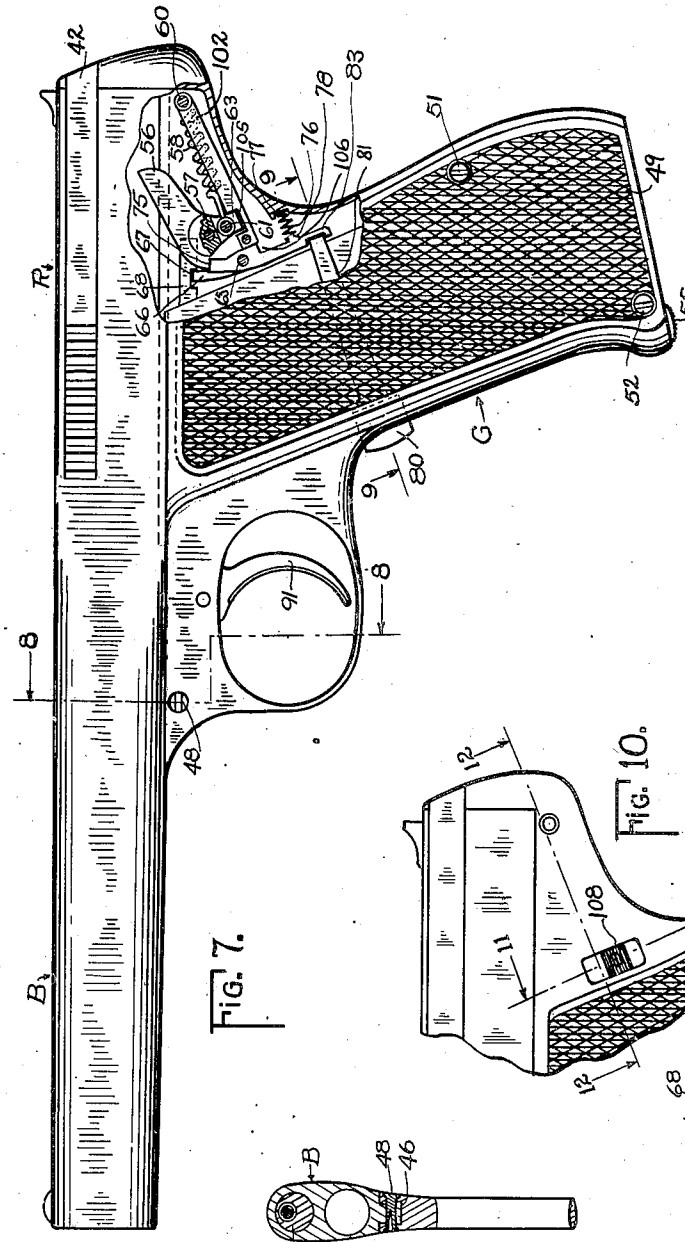


FIG. 7.

FIG. 8.

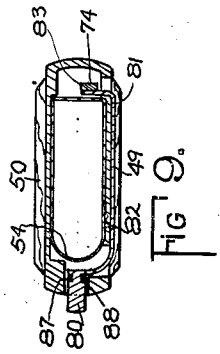


FIG. 9.

FIG. 10.

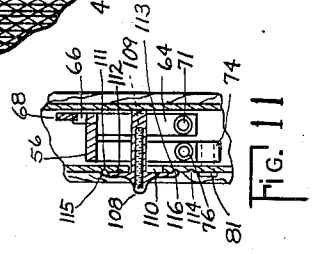


FIG. 11

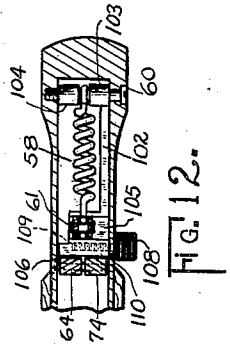


FIG. 12.

