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GAS OPERATED FIREARM

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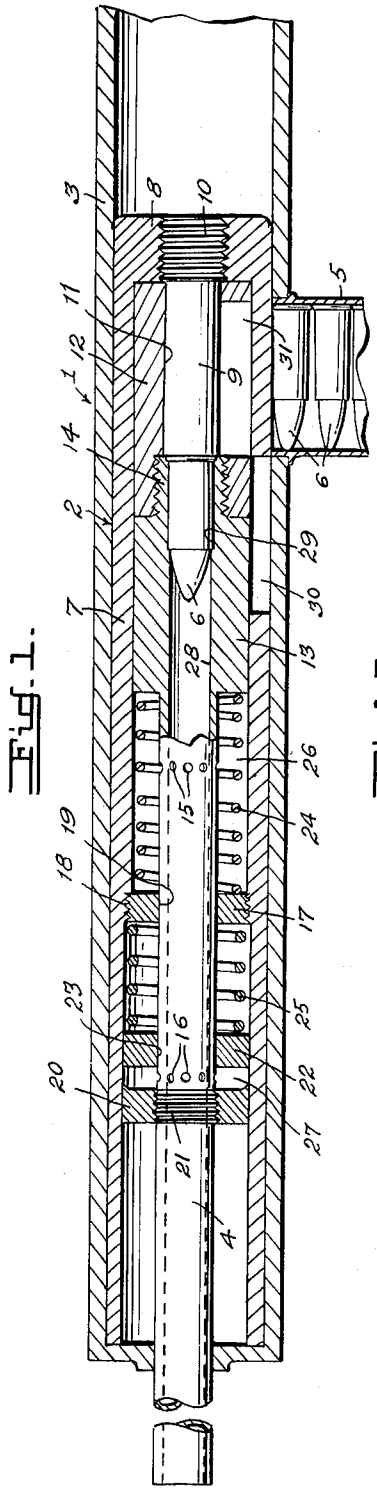


Fig. 1.

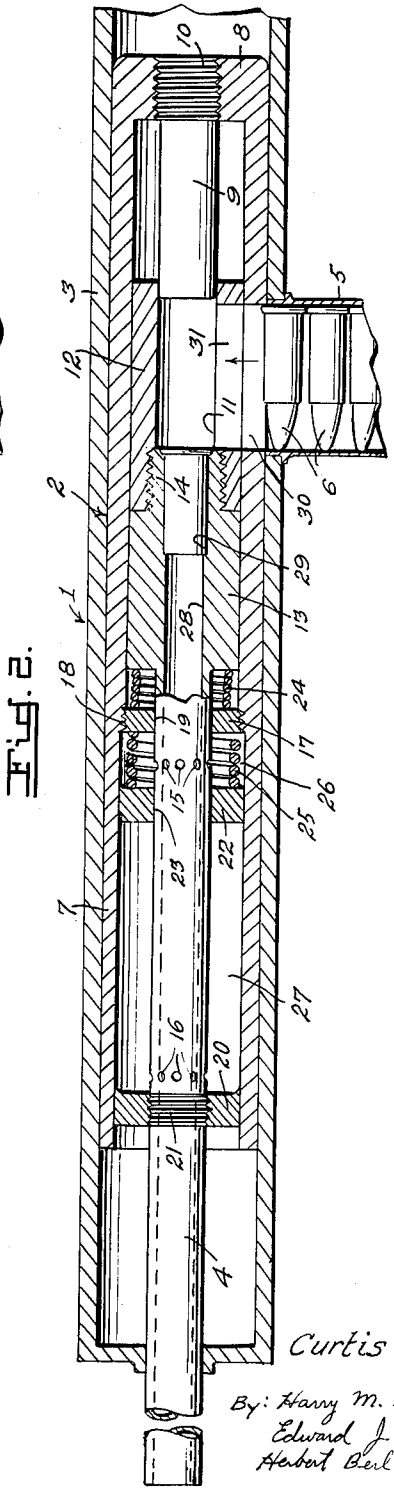


Fig. 2.

