SINGLE LOADING ENHANCEMENT DEVICE FOR FIREARM

Inventor: Robert Gerald Hahin, Berkeley, CA (US)

Correspondence Address:
LAW OFFICE OF TIMOTHY M. BARLOW
P.O. BOX 64775
TUCSON, AZ 85728-4775 (US)

Appl. No.: 10/844,692
Filed: May 13, 2004

Related U.S. Application Data

Provisional application No. 60/470,914, filed on May 15, 2003.

Publication Classification

Int. Cl. 7 .............................. F41A 3/00

ABSTRACT

A single loading enhancement device (sled) for a repeating firearm comprises a body where the external features of the body are in the form of an original firearm magazine. The body comprises a bottom end, a front surface, a rear surface, a pair of side surfaces and a top end. The top end of the body further comprises a pair of guide rails and a guide channel. The pair of guide rails is integrally formed into the top of the body and oriented approximately parallel to the body and extending from the front surface of the body toward the rear surface. The guide channel is defined by the guide rails and set into the top end of the body, the width and depth of the channel being slightly larger than the radius of a firearm cartridge and the guide channel is adjusted to prevent mechanical interference with the firearm’s action and moving parts. The sled replaces the firearm’s original magazine and enables the loading of a single cartridge and flawless functioning of the firearm without damaging the cartridge, irrespective of cartridge length.
SINGLE LOADING ENHANCEMENT DEVICE FOR FIREARM

DESCRIPTION OF RELATED ART

[0001] Firearms are a common part of our culture. They are used for a wide variety of purposes. Among the most popular uses is the recreational, sporting or competitive use of firearms. Organized or informal matches or competitions take place at virtually every firing range. Among the most popular of the organized competitions are the rifle matches. These matches often have strict rules to promote safety and parity among the competitors. Quite often within these matches, the rules require that the firearm be loaded with one cartridge at a time, i.e., singly, even if the firearm’s magazine or clip is capable of holding more than one cartridge.

[0002] When competition rules require that cartridges be loaded singly, competitors must not load the firearm’s magazine with more than one cartridge. At these stages of a competition, the competitors are given ample time to load their firearms and score their targets. Speed is not preferred over safety. The emphasis is on marksmanship; thus the rate of fire is not very important. The single loading requirement decreases the likelihood of a safety problem, such as a trigger failure on a self-loading firearm that permits the firearm to operate automatically.

[0003] Many firearms are very sensitive to cartridge alignment and positioning during the single loading process. A misaligned or poorly positioned cartridge may cause the firearm to malfunction. These firearms, including many automatic, semi-automatic, and bolt action rifles, are meant to be fed from a magazine. The magazine provides the proper cartridge position and orientation for problem-free functioning, but some problems still exist. To load a single cartridge with the magazine in place, many times the shooter must place a cartridge inside the firearm through a small port, such as with an M-16 or AR-15 type of firearm. Also, use of a standard magazine requires that the shooter follow a particular routine. Often, when the shooter simply places or lays a cartridge on top of the magazine followers, the cartridge is not properly aligned and will not load properly. In some situations this can be hazardous. As the bolt forces the cartridge forward, the tip of the bullet may strike the receiver of the barrel extension. In this situation, the bullet may be forced deeper into the cartridge, dramatically altering the overall length and decreasing the internal volume of the cartridge. Any decrease in internal volume increases the cartridge’s internal pressure when it is fired. Excessive pressure may cause damage to the firearm and injury to the shooter. If the shooter is lucky, the excess pressure will only degrade the accuracy of that shot. Alternatively, the firearm’s bolt may force the cartridge from its perch atop the magazine follower and out of the firearm completely. This happens when the cartridge is not precisely aligned with the bolt and chamber. If the shooter does not witness the event, he may proceed as if there is a cartridge in the chamber. When the shooter tries to fire the cartridge, nothing will happen. The shooter must treat the event as a potentially hazardous hangfire or misfire until the truth is discovered.