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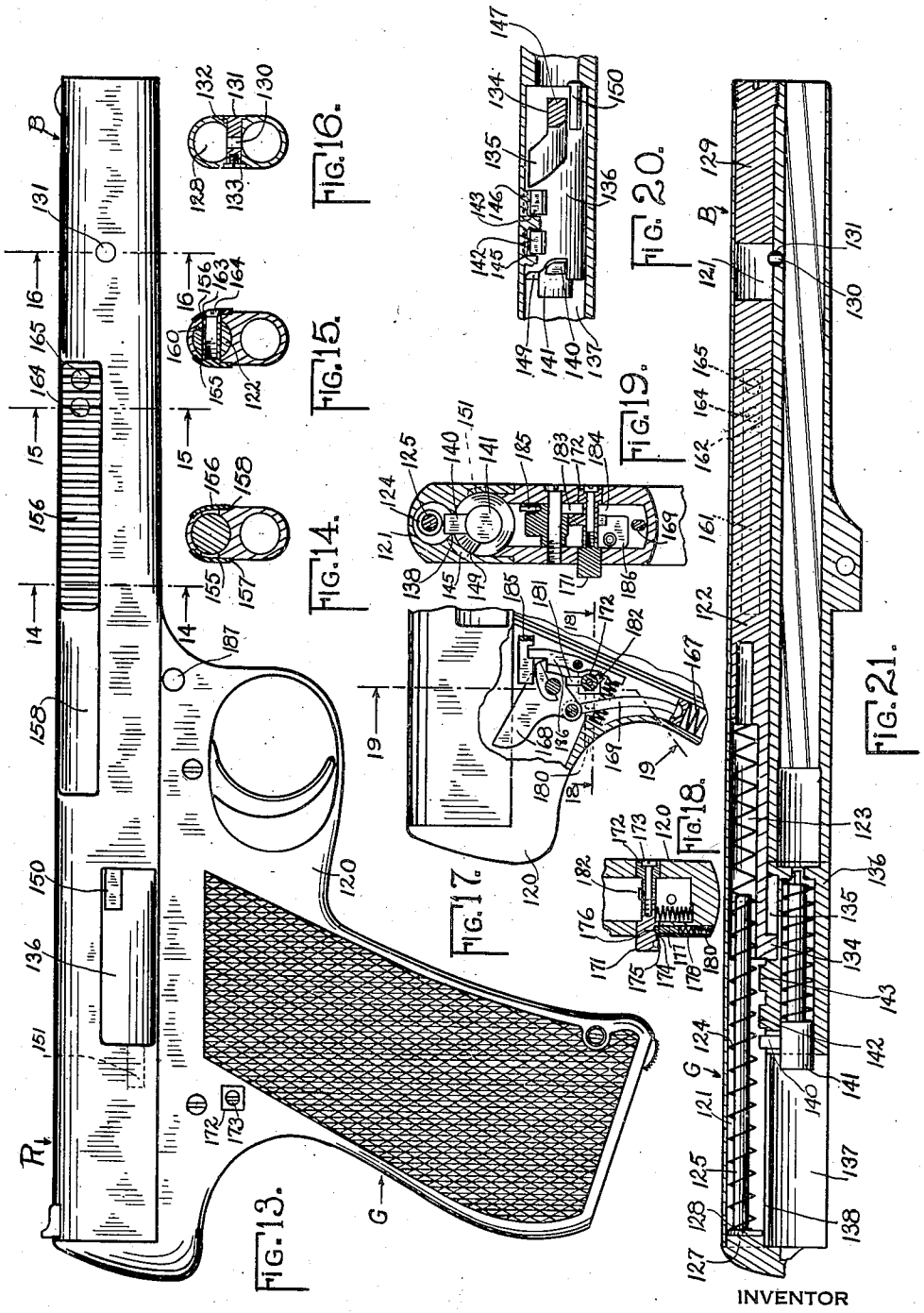


FIG. 13.

FIG. 14.

FIG. 15.

FIG. 16.

FIG. 17.

FIG. 18.

FIG. 19.

FIG. 20.

FIG. 21.

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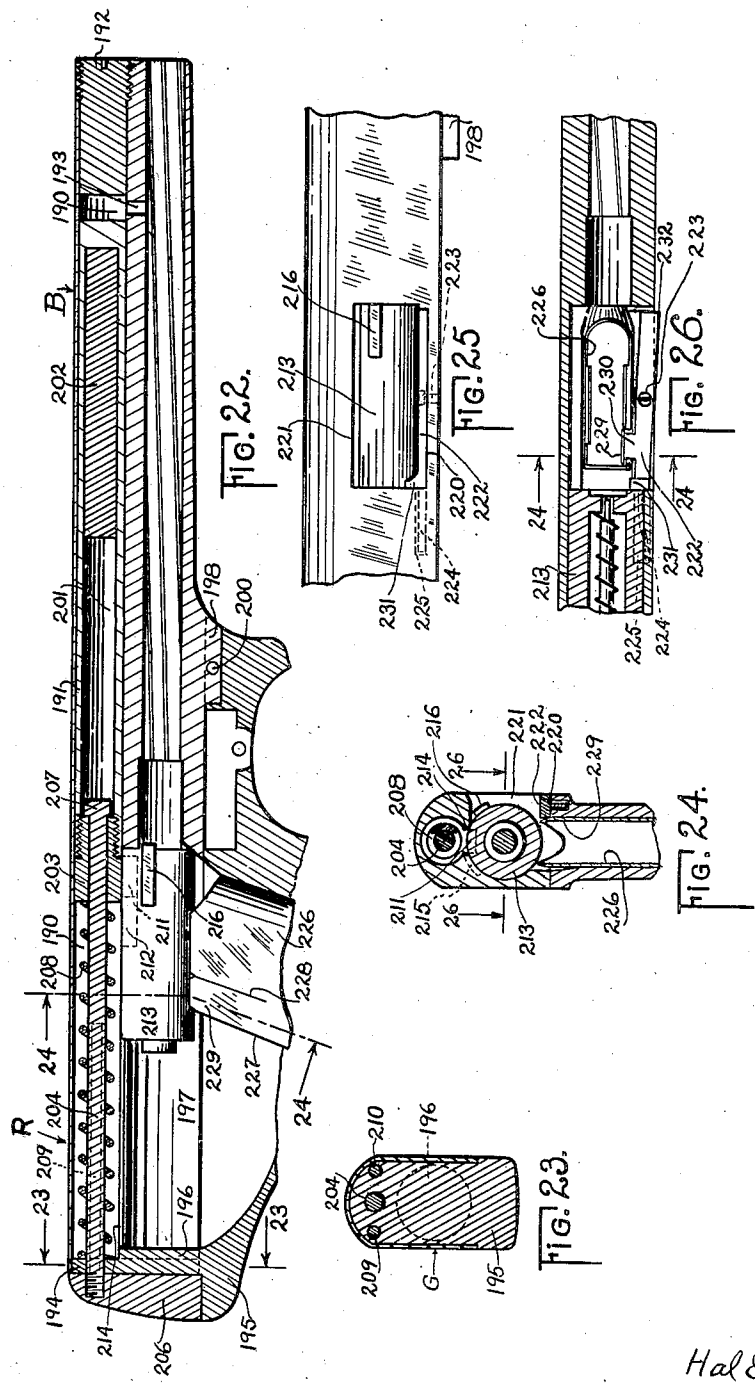


FIG. 22.