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GAS OPERATED FIREARM

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3 Claims. (Cl. 89—193)

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 a gas operated firearm and more particularly to a firearm bolt mechanism that is operated by gas pressure from a fired round to lock, unlock and cycle firing thereof.

The present invention is designed for automatic firearms. The bolt of the invention is entirely operated by the energy derived from gas pressure of the fired round and consists simply of a cylindrical sliding bolt having a baffle therein. The gas pressure is applied first to the rear then to the front of the baffle through ports in the barrel to lock and unlock the bolt in firing or load positions. Springs return the bolt to fire position when gas pressure drops therein.

It is a principal object of this invention to provide a firearm in which the bolt action thereof is solely controlled by gas pressure generated by a fired round therein.

Another object is to provide a firearm having a bolt mechanism which is reliable yet eliminating many mechanical parts and their necessary machining.

A further object is to provide a bolt mechanism for a firearm having longer life due to the elimination of locking and unlocking mechanisms that fail due to wear.

A final object is to provide a gas operated bolt mechanism providing greater safety in its use.

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 an axial section of the bolt mechanism of the invention and showing a portion of a weapon in which it is mounted, the bolt being in firing positon; and,

FIG. 2 is a similar view showing the bolt in its retracted or loading position.

Referring to the drawing, reference character **1** indicates a firearm generally.

The bolt mechanism of the invention is indicated generally by **2**.

Only a portion of the firearm **1** is shown and it includes a tubular casing **3**. A barrel **4** is mounted axially therein and a loading clip **5** having cartridges **6** is shown attached to casing **3**. The showing of the elements enumerated is purely schematic and is illustrated by way of example.

The bolt mechanism **2** comprises a tubular sleeve **7**, closed at its rearward end **8**. A bolt is indicated by **9** and is shown threadably mounted as at **10** in end **8**. Bolt **8** usually contains the necessary firing pin and extraction mechanism, not shown.

Bolt mechanism **2** is slidable in the tubular casing **3** of firearm **1**. Bolt **9** is slidable in a bore **11** in a guide cylinder **12** which is secured in the rearward portion of sleeve **7**.

Barrel **4** is provided with a cylindrical thickened portion **13** at its rearward end and portion **13** is provided with a reduced threaded portion **14** which is threadably secured to guide cylinder **12**.

Barrel **4** is provided with a series of spaced ports **15** and **16** as shown.

A first baffle **17** is secured by threads **18** to sleeve **7**. Baffle **17** is provided with a bore **19** which receives barrel **4** slidably therein.

A second baffle **20** is secured on barrel **4** and is slidable therewith in sleeve **7**.

A "floating" piston **22** having a bore **23** is slidable on barrel **4** and in sleeve **7**.

A first coil spring **24** encircles barrel **4** between first baffle **17** and thickened portion **13** of barrel **4** while a second coil spring **25** encircles barrel **4** between second baffle **20** and first baffle **17**. Spring **25** is heavier than spring **24**, as shown.

The area between first baffle **17** and thickened portion **13** will be designated as **26** while the area between second baffle **20** and first baffle **17** will be designated by **27**.

Barrel **4** is provided with the usual bore **28** and a firing chamber **29** in the breech end thereof.

Cartridges **6** in clip **5** are generally spring biased so that they are urged into position in the breech end of the firearm **1** and a slot **30** is provided in sleeve **7** and another slot **31** is provided in guide cylinder **12** for this purpose. The manner in which the cartridge **6** is positioned for ramming into the firing chamber **29** by bolt **9** is not illustrated, since it forms no part of this invention. Also necessary firing mechanism such as a trigger mechanism, cartridge ejecting mechanism are not shown as these also do not form a part of this invention and are not shown for simplification of the drawing.

Operation

As shown in FIG. 1, the firearm is in firing position, the bolt **2** being forward and there being a cartridge **6** in the firing chamber **29**. When cartridge **6** is fired, the bolt **2** is momentarily held closed by inertia thus permitting the cartridge to move from firing chamber **29** and through bore **28** in barrel **4** to the area **26** just beyond the first gas ports **15**. Gas under pressure from the firing enters area **26** and pushes forward on first baffle **17**, thus holding the bolt assembly **2** snugly closed in an obturating position.

