Jan. 11, 1955 J. D. TYLER 2,699,008

FIREARM

Filed Aug. 17, 1949 2 Sheets-Sheet 1

FIG. 1

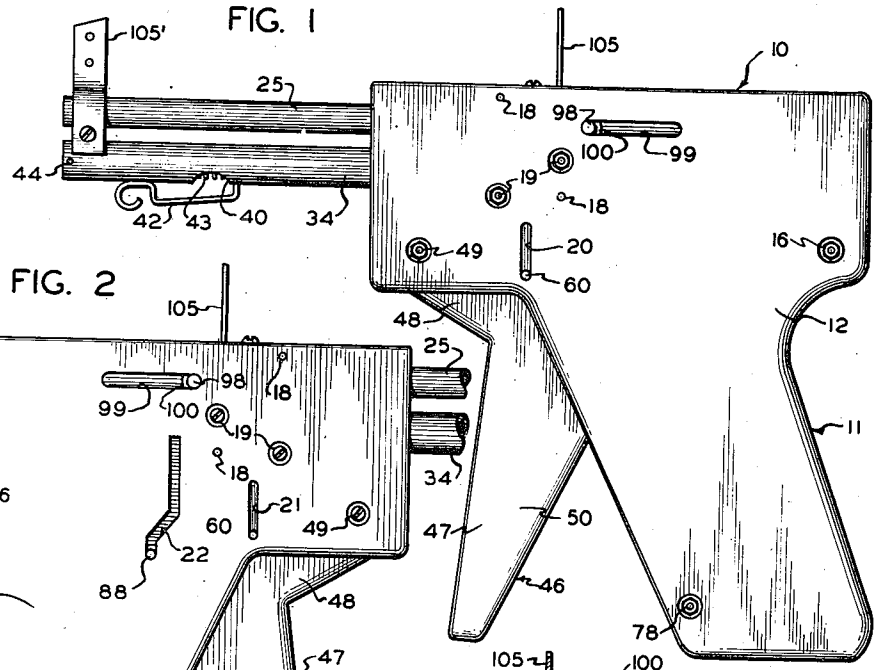


FIG. 2

FIG. 3

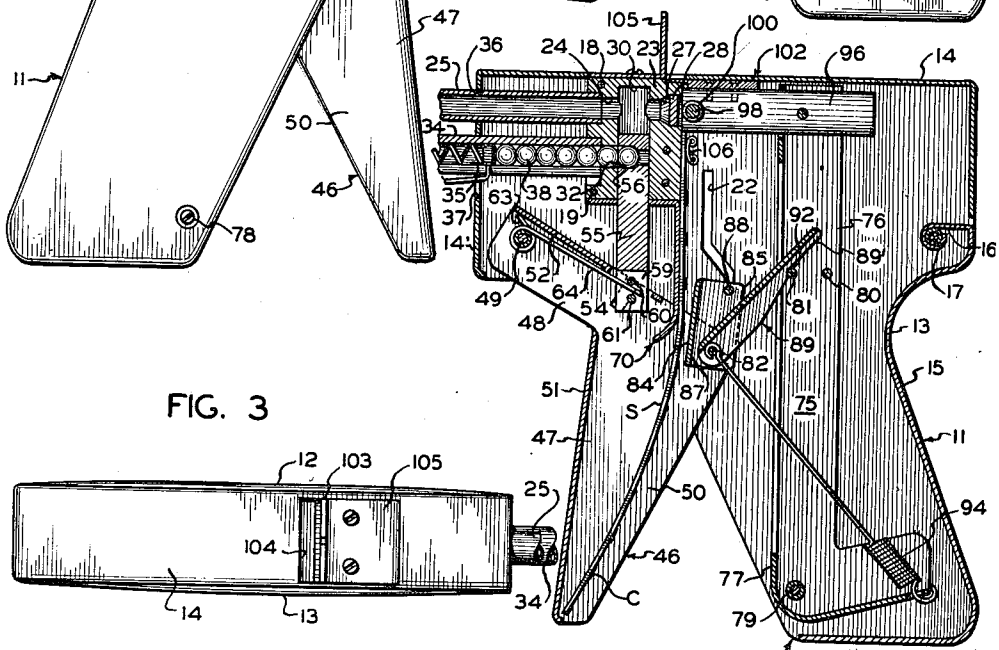


FIG. 4

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Jan. 11, 1955 J. D. TYLER 2,699,008