FIG. 25.

FIG. 26.

FIG. 24.

FIG. 23.

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UNITED STATES PATENT OFFICE

2,468,784

AUTOLOADING PISTOL

Hal E. Seagraves, Wilton, Conn.

Application September 2, 1944, Serial No. 552,456

4 Claims. (Cl. 89—195)

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This invention relates to pistols and has for its object the provision of an improved autoloading gas-operated pistol. The improved pistol of the invention comprises a receiver having a breech bolt therein, a barrel connected to the receiver which is oblong in cross-section with a space in the upper part of the barrel for a gas piston operatively connected to the breech bolt, and a grip member for the barrel and receiver with a space in the grip thereof for a cartridge magazine. The pistol of the invention is characterized by the fact that its mass such as the receiver, breech bolt and barrel are fixed at the instant of firing and accordingly do not move independently of other parts of the pistol.

The autoloading pistols proposed and constructed heretofore, both gas-operated and otherwise, have had such a preponderance of weight below the bore plane (a horizontal plane through the center of the bore when the pistol is in its horizontal firing position) that firing causes a violent upward flip of the muzzle. This, of course, is accentuated by the position of the grip which results in an upward force component. The upward flip of the muzzle contributes to inaccurate shooting and results in sighting complications when changing from one distance to another. The preponderance of weight below the bore plane has been due to the arrangement of the essential elements below the bore plane and the proportioning of the various parts. The pistol is peculiar among guns for the reason that it must have maximum low weight limits, regardless of the caliber, it is semi-automatic, firing once each time the trigger is pressed, it must have a grip below the bore to permit sighting, and it must be held in the outstretched hand. The hand is very yieldable under the terrific impact of the explosion, and actually has little influence on the upward flip of the muzzle at the instant of firing, while the bullet is in the barrel.

In one of its main aspects, the ivention provides an autoloading pistol with such a proportioning and arrangement of the supporting structure and operating mechanism, both below and above the bore plane, that the center of mass is at or above the bore plane and the upward flip of the muzzle is substantially reduced. The invention provides an improved barrel which is narrow and deep in cross-section (oblong) with gas-operated means in a space above the bore for operating the breech bolt, which has a preponderance of weight above the bore plane, together with means for admitting barrel gas to the space. The barrel and receiver are preferably unitary and may advantagously be integral as when formed of a single piece of metal. The barrel-receiver is detachably connected to a grip member comprising space and mounting means for the trigger, sear, hammer and magazine. The grip member is constructed as light as possible and may be made of steel in which case it is skeletonized to reduce weight in the lower part of the pistol. The grip member may also be formed of a molded plastic material, or of magnesium alloy, aluminum or aluminum alloy castings. These light weight molded and cast materials not only simplify construction but greatly reduce the weight in the lower part of the pistol.

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One of the features of the invention is the provision of a pistol with a fixed barrel and receiver with no exterior moving parts in the automatic section. In one embodiment of the invention means are arranged at the rear end of the receiver for the manual operation of the breech bolt, and the sides and top of the receiver are free of exterior moving parts, the only opening in the receiver being for ejecting the empty cartridge cases. This is an important feature in view of the fact that the receiver and barrel are fixed with respect to each other and the grip member.

The invention, in another of its aspects, provides a very simple and positive sear release comprising a trigger rod which is disengaged from the sear by the backward movement of the hammer and reengaged with the sear after the hammer is cocked.

Another feature of the invention is an improved means which automatically locks the hammer each time it is cocked by means of a safety sear and which is operated by a finger release on the forward face of the grip. This construction provides a safety feature without introducing any moving element in the heel of the grip. Devices mounted in the heel of the grip which are pressed in by the palm of the hand to release the hammer are very annoying to target shooters who prefer a fixed heel against the hand.

Still another feature of the invention is the provision of a very simple mechanism for holding the breech bolt in its open position when the magazine is empty and which automatically closes the breech bolt when a magazine with at least one cartridge is inserted into the grip. A pivoted spring-pressed member on one side of the receiver engages the breech bolt each time the breech bolt moves rearward with the magazine

empty or removed. Means on a side of the magazine actuated by the cartridges prevents the spring-pressed member from engaging the breech bolt when a cartridge is in the magazine. This permits target shooters, firing "slow fire," to have the breech automatically opened and left open after each shot.

