

Aug. 6, 1968

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MULTIPROJECTILE CARTRIDGE THEREFOR

3,395,478

Filed March 2, 1962

3 Sheets-Sheet 2

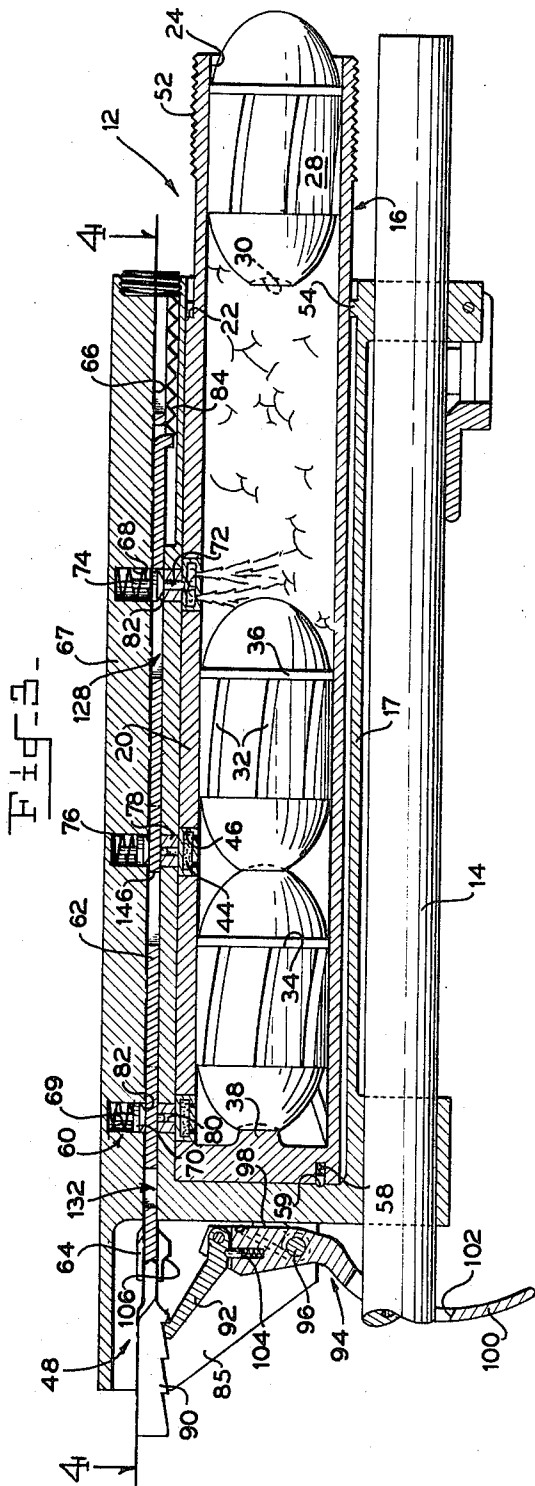
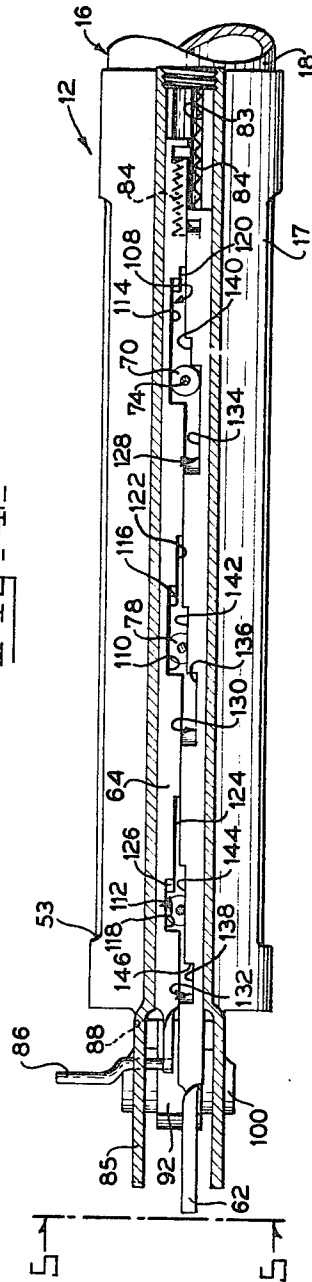


Fig. 4-



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Fig. 5.