FIREARM

Filed Aug. 17, 1949 2 Sheets-Sheet 2

FIG. 5

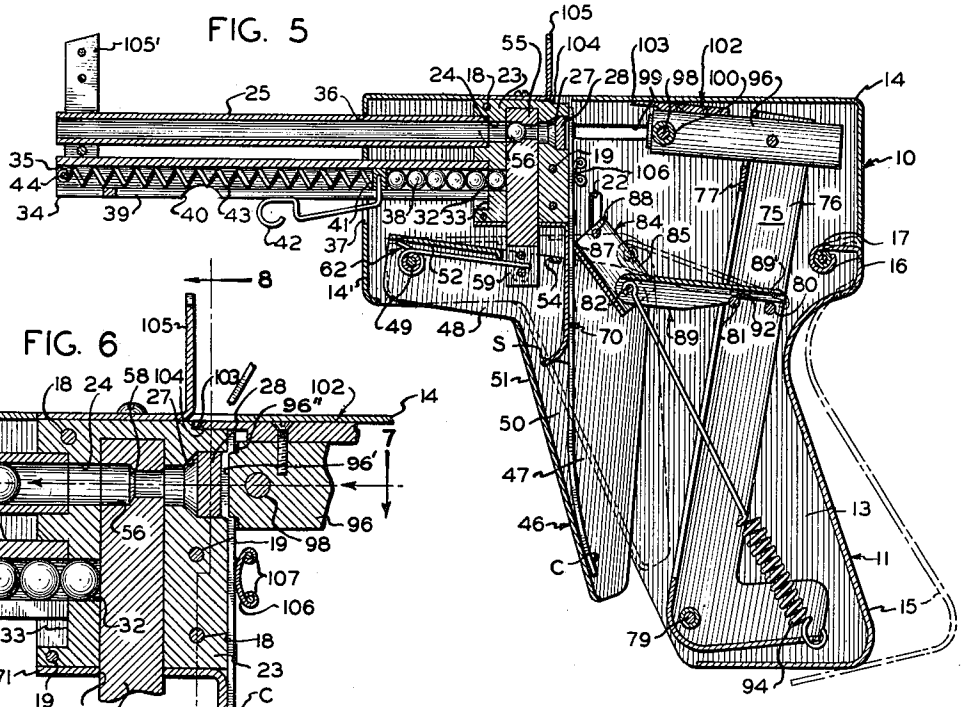


FIG. 6

FIG. 7

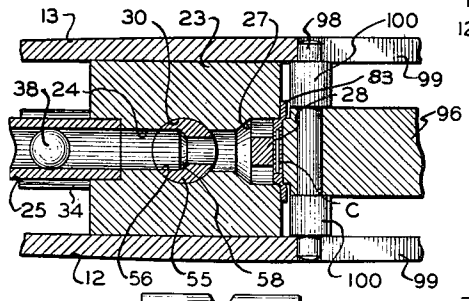


FIG. 8

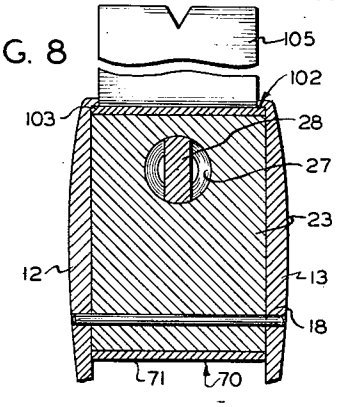


FIG. 9

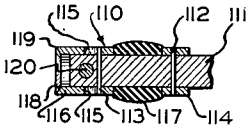


FIG. 10

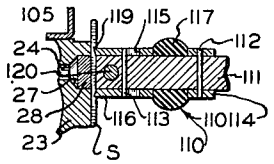


FIG. 11

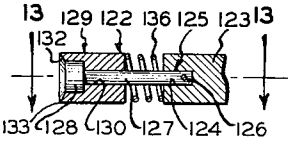


FIG. 12

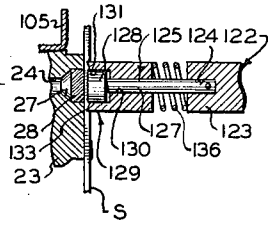
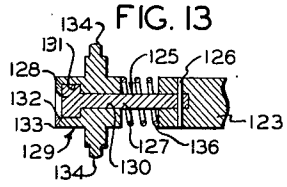