As the cartridge **6** passes the second gas ports **16**, gas under pressure enters area **27** and causes floating piston **20** to move rearwardly to compress second coil spring **25**.

By this time, the cartridge **6** has left the bore **28** and all gas pressures in areas **26** and **27** have begun to decrease therein. At this point the backward recoil of the cartridge shell of cartridge **6** in the firing chamber **29** combines its force with that of second coil spring **25** to accelerate the bolt assembly **2** rearwardly (see FIG. 2).

All the gas pressures in the barrel bore **4** and areas **26** and **27** have now dropped to zero and piston **22** has moved to its position as shown in FIG. 1 under influence of spring **25**.

As is usual in firearms, bolt **9** has ejected the spent cartridge shell of cartridge **6** in firing chamber by its rearward travel and picks up another cartridge **6** from clip **5** as it moves forward from its retracted position under bias of spring **24** and, bolt **9** rams another cartridge **6** from clip **5** into firing chamber **29**.

The cycle is now repeated, and, as long as there are cartridges in clip **5**, the gun continues its fire, since it is fully automatic. The cycle repeats itself when the bolt **9** is closed on a round.

The firearm of the invention is adaptable to fire rounds of different pressure ranges by adjusting the size of springs **24** and **25**. However, the amount of gas pressure applied to the back side of the bolt will automatically adjust in proportions to compensate for variations in rounds. Low pressure rounds apply a lower pressure to the rear of the bolt than do high pressure rounds.

Variations and modifications may be effected without departing from the scope of the novel concept of the present invention as set forth in the appended claims.

What is claimed is:

1. In combination with a firearm including a casing, a barrel having a longitudinal bore secured axially in said casing, there being a firing chamber in the breech end of said barrel and a means for feeding cartridges to said firing chamber; a bolt mechanism slidably mounted in said casing, said bolt mechanism having first and second areas therein, there being a series of ports in said barrel and being in communication with each said area whereby when a cartridge is fired from said firing chamber, gas pressure generated thereby will enter said first area to hold said bolt mechanism in a position to obturate said breech end of said barrel and then into said second area to move said breech mechanism to a recycling position.

2. In combination with a firearm including a tubular casing, a barrel having a longitudinal bore secured axially in said casing, there being a firing chamber in the breech end of said barrel, and means for feeding cartridges to said firing chamber; a spring biased, cylindrical bolt mechanism for the alternate ramming, locking and ejection of a cartridge in said firearm and comprising a tubular sleeve slidably mounted in said casing and disposed in coaxial and slidable arrangement with relation to said barrel, a baffle secured in said sleeve whereby said sleeve is divided into first and second areas, there being a series of ports in said barrel and communicating with each area whereby when a cartridge is fired from said firing chamber, the gas pressure generated therefrom will first enter said first area to hold said bolt mechanism in an obturating position in said casing and secondly enter into said second area to move said bolt mechanism to a reloading position.

3. In combination with a firearm including a tubular casing, a barrel having a longitudinal bore therein and

secured axially therein, there being a firing chamber in the breech end thereof, and a means for feeding cartridges to said firing chamber; a bolt mechanism for said firearm and comprising a tubular sleeve slidable in said casing and arranged in coaxial relation with said barrel, a baffle secured in said sleeve whereby said sleeve is divided into first and second areas, there being a series of ports in said barrel and being in communication with each said area, a first coil spring encircling said barrel in said first area, a floating piston slidable in said sleeve in said area and a second coil spring encircling said barrel between said baffle and said piston whereby when a cartridge is fired from said firing chamber, the gas pressure generated thereby will first enter said first area to hold said bolt mechanism in an obturating position and then enter said second area to cause said floating piston to compress said second coil spring and retract said bolt mechanism to a recycling position, said bolt mechanism being returned to said obturating position by said first coil spring upon cessation of gas pressure in said barrel and said first and second areas.

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