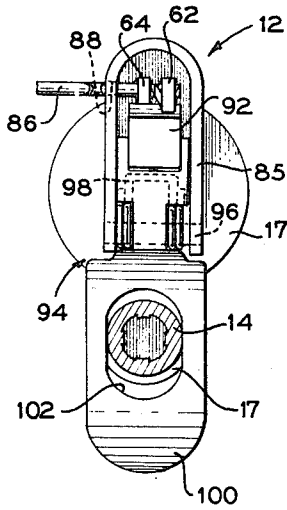
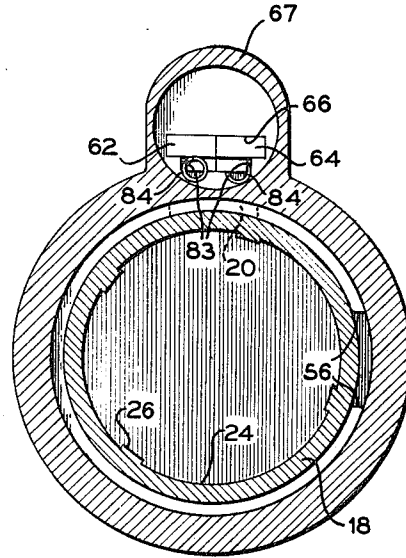


Fig. 6.



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RIFLE MOUNTED AUXILIARY FIREARM AND MULTIPROJECTILE CARTRIDGE THEREFOR

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5 Claims. (Cl. 42—1)

The invention described herein may be manufactured and used by or for the Government for governmental purposes without the payment to me of any royalty thereon.

This invention relates to accessories which are attachable to rifle barrels to provide means for firing ammunition of a different kind than that used in the rifle.

It is one object of this invention to increase the firepower available to the troops by providing for addition to their rifles an auxiliary firearm which is attachable to the barrel thereof and is adapted to semiautomatically discharge a plurality of projectiles having special capabilities.

It is another object of this invention to provide such an auxiliary firearm in which a plurality of the projectiles are disposed tandemwise in a cartridge so that an inclosed space is provided rearwardly of each of the projectiles to permit gas pressure to act thereagainst for propulsion from the cartridge.

It is a further object of this invention to provide in registry with each of the inclosed spaces a detonator for generating the energizing gas pressure.

It is still another object of this invention to rifle the inside of the cartridge tube to cause the projectiles to spin as they are propelled therefrom.

It is another and still further object of this invention to provide for sequential discharge of such a cartridge a lightweight receiver which is attachable to the rifle barrel and which includes a firing mechanism whereby the detonators are successively initiated, starting from the one nearest the muzzle of the barrel, each time a trigger is pulled.

The specific nature of the invention as well as other objects and advantages thereof will clearly appear from a description of a preferred embodiment as shown in the accompanying drawings in which:

FIG. 1 is a longitudinally, cross-sectioned view of the auxiliary firearm with the cocking bar retracted to the cocking position and the pawl cammed downwardly to release the sear bar shown in the searing position;

FIG. 2 is a view taken along line 2—2 of FIG. 1;

FIG. 3 is a view similar to FIG. 1 but showing the front detonator initiated and the first projectile energized thereby;

FIG. 4 is a view taken along line 4—4 of FIG. 3;

FIG. 5 is a view taken along line 5—5 of FIG. 4; and

FIG. 6 is a view taken along line 6—6 of FIG. 2.

Shown in the figures is an auxiliary firearm 12 which is releasably attached to a rifle barrel 14 and includes a replaceable multiprojectile cartridge 16 and a tubular receiver 17 therefor. Cartridge 16 includes a tube 18 with an integral rib 20 which extends longitudinally along the outside thereof and is provided with a front end 22. Tube 18 is provided with an axial bore 24 which is rifled, as noted at 26, and is closed at the rear end.

Located tandemwise inside bore 24 and in coaxial alignment are three projectiles 28 which are essentially elliptical in longitudinal cross-section. Projectiles 28 are held

in bore 24 by the addition of a suitable adhesive applied between the front one of the projectiles and the wall of the bore. References to front and rear positions herein are relative to the muzzle and breech ends of barrel 14, respectively, or to the right and left sides of the drawings. Provided in the rear end of each of the projectiles 28 is a concave recess 30 which is symmetrical to the longitudinal axis thereof and is arranged to matingly receive the nose of another projectile which is disposed to the rear thereof in tube 18.