FIG. 13



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FIREARM

John D. Tyler, Nashville, Tenn.

Application August 17, 1949, Serial No. 110,805

7 Claims. (Cl. 42—57)

This invention relates to firearms and more particularly to those in which the projectile and explosive charge are separately introduced in loading.

Separately loaded firearms have become relatively rare and little employed due to various usually inherent disadvantages such as the time required for loading, the difficulty of obtaining consistency of the charge, and the loss of firing power. Except for relics, firearms of this type have been almost entirely replaced by those which are adapted to fire the conventional type cartridge which consists of a shell having a primer at its base and a projectile at its forward portion with a charge within the shell between the two.

Various disadvantages accompany the use of conventional cartridges, such as the added expense of the shell and the primer, together with that of assembling the parts, the added weight, and the limited capacity of the magazines of the various firearms. Furthermore, inasmuch as the shell contains compressed powder and a relatively sensitive primer, the dangers accompanying its storage, transportation and handling have been great.

Accordingly, it is an object of the present invention to provide a firearm adapted to fire separate loading ammuntion in which the disadvantages accompanying separately loading firearms heretofore known are met and in which those accompanying the use of conventional cartridges are obviated.

A further object of the invention is the provision of a firearm which is adapted to hold a plurality of projectiles and charges separately and to fire the same semi-automatically.

A further object of the invention is the provision of a firearm having means for automatically positioning a projectile and a charge into firing position and firing the charge against the projectile.

A further object of the invention is the provision of a semi-automatic firearm adapted to fire separately loaded ammunition, which is simple and relatively inexpensive to manufacture, of a minimum number of parts, and which is sturdy and constructed to withstand rough usage.

Further objects and advantages of the invention will be apparent from the following description taken in conjunction with the accompanying drawings, wherein:

Fig. 1 is an elevation of the left side of a firearm constructed in accordance with the present invention;

Fig. 2, a fragmentary elevation showing a portion of the right side;

Fig. 3, a plan view of the device shown in Fig. 2;

Fig. 4, a longitudinal fragmentary section of the device shown in Figs. 1 to 3;

Fig. 5, a longitudinal section showing the positioning of the trigger mechanism just before and just after firing;

Fig. 6, an enlarged fragmentary longitudinal section through the firing block;

Fig. 7, a section on the line 7—7 of Fig. 6;

Fig. 8, a section on the line 8—8 of Fig. 6;

Fig. 9, a fragmentary section of a modified form of firing bolt;

Fig. 10, the structure of Fig. 9 in firing position;

Fig. 11, a fragmentary longitudinal section of a further modification of the firing bolt;

Fig. 12, a view similar to Fig. 11 showing the bolt in firing position; and,

Fig. 13, a section on the line 13—13 of Fig. 11.

Referring to the drawings, the embodiment of the invention shown is a firearm of the pistol type and it is

understood that the specific construction shown is merely illustrative of one embodiment by which the principles of the invention may be carried out.

The pistol includes a receiver **10** having a grip or stock **11**. The receiver includes left and right side members or face plates **12** and **13**, the latter of which has a top and back portion **14**. The front ends of the face plates have offset portions **14'** to box in the front of the receiver. Shaped to conform to the contour of the rear and bottom of the grip is a back cover strip **15** having an arm **16** pivotally mounted on a post **17** which extends between the face plates **12** and **13**.