These and other novel features of the invention will be better understood after considering the following discussion taken in conjunction with the accompanying drawings in which

Fig. 1 is a side view, partly in section, of a pistol embodying the invention;

Figs. 2, 3, 4 and 5 are views along lines 2—2, 3—3, 4—4 and 5—5 respectively of Fig. 1;

Fig. 6 is a view of the bolt of Fig. 1 from above;

Fig. 6A is a fragmentary view from below of the slide;

Fig. 7 is a side view of the pistol of Fig. 1 with internal parts exposed;

Fig. 10 is a fragmentary exterior view of the rear end of the pistol of Fig. 7;

Figs. 8, 9, 11 and 12 are views along lines 8—8, 9—9, 11—11 and 12—12 respectively of Figs. 7 and 10;

Fig. 13 is a side view of another embodiment of the invention;

Figs. 14, 15, and 16 are views along lines 14—14, 15—15 and 16—16 respectively of Fig. 13;

Fig. 17 is a fragmentary view of the rear end of the pistol of Fig. 13 with interior parts exposed;

Figs. 18 and 19 are views along lines 18—18 and 19—19 respectively of Fig. 17;

Fig. 20 is a view from above of the bolt of Fig. 13;

Fig. 21 is a side view, partly in section, of the barrel-receiver portion of the pistol of Fig. 13;

Fig. 22 is a fragmentary side view, partly in section, of still another pistol embodying the invention;

Figs. 23 and 24 are views along lines 23—23 and 24—24 respectively of Fig. 22;

Fig. 25 is a fragmentary side view of Fig. 22 and

Fig. 26 is a view along line 26—26 of Fig. 24 with the bolt moved rearward.

The pistols illustrated in the drawings comprise three main parts, a barrel B, a receiver R and a grip member G. The barrel and receiver merge into each other at the rear end of the cartridge chamber and may be connected together in any suitable way as a unitary structure. As shown in the drawings they are integral having been formed by simple mechanical operations from a single bar of steel or equivalent metal. The integral barrel-receiver is removably attached to the grip member and the barrel is of oblong cross-sectional shape having substantially flat or slightly curved sides with a preponderance of its weight above the bore place.

The pistol of Figs. 1 to 12 has a barrel-receiver with a longitudinal space extending from end to end, the space 1 in the receiver being substantially rectangular and the space in the barrel being a cylinder 2. The slide 3 is reciprocably mounted in the space with the piston 4 in the cylinder 2 and the cam part 5 in space 1 is rectangular at the top and partly cylindrical at the bottom. The forward end of the cylinder is closed with a screw plug 6 and the gas port 7 connects the cylinder 2 with the bore. The port 7 is close to the end of the bore and is easily accessible for cleaning. A slot 8 in the top of the barrel receives the sight 9, which is slidable up and down against the plug 6. The sight is secured in an adjustable position by the locking plug 10 which bears against the

sight. Advantageously, the slot 11 for a screw-driver in plug 6 receives the depending part of the sight and is accordingly prevented from turning. The plugs 6 and 10 not only securely close the end of cylinder 2 but provide means for elevating or lowering the front sight and securing it in the desired position. The slide 3 has an eccentrically disposed cylindrical hole 12 for housing the action spring 13 which bears against the piston at one end and the plate 14 on the pilot rod 15 on the opposite end. Plate 14 bears against the projecting lug 16 on the frame 47 of G. The cylindrical chamber 20 formed in line with the bore receives the cylindrical breech bolt 21 which has therein the firing pin 22 and firing pin spring 23. The breech bolt has an upwardly extending turning lug 24 which engages with the rectangular slot 18 and helical cam slot 25 in the cam part 5 of the slide (Fig. 6). The bolt has a spring-pressed-pin-type ejector 28, extractor 29, and a cam slot 30 for engaging the lug 31 on the firing pin, two locking lugs 32 and 33 on one side, and a locking lug 34 on the opposite side. The lugs 32 and 33 travel in the guide groove 36 during reciprocation of the bolt and enter locking slots 37 and 38 when the bolt is turned to its locked position. Lug 34 travels in guide slot 39 and enters the ejection opening 40, bearing against the rear edge thereof when the bolt is turned to its locked position. The side grip plates 42 and 43 are attached to the slide for manual operation of the bolt and these reciprocate with the slide, in the guide slots 44 and 45.

The under portion of the barrel has a depending wedge-shaped block 46. The barrel-receiver and assembled elements just described are removably attached to the grip member G in a very simple manner. The projecting lug 16 on the heel of the grip member frame 47 fits snugly into the space 1 and the block 46 fits snugly in a wedge-shaped slot in the front end of frame 47 (Fig. 8). To remove the barrel-receiver from the grip member, the cotter pin 48 is pushed out and the barrel-receiver may be pulled forward. The lug 16 secures the barrel-receiver at the rear and block 46 secures it at the forward end.

The grip member frame 47 may be formed of steel, in which case it is cut away as much as possible to reduce its weight, or it may be formed of alloys of aluminum or magnesium or a plastic material as will be more fully described hereinafter. The frame illustrated has cut out open sides which are covered with the wood grips 49 and 50 secured in position by screws 51 and 52. The central part has a chamber 53 for receiving the box magazine 54 which is held in position by the catch 55. The hammer 56 is pivoted on the screw 57 and is driven by the tension coil spring 58 secured to the frame by screw 60 and to the hammer by pin 61. The hammer has a cam shoulder 62 projecting to the right and a depending lug 63. The trigger-operated sear 64 is pivoted on the screw 65, has an upward extension 66 for engaging the notch 67 on the trigger rod 68 and a shoulder 69 for engaging the hammer notch 70. The sear compression spring 71 is secured in a recess 72 in the frame and fits over a nipple 73 on the sear which holds it in position thereon.