The larger diameter portion of projectiles 28 is pre-engraved, as noted at 32, to mate with rifling 26 so as to spin the projectiles as they are moved along bore 24. The front ogive of projectiles 28 is reduced in diameter immediately forward of the larger diameter portion thereof to form a forwardly facing annular shoulder 34. An O-ring 36 of elastic gas sealing characteristics is mounted over the front ogive on each of the projectiles 28 to contact shoulder 34. O-ring 36 has interference fit with bore 24 so that, when gas pressure is applied against the ring, it will be displaced to fill grooves of rifling 26 and provide a gas seal.

The length of tube 18 is arranged so that the front end thereof extends about four inches in front of the first one of the projectiles 28 therein. This provides sufficient length of tube 18 to initiate the trajectory of the first one of the projectiles 28 towards its target and to energize the projectile by gas pressure applied rearwardly thereof as hereinafter explained.

Extending axially forward into bore 24 from the rear end of the tube is an ogive-shaped spacer 38, the nose of which is received by concave recess 30 in the rear one of the projectiles 28. Spacer 38 holds the last one of the projectiles 28 forwardly away from the rear end of tube 18 to establish a chamber 40 between the rear end of the tube and such last projectile. Other chambers 42 are also established respectively between the last and middle ones of the projectiles 28 and between the middle and first ones thereof.

Energy for propelling projectiles 28 from tube 18 is provided by three impact-initiated detonators 44 which are arranged to be respectively dischargeable into chambers 42 and chamber 40. Detonators 44 are each mounted in an accommodating aperture 46 which extends through rib 20 to communicate with bore 24 at chamber 40 and chambers 42 and are successively initiated starting with the first one by a firing mechanism 48, to be described hereinafter, in receiver 17.

Receiver 17 is closed at the rear end by an end wall 51 and is adapted to slidably receive cartridge 16. Lightenings, such as are shown at 53, may be formed in receiver 17 to reduce the weight thereof and such receiver may be fabricated from one of the lightweight metals as aluminum or titanium. Receiver 17 is shorter than cartridge 16 so that a section 52 of tube 18 at the front end thereof extends from the receiver and such front end is knurled to facilitate the manual turning of the cartridge for locking purposes. This locking is achieved through the cooperation of front end 22 of rib 20 and an annular flange 54 disposed inside of receiver 17 at the front end. Flange 54 is interrupted by an opening 56 which is coincident with the central lateral plane of receiver 17 and is wide enough to permit the passage rib 20 past the flange. After cartridge 16 is fully inserted into receiver 17, it is turned 90° to the firing position where rib 20 projects upwardly coincident with the central vertical plane of the receiver.

Contact of front end 22 of rib 20 with flange 54 and the rear end of tube 28 with end wall 51 of receiver 17

prevents longitudinal displacement of cartridge 16. Cartridge 16 is indexed in firing position and is releasably held therein through the cooperation of a spring-biased plunger 58 in the base of tube 18 with a mating detent 59 in end wall 51 of receiver 17.

Firing mechanism 48 includes three spring-biased firing pins 60, respectively disposed for initiation of detonators 44, a sear bar 62 for releasably holding the firing pins in cocked positions, and a cocking bar 64 for manually displacing the firing pins to the cocked positions after being released by the sear bar to firing positions for initiation of the detonators.

Sear bar 62 and cocking bar 64 are slidingly received by an accommodating rectangular slot 66 which extends longitudinally through an integral flange 67 formed along the top of receiver 17 and which is coincident with the central vertical plane of receiver 17. Three similar bores 68 for receiving the firing pins 60 extend upwardly from the inside of receiver 17 through slot 66 to end walls 69 and are respectively positioned so as to be in registry with the detonators 44 when cartridge 16 is turned to the locked position.