The firing block

Attached to the face plates by suitable connecting means such as pins **18** and bolts **19** is a substantially rectangular firing or breech block **23**. The block has a first transverse bore **24** near its upper portion which is enlarged near its forward extremity to receive a barrel **25** through which a projectile is adapted to be discharged. The rear portion **27** of the bore is enlarged and partially covered by a transverse web or firing anvil **28** positioned thereacross near the opening but spaced slightly therefrom for purposes later to be described.

A second bore **30** extends transversely of the first bore and in communication therewith so that their axes intersect substantially at the central portion of the first bore. The second bore does not extend completely through the firing block but stops short of the top thereof.

A third bore **32** extends from the forward portion of the firing block into communication with the second bore and has an enlarged forward portion **33** for the reception of the rear extremity of a magazine barrel **34** whose bore **35** communicates with the bore **32**. The barrels **25** and **34** extend through mating arcuate notches **36** and **37** respectively in the offset portions **14'** of the faceplates **12** and **13**. The magazine barrel **34** is adapted to hold a plurality of shot or projectiles **38** and has a longitudinally extending slot **39** at its lower portion which communicates with an enlarged arcuate slot **40** near the end of the barrel. Positioned in the barrel is a follower **41** having a handle **42** extending through the slot **39** and a compression spring **43** which abuts against the follower at one end and against a pin **44** at the free end of the barrel. To load the barrel the follower is moved toward the free end of the barrel to expose the arcuate slot **40** and projectiles are then placed in the barrel through the slot. When the follower is released the spring **43** will urge the projectiles into the bore **33** of the firing block **30**.

The trigger mechanism

Pivotally attached to the forward portion of the receiver between the face plates **12** and **13** is a trigger **46** consisting of a substantially L-shaped member having a lower triangularly shaped finger engaging portion **47** and an arm **48** at its upper portion through the end of which a post **49** extends and is engaged by the face plates **12** and **13** so that the trigger may be oscillated about the post. The trigger is comprised of integral side plates **50** forming the portions **47** and **48** and has webs **51** and **52** connecting the side plates. The arm **48** of the trigger has a slot **54** extending through the web in substantial alignment with bore **30** of the firing block when the trigger is oscillated to position adjacent the firing block.

A loading rod **55** having an aperture **56** adapted to receive a projectile is positioned within the bore **30** of the block and adapted to reciprocate in the bore. The bore **56** in the rod is adapted when in its lower position as shown in Fig. 3 to receive a projectile and to move the same into registration with the bore **24** of the firing block when in its upper position as shown in Figs. 5 and 6. The bore **56** at its forward portion is preferably a few thousandths of an inch greater in diameter than that of the barrel **25** and the bore **24** of the firing block in order that a projectile may feed easily into the firing rod from the magazine barrel.

As a means for preventing accidental gravity discharge of the projectile, the depth of the bore **30** is slightly greater than is necessary for the bore **56** in the firing

rod to be aligned with the bore **24** of the firing block. By means of this construction when the firing rod is fully seated in the bore **30** the projectile will be slightly out of alignment with the bore **24** of the firing block which will provide a positive impediment to its discharge through the barrel. This alignment is of necessity very slight, on the order of a few thousandths of an inch in order that the projectile may bear against the upper portion of the bore **24** where it meets the bore **56** and cam the firing rod downwardly sufficiently to align the bores when the charge is fired.

The rear of the bore **56** is of substantially less diameter than its forward portion and the connecting surfaces **58** are tapered or conical to conform to the surface of the projectile in contact therewith in order that an explosive charge received through the smaller portion of the bore may act efficiently on the projectile, and to limit the capacity of the rod.

The lower end of the rod **55** has a longitudinal slot **59**, a pair of spaced pins **60** and **61** bridging the slot; the pin **60** extending into engagement with guide and limit slots **20** and **21** in the face plates **12** and **13** respectively. A coil spring **62** is positioned around the post **49** and has a short leg **63** engaging the web **52** of the trigger near its free upper end and a long leg **64** extending between the spaced pins **60** and **61** of the rod. It can be seen therefore that the depression of the trigger **46** rotates the same about the post **49** and by means of the arm **64** abutting the pin **61**, the spring member is adapted to move the rod **55** into the bore **30** of the firing block. The bore **56** is spaced from the extremity of the rod which it is near such that when the rod is in its innermost position in the bore **30** that the bore **56** will be substantially concentric with the bore **24**. The length of the rod **55** is such that it will be at the full depth of the bore **30** when pin **60** contacts the upper extremity of the slots **20** and **21**.

