April 16, 1957 V. A. BROWNING 2,788,714

RECOIL MECHANISM FOR FIREARMS

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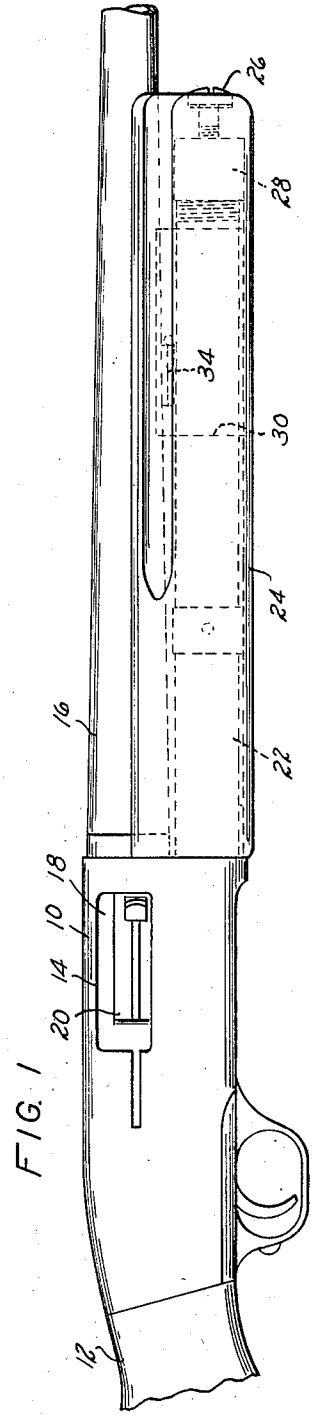