Each of the firing pins 60 is provided with a cylindrical body 70 having approximately the same diameter as bores 68 so as to be slidingly disposed in the associated one thereof. A striker 72 extends coaxially downward from body 70 so as to strike the aligned one of the detonators 44 when the related firing pin 60 is released to the firing position. A shaft 74 extends coaxially upward from body 70 to provide support for a compressible coil spring 76 which surrounds the shaft and bottoms against the body. The top of each spring 76 contacts end wall 69 of the associated bore 68 to bias the contacted firing pin 60 to the firing position. A cap 78 is pressed into the bottom end of each of the bores 68 and is provided with an axial orifice 80 which receives striker 72 for extension through the cap. Contact of body 70 with cap 78 stops the downward displacement of the associated firing pin 60 at the firing position. A chamfer 82 is formed around the bottom edge of each body 70 so as to cooperate with cocking bar 64 for displacing firing pins 60 to the cocked positions thereof as hereinafter described.

Sear bar 62 and cocking bar 64 are positioned side by side in slot 66 with the sear bar being disposed on the right side and are arranged for relative longitudinal displacement. Sear bar 62 is displaceable between a forward release position and a rearward searing position and cocking bar 64 is displaceable between a forward free position and a rearward cocking position.

The front end of slot 66 is modified to form a pair of laterally spaced arcuate channels 83 each of which receives a compressible coil spring 84. Springs 84 are cooperatively disposed relative to sear bar 62 and cocking bar 64 so as to bias the sear bar rearwardly to the searing position and the cocking bar forwardly to the free position.

Integrally formed on the rear end of receiver 17 is a housing 85 of inverted U-configuration. The rear end of cocking bar 64 extends into housing 85 and fixed to such extending end so as to extend laterally to the left thereof is a pin 86. Pin 86 extends through a longitudinally elongated hole 88 in housing 85 to provide means for manually actuating cocking bar 64 rearwardly to the cocking position.

The rear end of sear bar 62 also extends into housing 85 and formed on the underside of such extending end are three ratchet-type teeth 90 which are designed so as to cooperate with a pawl 92 pivotally mounted on the upper end of a trigger 94 so as to displace the sear bar forwardly one step each time the trigger is pulled to a firing position. Trigger 94 is pivotally mounted on a shaft 96 which extends laterally through housing 85 and is biased to a normal forward position by a spring 98. Trigger 94 includes a depending fingerpiece 100 which is provided with a hole 102 therethrough for receiving rifle barrel 14. Pawl 92 is pivotally mounted on trigger 94 above shaft 96 so

that, when the trigger is pulled rearwardly to the firing position, the pawl is moved forwardly against the engaged one of the teeth 90 for actuating sear bar 62 forwardly one step. When trigger 94 is released to the normal forward position thereof, pawl 92 is displaced rearwardly for engagement with the next succeeding one of the teeth 90. Pawl 92 is biased into resilient contact with ratchet teeth 90 by a spring 104. In order to release sear bar 62 for return to the rearward searing position after being actuated to the forward release position, a cam 106 is formed on the underside of the rear end of cocking bar 64 and is arranged for camming engagement with pawl 92 to depress the pawl downwardly out of engagement with teeth 90 when the cocking bar is pulled to the cocking position. Upon disengagement of pawl 92 from teeth 90, sear bar 62 is freed to be biased to the searing position by the cooperating one of the springs 84.

Provided in the side of cocking bar 64 which is adjacent sear bar 62 are three clearances which include a front clearance 108, a middle clearance 110 and a rear clearance 112 and which are respectively arranged for cooperation with the corresponding one of the firing pins 60 as hereinafter described. Each of the clearances is provided with a wide portion, noted at 114 for front clearance 108, at 116 for middle clearance 110, and at 118 for rear clearance 112. The wide portions extend into cocking bar 62 a distance equal to approximately one-half the diameter of bodies 70. Narrow portions 120, 122 and 124 extend forwardly respectively from wide portions 114, 116 and 118 and extend into cocking bar 62 a distance equal to approximately half the diameter of strikers 72. A ramp 126 is formed on the uninterrupted portion of the front end of each of the wide portions 114, 116 and 118 and such ramp inclines upwardly and forwardly so that, when actuated against chamfer 82 of the cooperating bodies 70, the firing pins 60 are cammed to the cocked position thereof.

