Dec. 3, 1946. F. I. RATAICZAK 2,411,979

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Filed Nov. 27, 1944 2 Sheets-Sheet 1

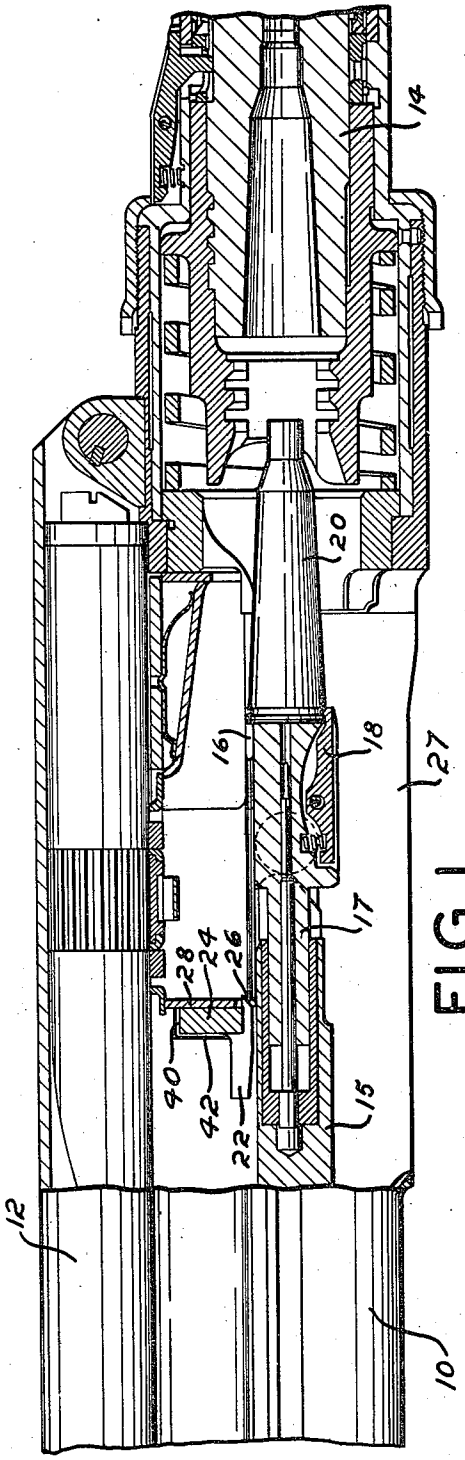


FIG. 1

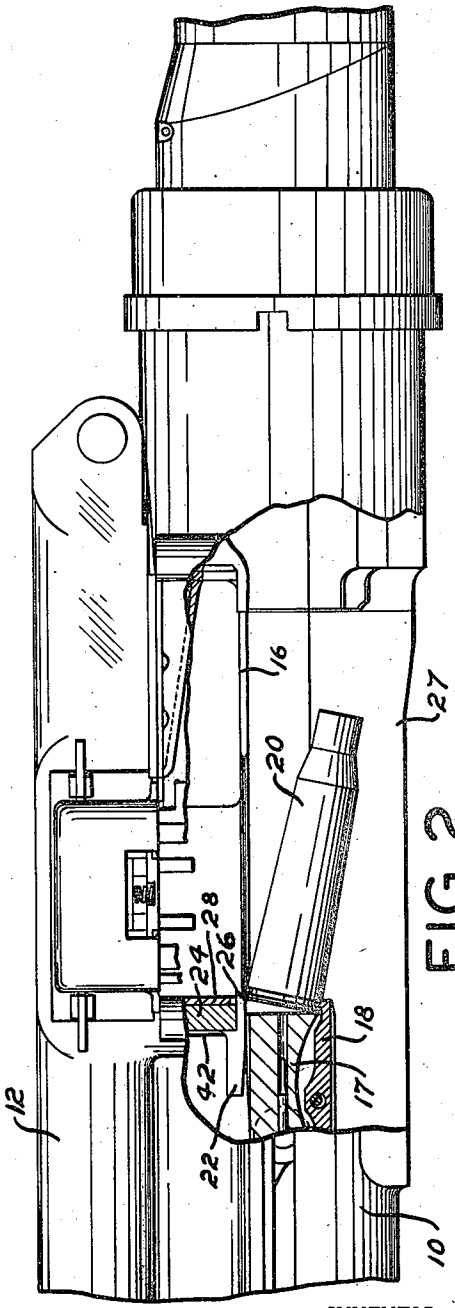


FIG. 2

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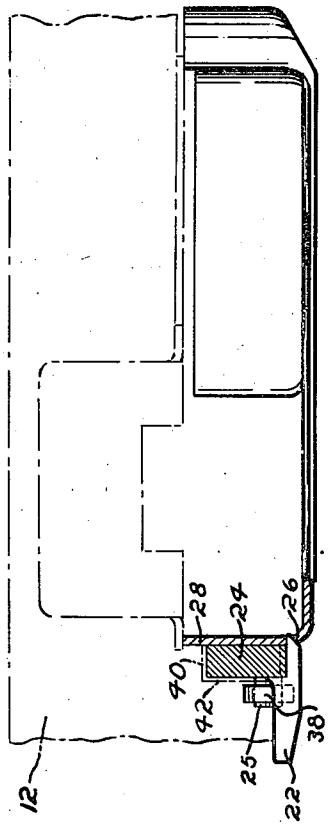
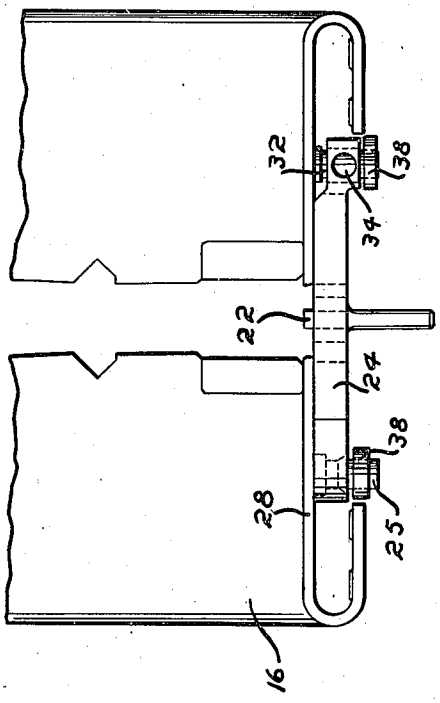


FIG. 4

FIG. 5



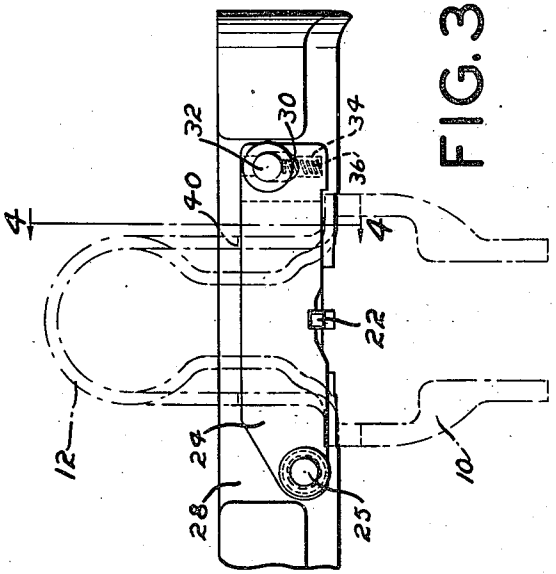


FIG. 3

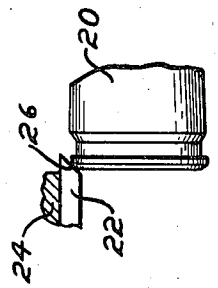


FIG. 6

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Patented Dec. 3, 1946 2,411,979

UNITED STATES PATENT OFFICE

2,411,979

ORDNANCE

Francis I. Rataiczak, Dayton, Ohio, assignor to General Motors Corporation, Dayton, Ohio, a corporation of Delaware

Application November 27, 1944, Serial No. 565,252

3 Claims. (Cl. 42—25)

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This invention relates to ordnance and more particularly to an improved shell ejecting mechanism for use in a machine gun.