[0004] However, even if the loading process does not create a hazardous condition, the loss of or damage to a cartridge may affect the competitor’s rhythm or routine. If the damaged cartridge fires, accuracy may suffer due to the damage. If the cartridge is missing, the shooter has wasted time. It forces the shooter to find the lost cartridge or to replace it with another. One way to avoid these issues is to latch each cartridge into a standard magazine before each shot, feeding the cartridge from the magazine. In such a case, the cartridge is held under spring pressure between the magazine’s follower and the magazine’s feed lips, the same way it occurs when the shooter loads more than one cartridge into a magazine. The cartridge is squeezed against the bottom of the feed lips by the follower, under spring pressure from the magazine spring. This process works properly only if the cartridge is not too long to fit into the magazine or to function properly as the top cartridge in a magazine. However, even if a cartridge can function properly from a magazine, the extra stress on the cartridge may damage it, reducing accuracy.

[0005] At least one attempt has been made to address the problem of properly single-loading magazine-fed firearms. The Sinclair International company and others have sold a device that replaced a magazine’s follower for AR-15 and M-16 type firearms. It required a "sacrificial" magazine to make it work. The sacrificial magazine was disassembled and the original follower was replaced. This solution created several problems. First, magazines are not inexpensive. Purchasing an expensive magazine to use as a shell is a waste of money and resources. Second, the follower replacement does not function totally reliably without a lot of fine-tuning for the intended firearm. The shooter had to tune the follower replacement for his individual rifle to try to achieve proper functioning. However, many firearms simply will not operate properly with these devices. With respect to self-loading firearms, such as semi-automatic rifles, this is a problem because the bolt catch may not actuate. This requires the shooter to operate the bolt catch manually, negating any time savings from the follower replacement.

[0006] Thus what is needed is a device that replaces the firearm’s magazine to allow reliable single-loading of a cartridge into a magazine-fed firearm. The device should replace the original magazine, and permit proper functioning of the firearm without damaging the cartridges or degrading accuracy.

SUMMARY OF THE INVENTION

[0007] The device is a magazine replacement for a firearm, more specifically a single loading enhancement device (sled) for firearms. The sled allows reliable, proper feeding of a cartridge into a magazine-fed firearm when single loading is required. The sled replaces a magazine during single loading events. The sled is inserted into the firearm just as a normal magazine. It is held in place with the firearm’s original magazine catch, and is released by normal operation of the firearm’s magazine catch.

[0008] The shape of the sled and its guide channel guides the cartridge securely and properly into the firearm’s chamber. If the firearm is so equipped, the sled actuates a bolt hold-open device. This allows ease of reloading for subsequent shots.

[0009] The sled solves at least two problems: reliable single feeding of rounds into a magazine fed firearm, and the reliable actuation of an existing hold-open device, or bolt catch, on the firearm.
Existing devices use an insert to replace the follower of the original magazines. This method is an ineffective compromise due to several factors, including the shape of the existing magazines, the strength of the magazine's spring, and the mass of the insert. The combination of factors, together with the range of allowable manufacturing tolerances for each piece, frequently act together to cause binding of the insert within the magazine, failure to feed cartridges properly and failure to actuate the bolt catch.

The sled was developed by addressing each problem separately. There are two main problems to overcome, reliable cartridge feeding, and proper operation of the bolt catch or hold-open device, if so equipped.

With regard to reliable cartridge feeding, the shape of the sled was created to orient the cartridge in the proper location, when installed in the firearm, to guide the cartridge into the chamber. The cartridge must be properly aligned along all three axes to enter the chamber properly. The shape of the top of the sled was designed with guide rails and a guide channel to guide the cartridge into the barrel's feed ramp or chamber without permitting the cartridge to become misaligned, to fall out the firearm or to be damaged. The operation of the firearm's bolt or bolt carrier cannot be interfered with. Each different type of firearm has a unique set of requirements, but all share the common problem and solution. This solved the cartridge-feeding problem.