FIG. 1

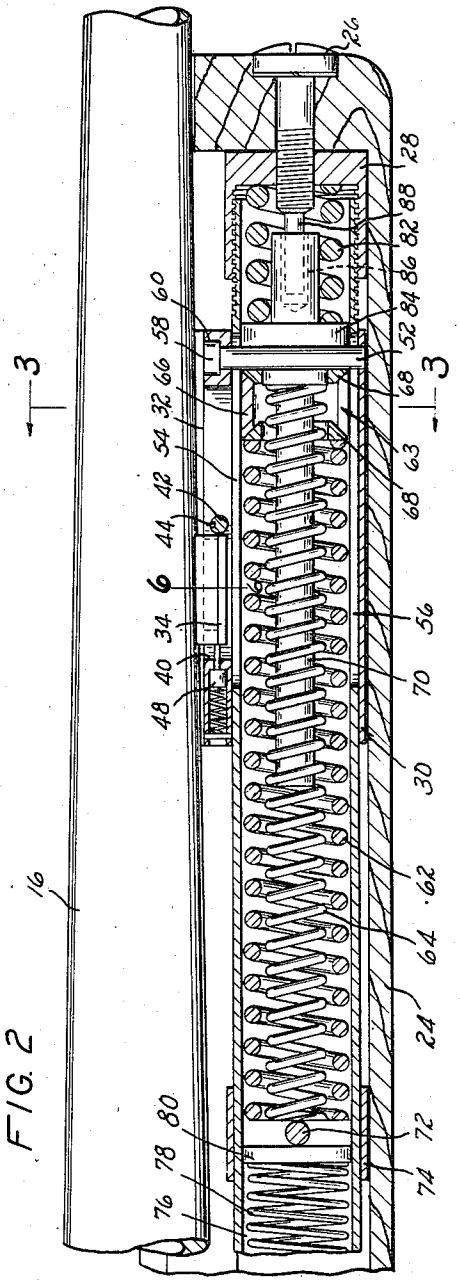


FIG. 2

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FIG. 3

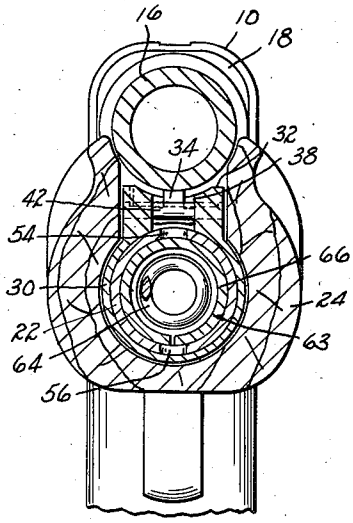


FIG. 4

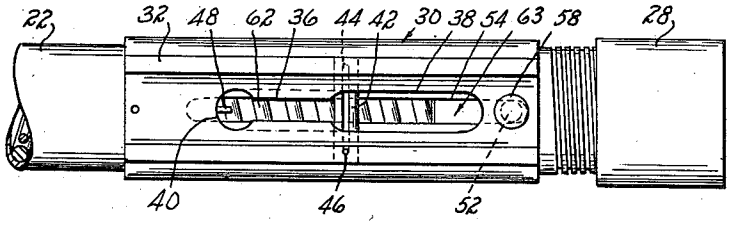


FIG. 5

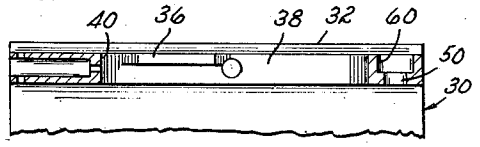
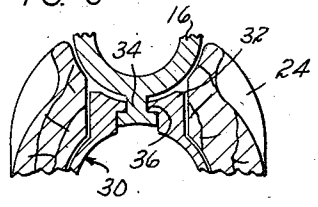


FIG. 6



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United States Patent Office 2,788,714
Patented Apr. 16, 1957

2,788,714

RECOIL MECHANISM FOR FIREARMS

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Application July 18, 1955, Serial No. 522,679

2 Claims. (Cl. 89—177)

The present invention relates in general to firearms and more especially to firearms having a barrel and breech block adapted to recoil, upon firing the gun, and means for restoring the barrel and breech block to firing position.

An object of the invention is to provide a compact rugged recoil-absorbing device, whereby the effects of recoil on the shooter are lessened, utilizing as much as possible parts presently being manufactured, and allowing by the compactness of design the addition of a limited magazine capacity to certain self-loading firearms.

A further object of this invention is to combine with a recoil-absorbing device on a firearm either with or without a magazine a simplified inexpensive take-down arrangement whereby the barrel and frame are readily separable, within such a minimum of space as would allow the maximum freedom in the design of a functional and aesthetically satisfying forearm.

A still further object of the invention is to provide with a firearm a recoil-absorbing device and take-down latch which require a minimum of hand fitting or close manufacturing tolerance for the successiful manufacture and inexpensive assembly or repair of the firearm.

Still another object is to provide a recoil-absorbing device wherein the operating parts are sufficiently protected from abrasion or corrosion and at the same time providing such a mechanism which is of light weight and compact size.

Another object of the invention is to provide a recoil-absorbing device having an improved action in counter-recoil whereby ejection is improved and the time of counter-recoil is lessened.

Other objects will be in part obvious, and in part pointed out more in detail hereinafter.

The invention accordingly consists in the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereafter set forth and the scope of the application of which will be indicated in the appended claims.

In the drawings:

Fig. 1 is a fragmentary side view of a firearm embodying the present invention;

Fig. 2 is an enlarged fragmentary side view with the recoil mechanism in cross section;

Fig. 3 is a cross-sectional view taken along the line 3—3 of Fig. 2;

Fig. 4 is a fragmentary top view of the recoil mechanism with the barrel removed;

Fig. 5 is a fragmentary view, in longitudinal section, of the upper portion of the sleeve which constitutes the barrel guide; and

Fig. 6 is a fragmentary view taken along line 6—6 of Fig. 2.

Referring to the drawings, the firearm in which the present invention is embodied comprises a receiver **10** having a stock **12** fixed to the rear end thereof and provided with the usual ejection opening **14**. Slidably mounted in the front of the receiver **10** is a barrel **16** having the usual barrel extension **18** which is slidably received in the receiver.

It will be understood that when the firearm is fired, the barrel and barrel extension recoil rearwardly relative to the receiver **10** to operate the breech block, which is indicated at **20**, as explained more in detail in my Patent No. 2,565,196, granted March 22, 1949. In the firearm illustrated the barrel extension is provided with an ejector (not shown) for ejecting the spent cartridge out of the ejection opening **14**.