As best shown in Figs. 3 and 11, a safety sear 74 is also pivoted on pin 65 and it has a shoulder 75 for engaging the hammer in the same manner as sear 64. The coil compression spring 76 for sear 74 is secured in the recess 77 in the frame and fits over the nipple 78 on the safety sear which

secures it in position thereon. The safety sear always catches the hammer in the same manner as sear 64. The safety sear is operated by a release button 80 so arranged as to be pressed inward by the large or second finger, and the hammer cannot be released until button 80 is pushed in. Button 80 is connected to a U-shaped bar 81 which slides in a slot 82 inside the grip 49 (Fig. 9) and engages a slot 83 in the lower end of the safety sear. The flat spring 84 is attached to the frame by screws 85 and 86 and the upper forked end 87 thereof fits into a slot 88 in the button 80 normally forcing the button to the projecting position shown in the drawings with the bar 81 out of bearing contact with the slot 83 in the safety sear. By pressing the button 80 inward, the safety sear is moved out of contact with notch 70 and the hammer may be released by pulling the trigger. The lower part 90 of the spring 84 bears against the magazine catch 55 and holds it in its locking position (Fig. 1). It will thus be seen that spring 84 performs a dual function. Catch 55 can only be released by pushing it forward, an advantage when the gun is used in the brush.

As shown in Figs. 1 and 4, the trigger 91 is pivoted on screw 92 and has a bifurcated upward lever arm 94 with the trigger rod 68 therein and pivoted thereto by the pin 95. The trigger rod is urged to the rear by the coil spring 96 which may be adjusted for tension by the screw 97. The spring 96 not only sets the trigger rod in position for actuating the sear, but it regulates the trigger pull and this may be varied by screw 97. The coil spring 98 around the screw 92 has one arm 98' bearing against the frame and another arm 99 hooked over the top of the trigger rod. As thus arranged the spring turns the trigger rod counterclockwise so that the notch 67 therein will snap down over the sear top 66 when in proper position. It will be seen in Figs. 1, 2 and 3 that the trigger rod has a U-shaped portion permitting it to operate around the magazine and inside the grip 50.

Referring to Fig. 1, it will be seen that the hammer is pushed backward by the bolt beyond the cocked position of Fig. 7 and that the cam shoulder 62 has lifted the trigger rod 68 upward disengaging the notch 67 from the top 66 of the sear. The sear 64 is accordingly free to engage the hammer whether the trigger be held or released. When the bolt travels forward the hammer follows it until it is caught by both sears as shown in Fig. 7. (Safety sear 74 has no connection with the trigger.) This movement of the hammer drops the cam shoulder 62 permitting the trigger rod to rest on the top 66 of the sear, if the trigger be held, and the notch 67 to drop over the top 66 if the trigger be released. In any event, when the trigger is released and the hammer is cocked, the notch 67 will always engage the top 66 of sear 64.

The safety bar 102 pivoted on screw 60 has a hub 103 which cooperates with bushing 104 to center the spring 58 on the screw (Fig. 12). The safety bar has a channel 105 and a flat end 106 (Fig. 1). In the safe position shown in Fig. 7, the channel 105 straddles the lug 63 of the hammer preventing it from moving regardless of the position of the sears and the end 106 engages both sears blocking them from movement and the hammer is triple locked. In the non-safe position of Fig. 1, the safety bar is pushed down out of engagement with the hammer and the sears. The notch 107 in the sears permits them to be

turned and to clear the flat end 106 when the safety bar is in the position of Fig. 1. The safety bar is operated by an exterior thumb button 108 which is connected thereto by screw 109 through a slot 110 in the side of the frame 47. As best shown in Fig. 11, the safety button has two flattened ears which bear against the side of the frame by spring action. The frame has four shallow grooves 111, 112, 113 and 114 in which the heads 115 and 116 on the inner end surfaces of the ears make engagement. In the safe position of Fig. 11, beads 115 and 116 are in grooves 111 and 113. In the non-safe position, the beads 115 and 116 will engage beads 112 and 114 respectively. The button 108 cannot be set in the safe position unless the hammer is cocked.

As shown in Fig. 1, the bolt is ready to start forward under the driving action of spring 13. The bolt is pulled forward by the lug 24 and is prevented from turning during its longitudinal travel by the lugs 32 and 33 traveling in guide 36 and lug 34 traveling in guide 39. Fig. 6 shows the bolt as it reaches the end of its forward stroke with the cartridge pushed into the barrel chamber. The bolt is in its unlocked position and is free to slide rearward. Further forward movement of the slide 3 will result in the cam 25 turning the bolt counterclockwise to its locked position with the lugs 32 and 33 in the locking slots 37 and 38 (Fig. 1) and the lug 34 in the ejection opening 40. After closing the bolt, the slide continues to travel forward a short distance, say around three-eighths of an inch, the lug 24 entering the rectangular slot 18 which locks the bolt in position preventing it from turning. The bolt is now locked with three lugs 32, 33 and 34 and cannot turn.

The lug 31 on the firing pin also travels in groove 36 and is thereby prevented from turning with the bolt. As shown in Figs. 1 and 6, the firing pin is held to a rearward position beyond the reach of a cartridge by the lug 31 bearing against the end of the bolt. When the bolt is turned counterclockwise to the locked position the lug 31 assumes a position in front of cam 30 and the firing pin may be driven forward by the hammer into contact with the cartridge except when the bolt is locked.

When a cartridge is fired and the bullet passes beyond gas port 7, the gas rushes into the cylinder 2 and drives the slide 3 rearward. (Fig. 22 shows a piston in the firing position.) The slide travels rearward about three-eighths of an inch, the length of rectangular slot 18, without acting upon the bolt lug 24. The forward inclined face in cam 25 strikes the lug 24 and turns the bolt clockwise to its unlocked position shown in Fig. 6. The momentum of the slide in cooperation with the residual gas pressure, carries the bolt to the rear as shown in Fig. 1 ejecting the empty cartridge case. A fresh cartridge rises to the position shown in Fig. 1 and is ready to be pushed into the chamber of the barrel on the return of the bolt.