The bolt catch or bolt hold-open device is typically a small lever, paddle, pin, plate or other device that interferes with the movement of the bolt and prevents the bolt from moving forward. The bolt catch is important only to self-loading firearms, such as semiautomatic and automatic rifles. On most firearms, it is actuated by the magazine's cartridge follower or by a dedicated actuator attached to the magazine. As the ammunition in the magazine is depleted, the follower rises up and moves the bolt catch into an interference position with the bolt. This stops bolt movement and holds the bolt open when the magazine is empty. The force required to operate the bolt catch is relatively small. The bolt catch simplifies the operation of the firearm. When a firearm has a bolt stop, particularly self-loading firearms, the sled incorporates a spring-loaded plunger, pin or other mechanism to actuate the bolt catch. Where a firearm has no bolt catch, the function of a sled for that firearm is focussed toward reliable feeding only.

Existing magazines were measured to create generally proper magazine replacements. These rough parts were milled and fitted to a firearm to establish ramp orientation dimensions for that firearm. Where there are moving parts, sufficient clearance was built in to prevent excessive interference. At that time, bolt catch actuator mechanisms were properly located and installed. The firearm's action was cycled by hand with inert cartridges, and then final testing was done with live cartridges to ensure proper functioning. The sled was then tested with a wide variety of similar firearms to ensure proper functioning. If the sled did not operate properly in all the firearms, further adjustments were made to remedy the malfunction.

Accordingly, it is a principal object of the invention to provide a device for flawless single-loading of a magazine-fed firearm.

It is another object of the invention to teach a device that actuates a firearm's existing bolt catch mechanism.

It is a further object of the invention to provide a device that enables the proper functioning of a firearm.

It is another object of the invention to teach a device that uses a firearm's original magazine retention and release system.

It is an object of the invention to provide improved elements and arrangements thereof in an apparatus for the purposes described which is inexpensive, dependable and fully effective in accomplishing its intended purposes.

These and other objects of the present invention will become readily apparent upon further review of the following specification and drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1 and 2 are perspective views of a sled for an AR-15 or M-16 type firearm according to the present invention.

FIGS. 3 and 4 are perspective views of a sled for an AR-10 type firearm according to the present invention.

FIGS. 5 and 6 are perspective views of a sled for an SR-25 or SR/LR308 type firearm according to the present invention.

FIGS. 7 and 8 are perspective views of a sled for a AR-15 or M-16 type firearm that is modified to fire .22 caliber rimfire ammunition.

FIGS. 9 and 10 are perspective views of a sled for an FN-FAL type firearm according to the present invention.

FIGS. 11 and 12 are perspective views of a sled for a Tikka type firearm according to the present invention.

DETAILED DESCRIPTION OF THE DRAWINGS

The present invention is a single loading enhancement device (sled) for a firearm, comprising a body that generally matches the external dimensions of an original firearm magazine. The sled may be inserted into the firearm in place of the original magazine for flawless functioning when loading and firing single cartridges.

FIGS. 1 through 10 are perspective views of sleds for various self-loading firearms. FIGS. 11 and 12 are perspective views of a sled for a bolt-action firearm.

The sled includes a body 10 where the external features of the body 10 are in the form of an original firearm magazine comprising a bottom end 12, a front surface 14, a rear surface 16, a left side 18, a right side 20 and a top end 22. The various sides and ends of the body 10 may be featureless or may include contours or grooves to accommodate layout of a particular firearm and ensure proper fit and function. The top end 22 further includes a left guide rail 24, a right guide rail 25 and a guide channel 26 for proper alignment and control of a cartridge during the chambering process. The pair of guide rails 24, 25 is integrally formed into the top end 22 of the body 10 and oriented approximately parallel to the sides 18, 20. The guide rails 24, 25 start near the front surface 14 of the body 10 and extend along the top 22 toward the rear surface 16. A guide channel 26 is between and defined by the guide rails 24, 25. The guide channel 26 is set into the top end 22 of the body 10, and the width and depth of the channel 26 is slightly larger
than the radius of a firearm cartridge. The overall dimensions and orientation of the guide rails 24, 25 and guide channel 26 are formed to prevent mechanical interference with the firearm's action and any moving parts. There are several variations within this basic layout.