The invention set forth herein represents an improvement over the mechanism set forth in my co-pending application Serial Number 536,229, filed May 19, 1944.

It is an object of this invention to provide a rugged shell ejecting mechanism capable of ejecting empty shells from a high speed machine gun without damaging or breaking away fragments of the rims of the shells. Many of the prior art shell ejecting mechanisms which are satisfactory for slow speed guns cannot be used in the higher speed guns because they would cut or dent the rims of the shells without properly ejecting them.

Another object of this invention is to provide a new location and an improved mounting arrangement for the shell ejecting mechanism. In the arrangement disclosed in my co-pending application, the shell ejecting mechanism is mounted within the bolt head with the result that it has to be small. Furthermore, that arrangement necessitates cutting away a portion of the bolt head, thereby unduly weakening the bolt head. By virtue of the improved arrangement disclosed herein, the bolt head is made stronger and the shell ejecting mechanism can be made large enough and consequently strong enough to stand up under all conditions.

Still another object of this invention is to provide an improved shell ejecting mechanism which can be used in existing guns without making any major changes in the gun construction which has otherwise proven to be very satisfactory.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings, wherein a preferred form of the present invention is clearly shown.

In the drawings:

Fig. 1 is a fragmentary view, partially in section, showing the arrangement of my improved shell ejecting mechanism relative to the rest of the gun parts;

Fig. 2 is a fragmentary view, with parts broken away, showing a shell being ejected by my improved shell ejecting mechanism;

Fig. 3 shows the relationship of the shell ejecting mechanism relative to the feedway, the cover, and the receiver housing;

Fig. 4 is a fragmentary sectional view taken substantially on line 4—4 of Fig. 3 showing the shell ejecting mechanism and feedway in solid

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lines and showing a portion of the cover in dot-dash lines;

Fig. 5 is a top view showing the relationship of the shell ejecting mechanism to the conventional feedway; and

Fig. 6 is a fragmentary view on an enlarged scale showing the relationship of the shell to the shell ejecting cam when the shell first engages the cam.

Referring now to the drawings, reference numerals 10, 12 and 14 designate the receiver housing, the cover, and the gun barrel respectively. As set forth more fully in my co-pending application, the shells are fed into the gun on a feedway 16 which is held in place between the receiver 10 and the cover 12. The bolt mechanism comprises a main portion 15 and a bolt head 17 both of which are mounted for reciprocation within the receiver 10 in accordance with present practice. The bolt head 17 is provided with a conventional type of extractor 18 which serves to extract the empty shell from the barrel 14 as the bolt and bolt head move to the rear upon recoil. As best shown in Fig. 2, the empty shell 20 strikes against a shell ejecting cam 22 which is carried by and actually formed as an integral part of the mounting bar 24 as shown in Figs. 3, 4 and 5. Since the movement of the bolt head is very rapid and since the shell 20 is made of relatively light-weight material, it is essential that the shell ejecting cam 22 be yieldably mounted so as to be able to move upwardly slightly as the shell first strikes the beveled surface 26 provided on the front end of the shell ejecting cam 22. The ejected shell leaves through the ejection opening 27 in the bottom of the receiver 10.

As best shown in Fig. 3, the mounting bar 24 is pivotally supported at its one end by means of a stud 25 carried by the end wall 28 of the conventional feed rack 16. The other end of the mounting bar 24 is provided with a slot 30 which engages the stud 32 carried by the end wall 28 of the feedway 16. In order to more clearly show the relationship of the cam 22 to the rack 16, that portion of the end wall 28 which is directly above the cam 22 has been broken away in Fig. 5. As best shown in Figs. 3 and 5, a hole 34 has been drilled downwardly from the top of the bar 24 so as to provide a recess for the spring 36 which serves to bias the bar 24 downwardly. Thus, the one end of the spring 36 rests against the bottom wall of the recess 34 and the other end of the spring contacts the shank of the stud 32. Each stud is provided with a locking means 38 which is arranged as shown in Fig. 5 so as to prevent

the bar **24** from sliding off the studs. Enough clearance is provided between the bar **24** and the locking members **38** so as to allow a small amount of movement of the bar relative to the wall **28** of the feedway **16**.