The pistol shown in Figs. 1 to 12 has a bore of about .35 caliber and the barrel is five and five-eighths inches in length. This pistol may be provided with a bolt catch similar to that of Fig. 22 or with a hammer spring similar to that of Fig. 17 if desired.

The spring of Fig. 1 is especially important in pistols constructed for long cartridges because it permits the full use of the grip for the magazine and does not make the grip unduly wide and cumbersome. Moreover, the spring is close to the bore

plane and eliminates weight in the lower part of the grip member.

The pistol illustrated in Figs. 13 to 21 comprises a barrel-receiver B—R slidably attached to the grip member G in a manner similar to that of Fig. 1. The grip member is formed by casting or molding and the supporting frame 120 is a unitary structure with all of the large cavities and exterior shape formed therein by the casting or molding operation. It may be cast of aluminum or magnesium alloy or formed of a molded plastic material such as "Toolite."

As shown in Fig. 21, the barrel-receiver has a cylindrical space 121 bored therethrough and the slide 122 is in the form of a cylindrical piston with an eccentric hole 123 therein for receiving the action spring 124 and pilot rod 125. The rear end of space 121 is closed by the cylindrical projection 127 on the frame 120 and the disc 128 attached to rod 125 bears against projection 127 and helps maintain the rod in position. The forward end of cylinder 121 is closed by screw plug 129.

Gas from the bore is admitted to cylinder 121 through orifice 130 which is bored in a removable plug 131 fitted snugly in a transverse hole through the barrel between the bore and the cylinder 121. The plug is provided with an ear 132 which fits a slot in the barrel insuring proper positioning of the plug. The plug is held in position by the screw 133 and may easily be removed for cleaning. The slide 122 has a depending lug 134 which engages the helical cam slot 135 in the breech bolt 136. The bolt is reciprocably mounted in a cylindrical space 137 in the receiver and in line with the bore. As best shown in Fig. 19, the metal between cylinders 121 and 137 is cut out to form the guideway 138 in which lug 134 travels and the slide is prevented from turning. The projection 140 on the firing pin 141 and the locking lugs 142 and 143 travel in the guideway during reciprocation of the bolt. The firing pin has a spring 144 for holding it rearward. As shown in Figs. 19 and 20, the bolt is in its locked position with lugs in locking recesses 145 and 146 and the lug 134 is in the rectangular part 147 of the cam slot 135 and the bolt is prevented from turning. The turning of the bolt has set the recessed part of cam 149 in front of projection 140 on the firing pin and the firing pin is free to be driven forward by the hammer.

As shown in Fig. 21, the slide has moved rearward and the lug 134 has turned the bolt clockwise to its unlocked position. The slide and bolt are now ready to travel rearward under the pressure of the gas from the bore. The turn of the bolt during the unlocking causes the projection 140 to move the firing pin rearward by the engagement with the cam slot 149 and the firing pin cannot contact a cartridge. The rearward travel of the slide and bolt compresses the action spring 124 which returns the same to their forward positions and locks the bolt. This locking is done by lug 134 striking the forward helical face of cam slot 135 resulting in the bolt being turned counterclockwise to the position shown in Fig. 20. The bolt has an ejector (not shown) similar to that of Fig. 1 and an extractor 150 which enters a clearance recess 151 inside cylinder 137 on the rearward travel of the bolt.

The bolt is operated manually by the ribbed plates 155 and 156 which travel the length of slide travel 122 in recesses 157 and 158 on opposite sides of the barrel. Plate 155 has an integral projecting bar 160 which is inserted through a long narrow slot 161 on the left side of the barrel, through a short rectangular slot 162 in the slide, and through another long narrow slot 163 on the right side of the barrel. The plate 156 butts against the end of bar 160 and is secured thereto by screws 164 and 165. To operate the breech bolt manually, the plates are gripped between the thumb and fore-finger and are pulled rearward until the slide and bolt reach the end of their stroke. If the plates are released the action spring drives the slide and bolt forward to the locked firing position.

The pistol of Fig. 13 has a sear and trigger mechanism similar to that of Fig. 1 but the hammer is driven by a compression spring 167 in the grip which connects to the hammer 168 by rod 169. I may use with the pistol of Fig. 13 a safety sear and hammer spring similar to those of Fig. 1 and a bolt catch similar to that of Fig. 22.

As shown in Figs. 17, 18 and 19, the safety mechanism comprises a push button formed of two parts 171 and 172 which are connected together by screw 173. Both parts have square ends which fit into square holes on the opposite sides of the frame 120 and are, accordingly, prevented from turning. Part 171 has a slot 174 connecting with two hemispherical recesses 175 and 176 in which the plug 177 is pressed by the coil spring 178 held in position in the frame by screw 180. Part 172 has an upward extending bar 181 which, when in the same position shown in Figs. 18 and 19, blocks the hammer preventing it from moving towards the firing pin, and an angularly disposed depending bar 182 which blocks the sear preventing it from releasing the hammer. If button 171 be pushed inward, the plug 177 backs out of recess 176, travels through slot 174 and snaps into recess 175 securing button 171 in the non-safe position flush with the side of the frame 120. Simultaneously button 172 projects to the right and bars 181 and 182 enter the spaces 183 and 184 to the right side of the hammer and sear releasing them and permitting the trigger rod 185 to operate the sear 186 and release the hammer. The safety mechanism of Figs. 13 to 21 has several positive operating advantages in a pistol. For example, in the safe position, button 171 is in the way of the shooter's thumb and no time will be wasted in trying to fire when the safety is set in the non-firing position. When in the non-safe or firing position, button 172 projects to the right where it is easily seen even when the pistol is in a holster. Moreover, the safety member cannot be set in the safe position unless the hammer be cocked.