**[0030]** In one embodiment, the guide rails 24, 25 extend along the top end 22 of the sled from the front surface 14 to a position approximately halfway between the front surface 14 and the rear surface 16 of the sled. To accompany the truncated guide rails 24, 25, the guide channel 26 extends along the top 22 of the sled from the front surface 14 of the sled to a position approximately halfway between the front surface 14 and the rear surface 16 of the sled. This is shown in FIGS. 7 and 8, where the firearm has been modified to fire a much shorter cartridge than originally designed. In this case, the .223 Remington cartridge and the appropriate barrel and chamber have been replaced with a barrel and chamber that accepts and fires .22 caliber rimfire ammunition. The rimfire cartridges require significantly less bolt travel to properly extract, ejection, and load the cartridges, and a rimfire cartridge occupies only a small fraction of the space at the top end 22 of the sled. Thus, this firearm needs a sled that has guide rails 24, 25 and a guide channel 26 that occupy only a part of the top end 22 of the sled.

**[0031]** In another embodiment, the guide rails 24, 25 extend along the top 22 of the sled for substantially the entire distance from the front surface 14 of the body 10 to the rear surface 16 of the body 10. To accompany these longer guide rails 24, 25, the guide channel 26 extends along the top of the body 10 for substantially the entire distance from the front surface 14 of the body 10 to the rear surface 16 of the body 10. This is shown in FIGS. 1 through 6 and 9 through 12, where the cartridge length is approximately the same as the length of the top end 22 of the sled.

**[0032]** In the preferred embodiment, the sled is machined from a single piece of material. Dehini® is favored because it can be machined, resists mechanical damage and also resists oil, grease, and cleaning chemicals. Wood, metal, and other synthetic materials may also be used to construct a sled. Further, sleds may be made from multiple pieces and assembled to form a complete sled, as an alternative to machining a sled from a single piece of material.

**[0033]** The sled may further include a magazine catch slot 28 formed of machined into the body 10 of the sled. The magazine catch slot is typically located in the same place as the original firearm magazine, such as the front surface 14, the rear surface 16 or a side wall 18, 20 of the body 10. The magazine catch slot 28 enables the sled body 10 to be removably attached within a magazine well on the repeating firearm.

**[0034]** In another embodiment, the sled further comprises a bolt-catch activation mechanism incorporated into the rear surface 16 of the body 10, where the bolt-catch activation mechanism accomplishes the same function as the bolt-catch activation mechanism found on the original magazine. The bolt catch actuator may be a spring-loaded pin, plunger, or lever incorporated into the sled body 10. Two different kinds of bolt-catch mechanisms are shown in the Figures. FIGS. 1, 2, 7 and 8 show a bolt-catch activation mechanism with a spring-loaded plunger 30. The plunger mechanism 30 is fixed into a recess near the junction of the top end 22 and the rear 16 of the body 10. The plunger mechanism 30 is oriented vertically with the plunger pointing upward. The plunger is biased to an extended position by an internal spring so that the firearm's bolt catch mechanism is activated when the bolt travels far enough to the rear. This holds the firearm's bolt open after each shot is fired.

**[0035]** FIGS. 3 through 6, 9 and 10 show a bolt-catch activation mechanism with a sliding plate 32. The sliding plate is spring-loaded, vertically-oriented and biased upward by the internal spring. The sliding plate mechanism is fixed into the rear surface 16 of the body 10 in a position and location to properly operate the firearm's own bolt-catch mechanism to hold the bolt open after each shot.

**[0036]** FIGS. 11 and 12 show a sled without a bolt catch activation mechanism. Bolt-action firearms, such as the Tikka, Remington model 700 and Winchester model 70, are entirely manually operated. There is no operating spring or other mechanism to close or open the bolt. Thus, no bolt-catch or activator is required.

**[0037]** The external appearance of the sled is that of a firearm magazine. The top of the sled has guide rails 24, 25 and a guide channel 26 that is specially contoured to control a cartridge on its way into the chamber of a firearm. Numerous variations are appropriate depending upon the differences found in firearms designs. The biggest differences are found in the top ends 22 of the different sleds. For example, FIGS. 1 and 2 show a sled for an M-16 and AR-15 firearm. The guide rails 24, 25 are generally symmetrical as is the guide channel 26. FIGS. 3-6 show sleds appropriate for use with AR-10 and SR/LR308 firearms. Here the guide rails 24, 25 and guide channel 26 are quite asymmetrical. The guide channel 26 is skewed to the left side of the top end 22 of the sled to ensure proper cartridge feeding in those firearms. The guide rails 24, 25 and guide channel 26 are precisely formed to provide the appropriate inclination and orientation to chamber a cartridge without damage, improving accuracy and dramatically reducing wear on expensive magazines.

