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H. ABRAMSON

2,925,014

ANTI-RECOIL ARMS

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FIG.1

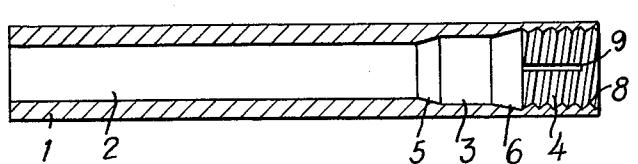


FIG.2



FIG.3

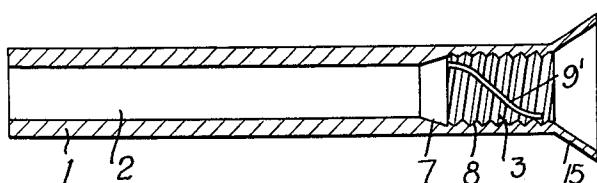


FIG.4

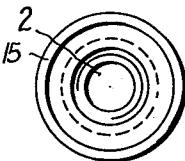


FIG.5

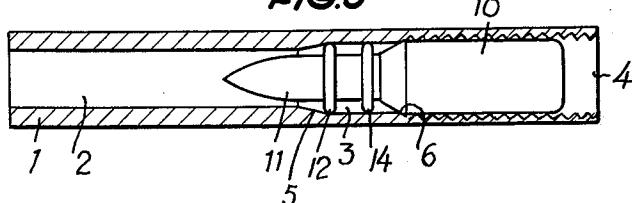
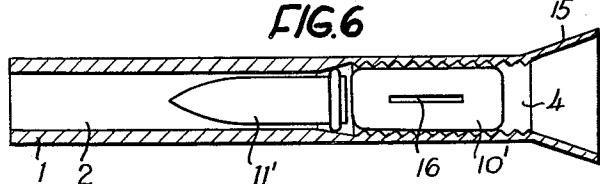


FIG.6



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## ANTI-RECOIL ARMS

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Application December 7, 1956, Serial No. 627,073

Claims priority, application Sweden August 4, 1950

3 Claims. (Cl. 89—1.7)

This application is a continuation in part application of my abandoned parent patent application Serial No. 236,486, filed July 13, 1951, and claiming Convention priority from the Swedish patent application No. 6,732/50, filed August 4, 1950, as to common subject matter. The present application relates back to said application Serial No. 236,486 and to the said Swedish application for all dates and rights incident to the filing thereof.

My original application referred to an anti-recoil gun comprising a breechless and rearwardly open barrel provided with a chamber with a supporting surface for a driving band on the projectile intended to be fired by the gun and an interior circumferential seat behind said surface for engagement by the cartridge case or shell of the projectile. Said seat for the cartridge case had surface qualities adapted through friction to retain the cartridge case during the greater part of the time of combustion of the powder in the cartridge. The cartridge case was automatically ejected, since in firing such a gun, when the pressure in the case rises, the case will be jammed so fast in the chamber that it will be prevented from being hurled rearwardly, but when the pressure in the case has fallen so much that the resiliency of the case and any gas enclosed between the walls of the case and the chamber wall will give a sufficient back pressure, the jamming action will be reduced so that the remaining gases eject the case.

The main object of the invention is to provide means in the barrel whereby the cartridge case will be accurately held in place until the projectile has been imparted sufficient kinetic energy, and then will be released to be ejected rearwardly itself in a proper manner.

A further object is to adapt the projectile and the barrel to one another so as to obtain an accurate operation of the gun and an automatic ejection of the cartridge case.

The means required according to the invention comprises a roughening of the surface of the seat engaged by the cartridge case, whereby pressure gas may leak in between the wall of the case and the seat, said gas contributing to compressing the cartridge case when the gas pressure is reduced therein. Said roughening of the seat also augments the friction between the case and the seat, so that the case is jammed positively at the seat when the pressure is rising to its maximum value, and is retained in the chamber until the projectile has obtained sufficient initial velocity.

The invention will be explained more in detail hereinafter, reference being had to the accompanying drawing 65 in which—

Fig. 1 is an axial section of a barrel according to one embodiment of the invention,

Fig. 2 is an end view of the barrel illustrated in Fig. 1,

Fig. 3 is an axial section of a barrel according to a second embodiment of the invention,

Fig. 4 is an end view of the barrel shown in Fig. 3,

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Fig. 5 illustrates the barrel as in Fig. 1 but with a projectile and a cartridge case mounted therein,

Fig. 6 illustrates the barrel as in Fig. 3 but with another form of projectile and cartridge case therein than that shown in Fig. 5.