The barrel illustrated is six and three-eighths inches in length and is bored for about 35 caliber.

When the pin 187 is removed, the barrel-receiver may be slid free of the grip member G. The slide, action spring, pilot rod and breech bolt slide out of the barrel-receiver towards the open rear. The pistol of Figs. 13 to 21 is of very simple construction being formed by the simplest machining operations.

Figs. 22 to 26 illustrate only the upper part of the grip member G, it being understood that the lower part thereof may be similar to that shown in Fig. 1 or 13. The barrel-receiver has a cylindrical space 190 above the bore and extending from end to end in which is mounted the cylindrical slide 191. The barrel is deep and narrow in cross-section having an oblong configuration similar to the barrels of Figs. 1 and 13. The forward end of the space is closed by a screw plug 192 and connects to the bore by a gas duct 193.

The upward extension 194 on the frame 195 of the grip member has a cylindrical projection 196 which fits into the cylindrical chamber 197 in the receiver and in line with the bore, and the rear end of the barrel-receiver is thereby slidably coupled to the grip member. The front part of the grip member is slidably connected to the barrel by the wedge-shaped lug 198 which slides into a wedge-shaped slot similar to that of Fig. 8 and the two members are secured together by the pin 200.

The slide 191 has a central cylindrical space 201 a part of which is filled with lead 202 to increase its mass and has a screw plug 203 with a cylindrical hole in which the combined action rod and pilot rod 204 is slidable. The rod slides through a hole 205 in the extension 194 and is threaded into the manual operating member 206. The other end of the rod has a head 207 slidable inside the space 201. The action spring 208 bears against the extension 194 at one end and the plug 203 at the other end. Member 206 has guide rails 209 and 210 securely attached thereto as by threads. These rails pass through holes in the extension 194 and member 206 is thereby held in its upright position and is prevented from turning.

The slide has a depending lug 211 which operates in a helical cam slot 212 in breech bolt 213 similar to that of Fig. 20. The metal between cylinders 190 and 197 is cut out to form the guideway 214 in which the lug 211 travels, preventing the piston slide 201 from turning. The locking lug 215 also travels in this guideway when the bolt reciprocates. In this form of the invention the bolt has two locking lugs and grooves therefore which are similar to those shown in Fig. 20 and the extractor 216 may be of any suitable type.

One of the features of the pistol of Figs. 22 to 26 is an improved bolt catch which may, of course, be applied to other guns. Along the lower edge 220 of the ejection opening 221, the bolt catch 222 is pivoted on screw 223. The catch has a curved spring 224 on one end that fits into a recess 225 in the receiver and bears against the side thereof pressing the catch inward at the rear end turning it clockwise as viewed in Fig. 26. The side of the magazine 226 has a slit 227 near the corner and another slit 228 spaced inwardly therefrom, leaving a section 229 as a fairly easily movable flap. As shown in Figs. 24 and 26 the projection 230 presses the flap 229 inward under the strong turning action of spring 224. When the catch is in the position shown in Figs. 24 and 26, the lug 231 is swung in front of the bolt 213 and the bolt is locked in its open position. The bolt may be released by pressing the opposite outwardly projecting end 232 inward.

Normally, whether the magazine be loaded or empty, the flap lies flush with the side of the magazine and when it is loaded the cartridges prevent it being pushed inward by the catch lug 230. When the last cartridge has been removed from the magazine and when the bolt has moved to its rearward position, the spring 224 pushes the catch inward as described until the catch lug 231 takes a position in front of the bolt and blocks it from closing. This action of the catch is possible because the flap yields permitting the catch 222 to be pivoted. The catch not only holds the bolt open when the last shot has been fired but it holds the bolt open even when the magazine is not used. The pistol may be used for single shot firing and the bolt automatically remains open after each shot with or without the magazine.

When a cartridge is fired and the bullet goes past port 193, gas passes therethrough into cylinder 190 and drives the slide 191 rearward against action spring 208, the lug 211 operating in the cam groove 212 to operate the bolt in the manner described in connection with Figs. 13 to 21. The manual operating member 206 and rod 204 remain stationary due to their inertia and frictional resistance and the slide moves over the rod. When it is desired to operate the breech bolt 213 manually, the member 206 is pulled backward and the head 207 engages the plug 203 and draws the slide and bolt rearward. When the motion has been completed the member 206 may be released and the action spring 208 drives the slide and breech bolt forward to the locked position.

As stated hereinbefore, an important feature of the invention is the proportioning and arranging of the operating elements of the pistol to have more of the mass of the pistol above the bore plane than below. It is necessary to eliminate all unnecessary weight below the bore plane. This may be accomplished by cutting out all unnecessary weight in the grip member, especially when the grip member frame is made of a heavy metal like steel. Since the grip member of the invention is under very little strain no heavy sections are necessary.