Provided in the side of sear bar 62 which is adjacent cocking bar 64 are three recesses which include a front recess 128, a middle recess 130 and a rear recess 132 which are essentially similar, in reverse, to the corresponding ones of the clearances 108, 110 and 112. Front recess 128, middle recess 130 and rear recess 132 are respectively provided with wide portions 134, 136 and 138 and each extends into sear bar 62 a distance equal to approximately one-half the diameter of body 70. Narrow portions 140, 142 and 144 extend respectively forwardly from wide portions 134, 136 and 138 and such narrow portions extend into sear bar 62 a distance equal to approximately one-half the diameter of striker 72. The uninterrupted portion of the front end of each of the wide portions 134, 136 and 138 forms a sear edge 146.

The lengths of clearances 108, 110 and 112 are the same and they are the same as the lengths of recesses 108, 130 and 132, however, the lengths of wide portions and the narrow portions vary. The lengths of wide portion 114 of front clearance 108 and wide portion 134 of front recess 128 are equal to approximately three times the diameter of body 70, and narrow portions 120 and 140 of such clearance and recess each have a length approximately equal to the diameter of the body.

The lengths of wide portion 116 of middle clearance 110 and wide portion 136 of middle recess 130 are each equal to approximately twice the diameter of body 70 as are also the lengths of narrow portions 122 and 142. The lengths of wide portions 118 and 138 of rear clearance 112 and rear recess 132, respectively, are equal to approximately one diameter of body 70 and the lengths of narrow portions 124 and 144 are equal to approximately three times the diameter of the body.

When firearm 12 is ready to be fired, cocking bar 64 is biased forwardly to the free position thereof wherein wide portions 114, 116 and 118 are in registry with body 70 of firing pins 60 so as to be free for actuation to the

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striking position in respect to such wide portions, and the sections of sear bar 62 which are adjacent the sides of narrow portions 140, 142 and 144 are positioned under the bodies to hold the firing pins in the cocked positions.

A pull on fingerpiece 100 moves pawl 92 forwardly against the first one of the ratchet teeth 90 to displace sear bar 62 forwardly one step. When sear edge 146 of front recess 128 is advanced to clear body 70 of front firing pin 60, the front firing pin is free for displacement through wide portion 134 of the front recess to the firing position by the associated spring 76 to initiate the respective one of the detonators 44. The resulting gas pressure enters the front one of the chambers 42 to energize the front one of the projectiles 28 for flight tube 18.

Release of fingerpiece 100 permits the rearward displacement of pawl 92 to engage the second one of the ratchet teeth 90. When trigger 94 is actuated again to the firing position, sear bar 62 is displaced forwardly another step to similarly release the middle of the firing pins 60 for discharge of the middle one of the detonators 44 and projection of the second one of the projectiles 28. The last one of the projectiles 28 is energized for flight when trigger 94 is pulled the third time.

To recharge firearm 12, cocking bar 64 is pulled rearwardly by means of pin 86. During rearward displacement of cocking bar 64, ramp 126 on rear clearance 112 contacts chamfer 82 on the corresponding one of the firing pins 60 to cam the firing pin to the cocked position. Then ramps 64 on middle and front clearances 110 and 112, respectively, successively contact chamfers 82 on the corresponding ones of the firing pins 60 which are thereby elevated to the cocked positions and are held therein by the sliding contact of the sections of the cocking bar 64 adjacent to narrow portions 120, 122 and 124. When cocking bar 64 is adjacent the cocking position, cam 106 thereon contacts pawl 92 for actuation thereof out of engagement with the last one of the teeth 90. With sear bar 62 released from pawl 92, it is free to be actuated to the searing position under the bias of the corresponding spring 84 as bodies 70 of firing pins 60 are all elevated free of contact by sear edges 146. When sear bar 62 is in searing position, cocking bar 64 is released and is, consequently, displaced forwardly under bias of the corresponding one of the springs 84 to the free position wherein wide portions 114, 116 and 118 are in registry with the respective ones of the bodies 70 and thereby the bodies are released into contact with sear bar 62 and are releasably held thereby in the cocked positions.

With firing mechanism 48 recharged and strikers 72 clear of contact with the initiated detonators 44, the fired cartridge 16 is removed and a fresh cartridge installed.

From the foregoing it is clearly apparent that there is provided herein for rifles a simple and compact auxiliary firearm which provides additional firepower for the troops by making available for semiautomatic discharge ammunition which is of larger caliber than that of the rifle and which has special capabilities. Such auxiliary firearm is light in weight, easy to manufacture and positive in operation.