A tape guide member **70** having a foot portion **71** and a depending portion **72** is attached by its foot portion to the under side of the firing block **23** such that its substantially flat depending portion **72** extends in the plane of the rear face of the firing block. The end of the depending portion may be curved as shown in order to offer less resistance to the movement of tape. The foot **71** has an aperture **72'** the same size as and in alignment with bore **30** of the firing block to permit reciprocation of the loading rod **55** in the firing block.

An L-shaped actuating lever **75** comprising side members **76** connected by a web **77** is positioned in the receiver with the short leg of the L substantially in the lowermost portion of the grip and extending rearwardly thereof and with its long arm extending substantially to the top of the receiver. At approximately the intersection of the arms and adjacent the lower forward portion of the grip is a pivot post **79** for the lever **75** which post extends through the side members **76** of the lever and through the face plates of the receiver **10** to which it is fastened by suitable means **78**. A pair of spaced pins **80** and **81** extend between the side plates of the lever **75** and are spaced slightly above the center of the longer arm, the pin **80** being nearer the rearward edge and the pin **81** being nearer the web **77**. A pin **82** extends between the side plates **50** of the trigger **46** near the rear apex of the triangular portion. Pivotally mounted on the pin is a feed finger **84** which is substantially U-shaped, being comprised of sides **85** and a web **87**. A pin **88** connects the sides **85** of the finger **84** near their upper extremity and extends into engagement with a guide slot **22** in the right plate of the receiver. The finger is adapted to engage a strip or tape S of sheet material carrying a plurality of centrally controlling disposed charges C and having a rim **83** of material around each and advance the tape, the distance corresponding to the spacing between successive charges each time the trigger is fully depressed, the spring leg **64** yielding to permit the trigger to move the finger the full amount.

Positioned between the sides of the feed finger is a sear **89** of channel material, one extremity of which is apertured to receive the post **82** for pivotal mounting of the sear on the post. The end portion of the sear comprises a substantially narrow finger **89'** and a notch **92** is formed where the finger and the body portions meet which is adapted to be engaged by the pin **81** of the actuating lever **75**. Depression of the trigger rotates the actuating lever about its pivot post **79** through engagement of the notch **92** and pin **81**, until the sear finger engages the post **80** sufficiently to lift the sear notch from engagement with the post **81** and thus release the actuating lever.

A tension spring **94** has an end attached to the post **82** and its other end attached to the extremity of the shorter leg of the actuating lever **75**. The spring therefore tends to rotate the actuating lever in the opposite direction from that in which it is urged by the sear, and also tends to return the trigger from its depressed position.

Pivotally attached to the upper extremity of the longer leg of the actuating lever **75** is a firing bolt or hammer **96**. The bolt is preferably solid and of a metal which is relatively heavy and corrosion proof, such as brass or the like, in order that it may resist corrosion and the force of explosion of the charge through its inertia. In order to guide the bolt a post **98** extends through its forward portion and engages longitudinal slots **99** in the face plates of the receiver. Washers **100** are provided to properly space the bolt from the sides of the receiver. Attached to the upper surface of the bolt is a knife member **102** having a projecting edge portion **103** which is adapted to be received in a notch **104** on the upper surface of the firing block.

A rear sight member **105** is attached to the upper surface of the firing block and a front sight member **105'** is attached to the muzzle end of the barrel **25**.

A spring member **106** is positioned on posts or the like **107** between the side plates of the receiver and adjacent the rear face of the firing block and is adapted to exert a light pressure on the strip carrying the charge in order to maintain the same in position.