In accordance with the invention, there is secured to the forward end of the receiver, such as by brazing, a tube **22** which serves the combined function of a housing for the recoil mechanism, a support for the barrel, and a limited magazine as described more fully hereinafter. Mounted on the tube **22** and concealing the same is a forearm **24**, preferably formed of wood, which is generally V-shaped in section which is slidably mounted on the tube **22**. The forearm **24** is secured to the tube **22** by means of a holding screw **26** which is threadably received in a closure cap **28** which is threaded on the forward end of the tube **22**. Preferably, the forward end of the forearm **24** is countersunk, as indicated, to conceal the head of the holding screw **26**.

Slidably mounted on the exterior of the tube **22** is a barrel guide **30** generally in the form of a sleeve and provided with a raised platform **32** on which the barrel is adapted to be releasably mounted. The mounting of the barrel **16** on the platform **32** is accomplished by means of depending T-shaped lug **34**. It will be observed that, recessed in the top of the platform **32**, is an extended well **36** with an undercut groove **38** on its side walls and with the groove cut away in the forward half along the walls in such a manner as to detachably accommodate the T-shaped lug **34** depending from the under side of the barrel. The well **36** has a rear wall **40** against which the rear edge of the lug **34** is adapted to seat, and the lug is held in seated position by a transverse pin **42**. The pin **42** is slotted as indicated at **44** to accommodate a small retainer pin **46** which permits the pin **42** to be slid to releasing position without permitting the pin to be entirely removed and thus possibly lost. A spring-pressed plunger **48** mounted in the rear wall of the well **36** engages the barrel lug and urges it forwardly against the transverse pin **42**, thus eliminating any looseness which might result from manufacturing tolerances. As a result of this arrangement, it will be seen that the barrel may be removed from the barrel guide **30**, after the forearm has been removed as previously described, merely by displacing the transverse pin **42** with a suitable tool, and then sliding the barrel forwardly relative to the barrel guide **30**, which brings the T-shaped lug **34** to the enlarged portion of the well **36**, whereupon the barrel may be removed from the barrel guide and the barrel may be slid forwardly to remove the same from the receiver.

The forward end of the barrel guide **30** is apertured as shown at **50** to receive a barrel guide pin **52** which intersects vertically the axis of the barrel guide and also the recoil tube, the pin **52** being freely received within two longitudinal slots **54**, **56** opposing each other horizontally along the axis of the recoil tube. The barrel guide pin **52** has a head **58** concentric with the pin, which rests in a counterbore **60**, thus limiting the pin in its downward movement. Thus the action of the barrel guide pin **52** in the recoil tube slots **54**, **56** is such that it allows the barrel guide **30** a longitudinal reciprocating movement and keeps the barrel guide from turning from its erect position with the platform **32** uppermost.

Disposed within the tube **22** and thereby protected from weather and foreign matter is a main recoil spring **62** having a diameter just slightly smaller than the tube **22**, and also an auxiliary recoil spring **64** of smaller di-

ameter than the main recoil spring 62 and disposed coaxially therein. Cooperating with the forward end of the main recoil spring 62 is a friction device 63 comprising a longitudinally split friction ring 66 which is bounded by two conical rings 68 which seat in complementary conical surfaces on opposite ends of the friction ring 66. The forward conical ring 68 bears against the barrel guide pin 52, whereby the recoil energy of the barrel is transmitted through the friction device and to the main recoil spring 62. This arrangement is such that any compressive force exerted longitudinally against the faces of the conical rings tends to expand the friction ring against the inside of the recoil tube 22 and thus assists in absorbing recoil energy.

The inner or auxiliary recoil spring 64 is provided with a headed spring guide 70 which extends through the friction device and abuts against the barrel guide pin 52. Thus the recoil energy of the barrel also is transmitted to the auxiliary recoil spring 64, this being accomplished directly without the intervention of a friction device.

The rearward ends of the main recoil spring 62 and auxiliary recoil spring 64 abut against a transverse pin 72 intersecting horizontally the axis of the tube 22 and reinforced by a ring 74 closely fitted and rigidly and permanently fixed to the tube 22. Because of the compactness of the dual recoil spring arrangement previously described, it is possible to locate the pin 72 sufficiently forwardly in the tube 22 so as to provide a magazine section to the rear thereof denoted at 76 having a capacity of one cartridge. The magazine is provided with a magazine spring 78 and magazine spring retaining disc 80. It will be understood that a magazine follower (not shown) in the rearward end of spring 78 will feed the contents of the magazine to the loading mechanism of the firearm during the cycle of firing in the regular fashion shown in the prior art.