In the drawing, 1 designates the barrel and 2 the smooth-bored or grooved bore thereof, and 3 denotes the chamber located in the rear part of the barrel, the rear portion of the chamber, the shell receiving or gun chamber, forming a seat for a shell or cartridge case, connected to the projectile proper or adapted to be inserted as an independent unit behind the projectile, said shell being constructed, for instance, in accordance with a patent application Ser. No. 236,485 filed July 13, 1951, under the title "Shell for the Propulsive Agent of Anti-Recoil Arms." As therein described the shell or cartridge case is of elastic metal which expands radially into engagement with the circumferential wall of the gun upon the firing of the powder charge within the shell. 15 The chamber is provided with one or more supporting surfaces serving to support the cartridge case and/or one or more driving-bands arranged on the projectile. In the construction according to Fig. 1 there are two supporting surfaces 5, 6 tapering conically in a forward direction, whereas the embodiment according to Fig. 2 shows a single supporting surface 7.

The rear portion of the chamber may be cylindrical, that is to say, it may have an opening angle equaling naught, or, it may taper rearwardly, i.e. may have a negative opening angle, or, it may widen somewhat rearwardly, still so slightly that the special shell intended to be used in the arm in consideration remains by friction in the chamber during the greater part of the time of combustion of the powder, in spite of the fact that the chamber is entirely open rearwardly and a breech is lacking. An accurate engagement between the cartridge case or shell and the seat is obtained by roughening the surface of the latter. Thus, the seat for the shell may be provided with screw threads 8 preferably obtained by turning, the profile of the threads being generally rounded or wave-shaped, care having been taken to avoid sharp edges which could cause difficulties in cleaning and also could augment the risk for rusting. Leakage means preferably in the form of one or more small axial grooves 9 may be made in the seat to facilitate the admittance of gas between the shell and the seat. Alternatively, the groove can be helical as shown at 9' in Fig. 3. The depth and breadth of the groove 9 or 9' may be 0.5 millimetre and 3 millimetre respectively.

If required, it is possible for the purpose of reducing the recoiling effect to provide the chamber with a rearwardly widening nozzle-shaped expansion venturi 15, such as is shown in the embodiment according to Fig. 3.

The cartridge case or shell 10 shown in Fig. 5 is connected with the rear end of the projectile 11, which can have two driving bands 12, 14, one band 12 engaging the supporting surface 5 and the other band 14 engaging the wall of the chamber 3. One driving band 12 or 14 can be omitted. The fore portion of the shell 10 engages the supporting surface 6, the main portion thereof being carried in contact with the seat 4.

In Fig. 6, the shell 10' is a unit independent of the projectile 11', which has only one driving band 14'. The shell is inserted behind the projectile in engagement with the roughened seat 4.

The shell may have scores such as 16 in its wall to cause splitting thereof by the pressure of the combustion gases, and in such case no groove or grooves such as 9 or 9' are needed.

In firing, when the pressure in the case rises, the case will be jammed so fast in the chamber that it will be prevented by the engagement with the threads 8 from

being hurled rearwardly. This jamming is maintained until the pressure created during the combustion of the propulsive agent has exceeded a maximum value. When the pressure in the case has fallen so much that the resiliency of the shell and any gas admitted through the groove 9 or 9' between the walls of the shell and the seat will give a sufficient back pressure, the jamming action will be reduced, so that the remaining gases eject the case. The projectile has been launched forward as the pressure was rising in the shell to release the projectile (Fig. 5) or open the fore end of the shell (Fig. 6).

What I claim is:

1. A one-piece anti-recoil gun for the discharge of a projectile having a driving band and provided with a cartridge case of elastic metal which expands radially upon firing of the powder charge contained therein, comprising a breechless and rearwardly open barrel provided with a chamber having a supporting surface for engaging the driving band on the projectile and an interior circumferential seat behind said surface for engagement by the cartridge case, said seat having a continuous screw thread on the periphery thereof extending the length of the cartridge for retaining the same in the chamber by friction during the greater time of combustion of the powder in the cartridge case, said screw thread having a wave-shaped profile, the threaded surface of said chamber seat having a generally axially-extending leakage groove therein to admit combustion gases between the circumferential wall of the cartridge case and said seat to release the cartridge case from the seat after the gas pressure therein has dropped below its maximum value.

2. An anti-recoil gun as defined in claim 1 wherein said leakage groove is helical.
3. A one-piece anti-recoil gun for the discharge of a projectile having a driving band and provided with a cartridge case of elastic metal which expands radially upon firing of the powder charge contained therein, comprising a breechless and rearwardly-open barrel provided with a chamber having a supporting surface for engaging the driving band on the projectile and an interior circumferential seat behind said surface for engagement by the cartridge case, said seat having a continuous screw-thread on the periphery thereof for retaining the cartridge in the chamber by friction during the greater time of combustion of the powder in the cartridge case, the threaded surface of said chamber seat having a generally axially-extending leakage groove therein to admit combustion gases between the circumferential wall of the cartridge case and said seat to release the cartridge case from the seat after the gas pressure therein has dropped below its maximum value.

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