**[0038]** It is to be understood that the present invention is not limited to the sole embodiments described above, but encompasses any and all embodiments within the scope of the following claims.

**[0039]** Part # Part Name

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0040</td>
<td>10 body</td>
</tr>
<tr>
<td>0041</td>
<td>12 bottom</td>
</tr>
<tr>
<td>0042</td>
<td>14 front</td>
</tr>
<tr>
<td>0043</td>
<td>16 rear</td>
</tr>
<tr>
<td>0044</td>
<td>18 left side</td>
</tr>
<tr>
<td>0045</td>
<td>20 right side</td>
</tr>
<tr>
<td>0046</td>
<td>22 top end</td>
</tr>
<tr>
<td>0047</td>
<td>24 left guide rail</td>
</tr>
<tr>
<td>0048</td>
<td>25 right guide rail</td>
</tr>
<tr>
<td>0049</td>
<td>26 guide channel</td>
</tr>
<tr>
<td>0050</td>
<td>28 magazine catch slot</td>
</tr>
<tr>
<td>0051</td>
<td>30 spring-loaded plunger-type bolt-catch activator mechanism</td>
</tr>
</tbody>
</table>
I claim:  
1. A single loading enhancement device (sled) for a repeating firearm comprising a body where the external features of the body are in the form of an original firearm magazine comprising a bottom end, a front surface, a rear surface, a pair of side surfaces and a top end, the top end further comprising:

   a left guide rail and right guide rail, the pair of guide rails integrally formed into the top of the body and oriented approximately parallel to the body and extending from the front surface of the body toward the rear surface, and

   a guide channel defined by the guide rails and set into the top end of the body, the width and depth of the channel being slightly larger than the radius of a firearm cartridge and adjusted to prevent mechanical interference with the firearm’s action and moving parts, where the sled replaces the firearm’s original magazine and enables the loading of a single cartridge and flawless functioning of the firearm without damaging the cartridge, irrespective of cartridge length.

2. The single loading enhancement device (sled) for a repeating firearm of claim 1, where the guide rails extend along the top of the body from the front surface of the body to a position halfway between the front surface and the rear surface of the body.

3. The single loading enhancement device (sled) for a repeating firearm of claim 1, where the guide channel extends along the top of the body from the front surface of the body to a position halfway between the front surface and the rear surface of the body.

4. The single loading enhancement device (sled) for a repeating firearm of claim 2, where the guide channel extends along the top of the body from the front surface of the body to a position halfway between the front surface and the rear surface of the body.

5. The single loading enhancement device (sled) for a repeating firearm of claim 1, where the guide rails extend along the top of the body for substantially the entire distance from the front surface of the body to the rear surface of the body.

6. The single loading enhancement device (sled) for a repeating firearm of claim 1, where the guide channel extends along the top of the body for substantially the entire distance from the front surface of the body to the rear surface of the body.

7. The single loading enhancement device (sled) for a repeating firearm of claim 5, where the guide channel extends along the top of the body for substantially the entire distance from the front surface of the body to the rear surface of the body.

8. The single loading enhancement device (sled) for a repeating firearm of claim 1, where the body is formed from a single piece of material.

9. The single loading enhancement device (sled) for a repeating firearm of claim 1, wherein the sled further comprises a magazine catch slot formed into the front surface, the rear surface or a side wall of the body, where the magazine catch slot enables the sled body to be removably attached within a magazine well on the repeating firearm.

10. The single loading enhancement device (sled) for a repeating firearm of claim 1, wherein the sled further comprises a bolt-catch mechanism incorporated into the rear surface of the body, where the bolt-catch mechanism accomplishes the same function as the bolt-catch mechanism on the original magazine.