Operation

In the operation of the firearm the projectiles are first loaded in the magazine barrel **34** as previously described and a tape carrying spaced explosive charges is positioned in the gun with the upper end between the spring **106** and the rear face of the firing block. To load and fire, the operator then depresses the trigger. Depression of the trigger **50** moves the rod **55** carrying a projectile upwardly into the bore **30** until the bore **56** of the rod is aligned with the bore **24** of the firing block and the barrel **25** attached thereto. Simultaneously the feed finger **84** is moved upwardly and tilted to the position shown in Fig. 5 by means of the post **88** engaging the slot **22** which feeds a charge of the tape into firing position. At the same time the notch **92** in the sear engages the post **81** of the actuating lever which rotates the lever about post **79** and cocks the firing bolt **96** rearwardly from the position shown in Fig. 4 to that shown in Fig. 5. As the post **82** moves upwardly about the post **53**, it reaches a position in which the narrow end portion of the sear engages the post **80**, as shown in Fig. 5. Further depression of the trigger to the position shown in phantom in Fig. 5 causes the notch **92** in the sear to be raised out of engagement with the post **81** permitting the actuating lever **75** carrying the bolt **96** to be rotated under the impulse of the spring **94**. The bolt is thus moved to the firing position shown in Fig. 6 at which its central portion **96'** enters the enlarged portion **27** of the bore **26** and compresses the charge carried by the tape against the firing anvil **28** to explode the charge. The explosive force is directed forwardly into the bore **27** around the sides of the anvil, the rim **83** of the tape acting as a gasket between the rim **96'** of the bolt and the firing block, to expel the projectile from the rod into the barrel and out of the gun. At the instant that the charge is exploded the aperture **27** is sealed at the rear extremity of the firing block by means of the engagement of the firing bolt therewith. After the shot has been fired and the trigger released, it is returned to its previous position by the spring **94**, thus moving all the parts back to their previous position and ready for the next round to be fired.

Referring more particularly to Figs. 9 and 10, a modified form of firing bolt **110** is shown which includes a firing bolt pin, or, more simply, firing pin **111**. The firing bolt pin has spaced fasteners or pins **112** and **113** extending transversely therethrough near its forward portion, the pin **112** rigidly securing a collar **114** to the firing bolt pin **111** and the pin **113** extending into longitudinal slots **115** on either side of a collar **116**. The forward extremity of the collar **116** is bevelled at **118** to provide

the edges **119** at the forward extremity of the collar **116**. Encircling the firing bolt pin **111** and separating the collars **114** and **116** is a resilient collar member **117**.

The firing bolt pin **111** has extending through it and through elongated slots, not shown, of the collar **116** a guide pin **120** similar to the guide pin **98** shown in Fig. 7 and having roller bearings, not shown, of the same type. Fig. 9 illustrates the firing bolt pin in normal position and Fig. 10 in the firing position. The firing bolt moves forward on its firing stroke until the edge **119** of the collar **116** contacts the firing tape against the rear face of the firing bolt to seal the firing block from the rear. In this modification, the collar **116** is larger than the enlarged portion **27** of the bore **24** of the firing block. The momentum of the firing bolt pin **111** moves the same through the bore of the collar **116** until it contacts the explosive charge in the tape adjacent the firing block anvil as shown in Fig. 10, compressing the resilient member **117**, and firing the charge. Since the firing bolt pin does not need to enter the bore **24** of the firing block to effect a seal, the anvil has its external face in substantially the plane of the rear face of the firing block. After the firing block pin reaches the extreme forward position of its travel the resilient member **117** retracts the firing block pin to its previous position as shown in Fig. 9.

Figs. 11, 12 and 13 illustrate a further modification of a firing bolt **122** which includes a firing bolt hammer **123** to which the actuating lever **75** is attached (not shown). Positioned in an axial recess **124** at the forward portion of the firing bolt hammer **123** is a firing bolt pin **125** which is secured in the recess **124** by a pin **126**. The firing bolt pin **125** consists of a shaft **127** having an enlarged portion or head **128** at its forward extremity. Mounted on the shaft **127** is a collar **129** having a bore **130** for the shaft **127** with an enlarged portion **131** for the head **128**. The forward extremity of the collar **129** is bevelled at **132** to provide the edge **133**. Lateral extensions **134** are provided on either side of the collar **129** for engagement with the guide slots **99** in the face plates of the receiver. A compression spring **136** is mounted on the shaft **125** and urges the firing bolt hammer **123** and the collar **129** apart. The normal position of the firing bolt is shown in Figs. 11 and 13, the head **128** of the firing bolt pin **125** being retracted. In operation, actuation of the lever **75** by means of the spring **94** moves the firing bolt forwardly until the edge **133** of the collar **129** contacts the tape adjacent the rear face of the firing block. The inertia of the firing bolt hammer moves the firing bolt pin **125** forwardly until the head **128** compresses the charge against the firing anvil. When the firing bolt hammer and the attached firing bolt pin have reached their extreme forward position the spring **137** being under compression at this point will retract the parts to their former positions.