In determining the weight of the pistol above and below the bore plane the magazine is removed and the barrel chamber is emptied. The hammer is set in position against the firing pin, the position it occupies at the time of firing. The pistol may have such excess weight above that it overcomes the weight of the magazine. I have found that the first shot from a fully loaded automatic does not strike the same place as the last shot, when the magazine is empty and that the most consistent accurate shooting "slow fire" will be accomplished when the magazine is removed. The pistol, nevertheless, operates automatically especially in unloading, and the term "autoloading" as used herein covers both loading and unloading.

The formation of the grip member frame of a light cast or molded material gives distinct advantages in the way of low weight and low cost. It may be cast of aluminum or the low-silicon aluminum alloys similar to the engine piston alloys, or of magnesium alloys containing say, from 0.05 to 3 percent manganese, or the magnesium base alloys containing from 0.1 to 12 percent of aluminum and from 0.05 to 1 percent of manganese. When the grip member frame is cast from a light metal the mechanical operations are reduced to a minimum and are comparatively simple. The trigger and parts of the magazine and magazine catch as well as certain screws and parts of the safety may be made of such metals.

The grip member frame may be molded from resins such as vinyl, phenolic, or methacrylates. The thermosetting resin having the trade name "Toolite" has distinct advantages because of its light weight and high compressive strength of around 20,000 pounds per square inch. Moreover, it may be cast to very accurate dimensions.

In view of the simple mechanical operations required to form the barrel-receiver, it may be made of stainless or other corrosion resistant steel and the use of a plastic or light metal grip member frame gives a pistol adaptable for use in damp climates.

The slide of Fig. 22 is weighted with lead and

it is to be understood that the slides of the other embodiments of the invention may be weighted with lead, depending on the caliber, length of barrel and diameter of the piston.

I claim:

1. An autoloading pistol comprising a receiver, a barrel connected to the receiver, said barrel being oblong in vertical direction in cross-section, a grip member for the barrel and receiver having a space in the grip for a cartridge magazine, a breech bolt in the receiver, means for locking and unlocking the breech bolt in breech closing position with respect to the barrel, said means including a longitudinal space in the receiver and in the barrel above the bore extending from the rear of the receiver through the barrel, a part of the space in the barrel being a cylinder, a piston mounted in the cylinder, means extending rearwardly from and operatively connecting the piston to the breech bolt, a gas duct connecting the bore with the cylinder forward of the piston to admit gas from the bore to drive the piston rearwardly to unlock and move the breech bolt rearwardly and eject the empty case, and means for forcing the breech bolt and piston forwardly to locked breech closing position.

2. An autoloading piston comprising a receiver, a barrel connected to the receiver, said barrel being oblong in vertical direction in cross-section, a grip member for the barrel and receiver having a space in the grip for a cartridge magazine, a breech bolt in the receiver, means for locking and unlocking the breech bolt in breech closing position with respect to the barrel, said means including a longitudinal space in the receiver and in the barrel above the bore extending from the rear of the receiver through at least the major portion of the barrel, a part of the space in the barrel being a cylinder, a piston mounted in the cylinder, means extending rearwardly from and operatively connecting the piston to the breech bolt, a gas duct connecting the bore with the cylinder forward of the piston to admit gas from the bore to drive the piston rearwardly to unlock and move the breech bolt rearwardly and eject the empty case, and means for forcing the breech bolt and piston forwardly to locked breech closing position, the parts comprising the pistol being so proportioned and arranged that the mass above the bore plane is at least equal to the mass below the bore plane.

3. An autoloading pistol according to claim 1 in which the space in the barrel above the bore extends completely through the barrel and a removable plug in the space closing it at the muzzle end forward of the gas port.

4. An autoloading pistol comprising a receiver, a barrel connected to the receiver, said barrel being oblong in vertical direction in cross-section, a grip member for the barrel and receiver having a space in the grip for a cartridge magazine, a breech bolt in the receiver, means for locking and unlocking the breech bolt in breech closing position with respect to the barrel, said means including a longitudinal space in the receiver and in the barrel above the bore extending from the rear of the receiver into the barrel, a part of the space in the barrel being a cylinder, a piston mounted in the cylinder, means extending rearwardly from and operatively connecting the piston to the breech bolt, a gas duct connecting the bore with the cylinder forward of the piston to admit gas from the bore to drive the piston rearwardly to unlock and move the breech bolt rearwardly and eject the empty case, means for forcing the breech bolt and piston forwardly to locked breech closing position, a rear sight mounted on the receiver, and a front sight mounted on the barrel, said sights being both rigid and fixed with respect to the bore and immovable by actuating parts of the pistol.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
570,388	Ehbets	Oct. 27, 1896
580,923	Browning	Apr. 20, 1897
813,694	Fidgeland	Feb. 27, 1906
934,158	Gates	Sept. 14, 1909
944,606	Frommer	Dec. 28, 1909
992,854	Cobb	May 23, 1911
1,041,928	Wesson	Oct. 22, 1912
1,163,516	Duffek	Dec. 7, 1915
1,166,554	Smith	Jan. 4, 1916
1,291,690	Smith	Jan. 14, 1919
1,344,991	Cunningham	June 29, 1920
1,387,460	Beets	Aug. 16, 1921
1,388,856	Fox	Aug. 30, 1921
1,430,662	Lewis	Oct. 3, 1922
1,511,509	Diehm	Oct. 14, 1924
1,520,671	Rosier	Dec. 23, 1924
1,711,874	Brinkerhoff	May 7, 1929
1,759,277	Revelli	May 20, 1930
1,835,286	Dickinson	Dec. 8, 1931
2,088,268	Lauf	July 27, 1937
2,287,032	Garand	June 23, 1942