As best shown in Figs. 1 and 4, the cover **12** has been cut away as indicated by the horizontal line **40** and the vertical line **42** so as to provide space for the mounting bar **24**. During operation of the gun, the upward movement of the mounting bar **24** is limited by the cover which engages the top surface of the bar **24** along the line **40**. Likewise, rearward movement of the mounting bar **24** is limited by the cover when the bar strikes the cover along the line **42**.

By virtue of the above described arrangement, it is apparent that when an empty shell **20** moves into engagement with the cam surface **26** provided on the shell ejecting cam **22**, the cam **22**, together with the mounting bar **24**, is free to give a limited amount so as not to strike the rim of the empty shell too hard a blow. The bar **24** is purposely made of rather heavy construction not only for reasons of strength but also so as to offer the desired amount of inertia to movement. The force exerted by the spring **36** should be made sufficient to return the shell ejecting cam **22** to the position in which it is shown in Figs. 3 and 4 between the shell ejecting operations regardless of the position of the gun.

As best shown in Fig. 6, the angle of the cam surface **26** corresponds nearly to the angle of the chamfer on the rim of the shell so as to provide good contact between the shell and the cam **26** and so as to provide a smooth camming action when the beveled surfaces first come into contact with one another. This improved action lessens the force of the initial impact between the moving shell and the cam **22**.

While the form of embodiment of the invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted, as may come within the scope of the claims which follow.

What is claimed is as follows:

1. In a rapid fire machine gun, a receiver, a receiver cover, a shell feedway mounted between said receiver and receiver cover, a shell ejecting mechanism loosely carried by the rear wall of said feedway comprising a mounting bar extending transversely of the receiver between the cover and the receiver, a shell engaging cam depending from said bar and arranged so as to engage the upper rear edge of each empty shell upon extraction of the shell from the gun barrel, means carried by said feedway for pivotally supporting one end of said bar, the other end of said bar having a slot formed therein, and means carried by said feedway cooperating with said slot for limiting the pivotal movement of said bar.

2. In a rapid fire machine gun a receiver, a receiver cover, a shell feedway mounted between said receiver and receiver cover, a shell ejecting mechanism loosely carried by the rear wall of said feedway comprising a mounting bar extending transversely of the receiver between the cover and the receiver, a shell engaging cam depending from said bar and arranged so as to engage the upper rear edge of each empty shell upon extraction of the shell from the gun barrel, means carried by said feedway for pivotally supporting one end of said bar, the other end of said bar having a slot formed therein, and means carried by said feedway cooperating with said slot for limiting the pivotal movement of said bar, said cover and said mounting bar having complementary surfaces arranged so that said cover serves to limit both the rearward and upward movement of said ejector.

3. In a rapid fire machine gun, a receiver housing, a barrel, a cover for said receiver housing, a reciprocating bolt mechanism disposed within said receiver housing, said receiver housing having an ejection opening in the bottom wall thereof, a shell ejecting mechanism comprising a shell ejecting cam disposed above the path of movement of said bolt for engagement with the empty shells upon extraction from said barrel and for interrupting backward movement of the upper edge of the shell so as to flip the shell downwardly through said opening, a mounting bar for said shell ejecting cam arranged transversely of said receiver housing with the ends of the bar projecting on opposite sides of said housing, means located externally of said cover for loosely supporting the projecting ends of said bar, means carried by said cover for limiting the upward movement of bar, and spring means for yieldably holding said bar in its lowermost position.

FRANCIS I. RATAICZAK.