11. The single loading enhancement device (sled) for a repeating firearm of claim 10, where the bolt-catch mechanism is a vertically-oriented, spring-loaded plunger attached into the rear surface of the body, where the plunger is biased upward into an extended position by the spring.

12. The single loading enhancement device (sled) for a repeating firearm of claim 10, where the bolt-catch mechanism is a spring-loaded sliding plate attached into the rear surface of the body, where the sliding plate is biased upward into an extended position by the spring.

13. A single loading enhancement device (sled) for a repeating firearm comprising:

   a body where the external features of the body are in the form of an original firearm magazine comprising a bottom end, a front surface, a rear surface, a pair of side surfaces, a top end and a magazine catch slot formed into the front surface, the rear surface or a side wall of the body, where the magazine catch slot enables the sled body to be removably attached within a magazine well on the repeating firearm; and

   a bolt-catch mechanism incorporated into the rear surface of the body, where the bolt-catch mechanism accomplishes the same function as the bolt-catch mechanism on the original magazine, the top end of the body further comprising:

   a pair of guide rails, the pair of guide rails integrally formed into the top of the body and oriented approximately parallel to the body and extending from the front surface of the body toward the rear surface, where the guide rails extend along the top of the body from the front surface of the body to a position halfway between the front surface and the rear surface of the body, and

   a guide channel defined by the guide rails and set into the top end of the body, the width and depth of the channel being slightly larger than the radius of a firearm cartridge and adjusted to prevent mechanical interference with the firearm’s action and moving parts,

   where the sled replaces the firearm’s original magazine and enables the loading of a single cartridge and flawless functioning of the firearm without damaging the cartridge, irrespective of cartridge length.

14. The single loading enhancement device (sled) for a repeating firearm of claim 13, where the guide channel extends along the top of the body from the front surface of the body.
the body to a position approximately halfway between the front surface and the rear surface of the body.

15. The single loading enhancement device (sled) for a repeating firearm of claim 14, where the bolt-catch mechanism is a vertically-oriented, spring-loaded plunger attached into the rear surface of the body, where the plunger is biased upward into an extended position by the spring.

16. The single loading enhancement device (sled) for a repeating firearm of claim 15, where the bolt-catch mechanism is a spring-loaded sliding plate attached into the rear surface of the body, where the sliding plate is biased upward into an extended position by the spring.

17. A single loading enhancement device (sled) for a repeating firearm comprising:

- a body where the external features of the body are in the form of an original firearm magazine comprising a bottom end, a front surface, a rear surface, a pair of side surfaces, a top end and a magazine catch slot formed into the front surface, the rear surface or a side wall of the body, where the magazine catch slot enables the sled body to be removably attached within a magazine well on the repeating firearm; and

- a bolt-catch mechanism incorporated into the rear surface of the body, where the bolt-catch mechanism accomplishes the same function as the bolt-catch mechanism on the original magazine, the top end of the body further comprising:

  - a pair of guide rails, the pair of guide rails integrally formed into the top of the body and oriented approximately parallel to the body and extending from the front surface of the body toward the rear surface, where the guide rails extend along the top of the body for substantially the entire distance from the front surface of the body to the rear surface of the body, and

  - a guide channel defined by the guide rails and set into the top end of the body, the width and depth of the channel being slightly larger than the radius of a firearm cartridge and adjusted to prevent mechanical interference with the firearm’s action and moving parts,

where the sled replaces the firearm’s original magazine and enables the loading of a single cartridge and flawless functioning of the firearm without damaging the cartridge, irrespective of cartridge length.

18. The single loading enhancement device (sled) for a repeating firearm of claim 17, where the guide channel extends along the top of the body for substantially the entire distance from the front surface of the body to the rear surface of the body.

19. The single loading enhancement device (sled) for a repeating firearm of claim 18, where the bolt-catch mechanism is a vertically-oriented, spring-loaded plunger attached into the rear surface of the body, where the plunger is biased upward into an extended position by the spring.

20. The single loading enhancement device (sled) for a repeating firearm of claim 19, where the bolt-catch mechanism is a spring-loaded sliding plate attached into the rear surface of the body, where the sliding plate is biased upward into an extended position by the spring.