Although a particular embodiment of the invention has been described in detail herein, it is evident that many variations may be devised within the spirit and scope thereof and the following claims are intended to include such variations.

I claim:

1. A semiautomatic auxiliary firearm attachable to a rifle barrel and including in combination a cartridge having rifled tube, a plurality of projectiles arranged in said tube in coaxial tandem alignment, an inclosed chamber formed rearwardly of each of said properties, and detonators disposed in said tube so as to be respectively dischargeable into each said inclosed chamber and a receiver attachable to the rifle barrel, said receiver being of tubular configuration designed for receiving said cartridge for discharge, and including a firing mechanism

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comprising a plurality of firing pins spring-biased in said receiver for displacement against respective ones of said detonators for initiation thereof, a trigger actuated sear bar arranged for releasably holding said firing pins in cocked positions, means on said sear bar designed for cooperation with said firing pins for separately and successively initiating said detonators starting with the front one thereof in said tube when said sear bar is trigger actuated, and a cocking bar arranged for cooperation with said firing pins for displacement thereof to respective cocked positions.

2. The auxiliary firearm as defined in claim 1 wherein said receiver is of tubular configuration designed for receiving a portion of said tube so that a front portion thereof protrudes from the front end of said receiver to provide manual means for turning the cartridge to a locked position relative thereto, and said receiver is provided at the front end with an internal annular flange interrupted by an opening; and said cartridge includes a rib extending longitudinally along the outside thereof, and having a front end, said rib being arranged to pass through said opening when said cartridge is inserted into said receiver, and said front end being positionable in back of said flange and in contact therewith when said cartridge is rotated to the locked position after being inserted into said receiver, and a spring-biased plunger mounted in said tube for engagement with a mating detent in said receiver to index said cartridge in the firing position.

3. A semiautomatic auxiliary firearm attachable to a rifle barrel including in combination a cartridge having a rifled tube, a plurality of projectiles arranged in said tube in coaxial tandem arrangement, an inclosed chamber formed rearwardly of each of said projectiles and detonators into each said inclosed chamber, a receiver discharged into each said inclosed chamber, a receiver attachable to the rifle barrel, said receiver being of tubular configuration designed for receiving said cartridge for discharge, and a firing mechanism for separately and successively initiating said detonators starting with the front one thereof including a trigger, firing pins positioned in said receiver for displacement against respective ones of said detonators for initiation thereof, a spring arranged in cooperation with each of said firing pins to bias said firing pins from a cocked position to a firing position in impact contact with the respective ones of said detonators, a sear bar mounted in said receiver for longitudinal displacement between a release and a searing position, a cocking bar mounted in said receiver in cooperation with said firing pins for displacement thereof to the cocked positions when said cocking bar is actuated from a free to a cocking position, a pawl mounted on said trigger for cooperation with ratchet teeth on said sear bar for progressive displacement thereof one step each time said trigger is pulled, and a plurality of recesses equal to the number of said firing pins formed in said sear bar, said recesses being formed and arranged in said sear bar so that said firing pins are held in the cocked positions when said sear bar is in the searing position and are successively released to the firing positions thereof starting with the front one in said tube each time said trigger is pulled.

4. The auxiliary firearm as defined in claim 3 wherein each of said firing pins is provided with a cylindrical body and a depending striker of smaller diameter, and including clearances equal to the number of said firing pins formed in said cocking bar, portions of said clearances respectively formed so as to permit uninterrupted displacement of said firing pins to the firing positions thereof when said cocking bar is in the free position, and ramps extending respectively from said portions, said ramps being formed and arranged so as to cammingly displace said firing pins from the firing to the cocked positions when said cocking bar is actuated from the free to the cocking position.

5. The auxiliary firearm as defined in claim 4 wherein said sear bar and said cocking bar are mounted in said receiver side by side for longitudinal displacement, and including means on said cocking bar actuatable against said pawl for release of said sear bar from said trigger when said cocking bar is adjacent the cocking position, and a spring disposed in cooperation with said sear bar for actuation thereof to the searing position when released from said pawl.

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SAMUEL W. ENGLE, *Primary Examiner.*