It will be obvious to those skilled in the art that various changes may be made in the invention without departing from the spirit and scope thereof and therefore the invention is not limited by that which is shown in the drawings and described in the specifications but only as indicated in the appended claims.

What is claimed is:

1. A firearm comprising a barrel, a firing block attached to the barrel, a receiver attached to and housing the firing block and having a grip, the firing block having a first bore extending transversely therethrough and in communication with the barrel, a magazine attached to the firing block and having a loading aperture, the firing block having a second bore communicating with the magazine and a third bore extending transversely of and communicating with said first and said second bores, a loading rod adapted to extend into the third bore and having a transverse bore adapted in one position to communicate with the bore of the firing block in communication with the magazine and in another position to communicate with the bore of the firing block in communication with the barrel, means in the magazine for urging one or more projectiles therein toward the rod, a firing anvil positioned transversely of said first bore and adjacent the rear of said bore; trigger mechanism mounted within the receiver, said trigger mechanism comprising a trigger mounted in the receiver, means for engaging the trigger with the loading rod whereby movement of the trigger may reciprocate the rod, an actuating lever mounted near the extremity of the grip of the receiver having a lower portion extending toward the rear of the receiver, a tension spring attached to said portion and to the trigger, a firing bolt attached to an upper portion of the actuating lever and adapted to engage the firing anvil when in one position, means for guiding and limiting the movement of the firing bolt, a sear attached to the trigger and having means adapted to engage the actuating lever when in one position and for disengaging the actuating lever when in another position in such manner that depression of the trigger causes the sear to engage the actuating lever so that continued depression rotates the actuating lever, its upper portion carrying the firing bolt moving toward the rear of the receiver until the sear contacts the disengaging means on the actuating lever, the bolt being in its rearmost position, permitting the actuating lever and bolt to move forward under the action of the tension spring, means for guiding a strip of charge carrying tape across the rear extremity of the first bore in the firing block, and means for advancing the strip of charge carrying tape along the guiding means and adjacent the firing anvil as the trigger is depressed.

2. In a separate loading firearm, a barrel, a magazine for projectiles, a firing block having a first bore communicating with the barrel, an anvil positioned transversely of said bore and adjacent the rear extremity thereof, the firing block having a second bore communicating with the magazine for projectiles and a third bore communicating with said first and said second bores, means for receiving a projectile from the magazine for projectiles and moving it through said third bore into said first bore, means for feeding an explosive charge to a position adjacent to and overlying the anvil, a firing bolt having a portion of reduced size at its forward extremity for snug reception in the first bore, means for retracting said bolt and for urging it into sudden engagement with said bore and against said anvil, and a trigger for actuating all of said means, whereby actuation of said trigger may load and fire said firearm.

3. In a separate loading firearm having a barrel, a magazine for projectiles, a firing block having a bore communicating with the barrel, an anvil positioned transversely of the bore and partially covering it adjacent its rear extremity, and a firing bolt of larger diameter than the bore and having a narrow rim portion at its forward extremity, a firing pin slideably mounted within the firing bolt, means for positioning the projectile in the bore, means for positioning sheet means carrying a central explosive charge adjacent the anvil, means for bringing the firing bolt into sudden engagement with the rear face of the firing block and aligned with the bore, and means for actuating all of said means simultaneously, whereby the rim of the bolt may engage the material surrounding the charge, and the firing pin strike the charge and compress it against the anvil to explode the same, the exposive force moving past the anvil to the projectile to impel the same out of the barrel, the rim portion of the firing bolt preventing leakage of the explosive through the rear of the bore.

4. In a separate loading firearm having a barrel, a magazine for projectiles, a firing block having a bore communicating with the barrel, an anvil positioned transversely of the bore and partially covering it adjacent its rear extremity, and a firing bolt of larger diameter than the bore and having a narrow rim portion at its forward extremity, a firing pin slideably mounted within the firing bolt, means for positioning the projectile in the bore, means for positioning said means carrying a central explosive charge adjacent the anvil, means for bringing the firing bolt into engagement with the rear face of the firing block and aligned with the bore, and means for actuating all of said means simultaneously, whereby the rim of the firing bolt may engage the material surrounding the charge, and the firing pin strike the charge and compress it against the anvil to explode the same, the explosive force moving past the anvil to the projectile to impel the some out of the barrel, the rim portion of the firing bolt preventing leakage of the explosive through the rear of the bore.

5. A firearm comprising a barrel, a firing block attached to the barrel, a receiver housing the firing block and having a grip, a projectile magazine communicating with the firing block, a loading rod for moving projectiles from the magazine to the firing block in position to be fired through the barrel, the firing block having a first bore extending transversely therethrough in communica-

tion with the barrel, the firing block having a second bore communicating with the magazine and a third bore extending transversely of and communicating with said first and said second bores, the loading rod moving into the third bore and having a transverse bore extending therethrough, the forward end having a diameter slightly greater than that of the first bore, the transverse bore of the rod in one position communicating with the bore of the firing block in communication with the magazine, and in another position communicating with the bore of the firing block in communication with the barrel in order to position a projectile in said transverse bore, a firing anvil positioned at the rear of the barrel and providing a seat for a charge in communication with the barrel, trigger mechanism mounted within the receiver, a firing bolt movably mounted to engage the firing anvil, means within the receiver connected with the trigger mechanism for simultaneously moving the loading rod, a charge carrying tape, and the firing bolt in order to position a projectile and a charge in firing position and the firing bolt in retracted position, and means for forcibly bringing the firing bolt from retracted position into contact with the charge to explode it and expel the projectile as the trigger mechanism is actuated.

6. A firearm comprising a barrel, a firing block attached to the barrel, a receiver housing the firing block and having a grip, a projectile magazine communicating with the firing block, a loading rod for moving projectiles from the magazine to the firing block in position to be fired through the barrel, a firing anvil positioned at the rear of the barrel and providing a seat for a charge in communication with the barrel, trigger mechanism mounted within the receiver, the trigger mechanism including a trigger pivotally mounted in the receiver by means of a post extending through the forward portion of said trigger, a coil spring having a long and short arm positioned on said post within the confines of said trigger, the short arm of the spring bearing against the forward portion of said trigger, and the long arm engaging the lower portion of the rod, a firing bolt movably mounted to engage the firing anvil, means within the receiver connected with the trigger mechanism for simultaneously moving the loading rod, a charge carrying tape, and the firing bolt in order to position a projectile and a charge in firing position and the firing bolt in retracted position, and means for forcibly bringing the firing bolt from retracted position into contact with the charge to explode it and expel the projectile as the trigger mechanism is actuated.

7. A firearm comprising a barrel, a firing block attached to the barrel, a receiver housing the firing block and having a grip, a projectile magazine communicating with the firing block, a loading rod for moving projectiles from the magazine to the firing block in position to be fired through the barrel, a firing anvil positioned at the rear of the barrel and providing a seat for a charge in communication with the barrel, trigger mechanism mounted within the receiver, the trigger mechanism including an L-shaped bolt actuating lever pivotally mounted at the intersection of its long and its short arms near the extremity of the grip of the receiver, and a tension spring attached to the extremity of the short arm and to the trigger, a firing bolt movably mounted to engage the firing anvil, means within the receiver connected with the trigger mechanism for simultaneously moving the loading rod, a charge carrying tape, and the firing bolt in order to position a projectile and a charge in firing position and the firing bolt in retracted position, and means for forcibly bringing the firing bolt from retracted position into contact with the charge to explode it and expel the projectile as the trigger mechanism is actuated.

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