Forwardly of the barrel guide pin 52 and also protectively housed within the tube 22 is a relatively strong buffer spring 82 which abuts at the forward end against the closure cap 28 and which is provided at its rearward end with a spring guide 84, which in turn bears against the barrel guide pin 52. Preferably, the rearmost coil of the buffer spring 82 is cinched on the spring guide 84 to prevent separation of these two members. As best shown in Fig. 2, the spring guide 84 is recessed at 86 and the holding screw 26 is necked down as indicated at 88 so as to provide ample clearance during counter-recoil.

It is an advantage of the invention that the correct longitudinal adjustment of the barrel with relation to the receiver and related breeching parts is a function of and may be easily adjusted by adjustment of the cap 28. A simple twist of the cap one way or the other transfers a longitudinal movement forward or back through the buffer spring and its spring guide to the barrel guide pin, compressing or decompressing the recoil springs, and thus to the barrel guide which holds the barrel. The relative strength of the buffer spring is such that the pressure of the recoil spring on it flexes this powerful spring a negligible amount, thereby making the buffer spring a suitable and reliable stop for the barrel guide pin.

Upon firing the gun, the parts being in their normal firing position as shown in Fig. 2, the barrel recoils within its recess in the receiver and through its connection with the barrel guide 30 moves this member rearwardly along the recoil tube 22. The barrel guide pin 52 riding vertically in the recoil tube slots, 54, 56 progresses rearwardly with the travel of the barrel against the friction of the friction ring 66 and the resilience of the recoil springs. The action of the conical rings 68 expands the friction ring against the inner sides of the tube. The barrel guide, being a close fit about the tube and reciprocating in unison with the friction piece, supports the tube along the section of stress throughout the firing cycle.

The combined action of the friction ring 66, the recoil spring 62 and the auxiliary barrel return spring 64 is such that the recoil movement of the barrel is entirely stopped on this resilient mechanism without any violent contact between barrel and receiver.

The barrel, at the conclusion of the recoil stroke, is urged forward by the stored energy in the recoil springs and begins its counter-recoil stroke. The auxiliary barrel return spring 64 acts directly on the barrel guide pin 52 and thus directly on the mass of barrel and barrel guide and thereby diminishes the compressive force on the friction cones and ring. Thus the friction mechanism is less active than would ordinarily be the case if the barrel mass were being driven forwardly entirely by the recoil spring. The barrel in its counter-recoil stroke is in this way intentionally speeded up so that the ejector, fixed to and traveling with the barrel extension, strikes the just fired shell a lively blow, driving it more forcibly and regularly from the ejection opening.

Due to the mass and velocity of the counter-recoiling parts, these same parts tend to continue their journey when they again reach firing position. The buffer spring 82 is placed such that the barrel guide pin strikes it along its length and the forward motion is resiliently stopped.

When it is desired to take the gun down, that is, separate the barrel from the action frame, the sequence of operations is as follows: With a suitable flat object, such as a coin, unscrew the screw 26 and remove it from the front of the forearm. The forearm may then be removed by slipping it forwardly along the length of recoil tube until its rear clears the recoil tube cap 28. Using the turned section 88 of the forearm screw as a drift pin, force the barrel assembly pin laterally of the axis of the barrel. The length of the turned section of the forearm screw is such that it is just possible to move the assembly pin far enough laterally to clear the front of the barrel lug. Upon removing the assembly pin, it is then possible to slide the barrel lug forward into the enlarged section of the barrel guide well. With this same forward movement of the barrel the union between barrel extension and receiver is cleared and the barrel may be lifted clear of the frame.

In storing the firearm in a take-down position, the forearm would normally be replaced over the recoil tube without the barrel in place and the forearm screw reattached. This would prevent loss and diminish the hazard of the damage to these parts.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

I claim:

1. In a firearm of the type having a receiver and a barrel mounted for reciprocation with respect to said receiver, a recoil mechanism comprising a tube extending forwardly from the receiver beneath the barrel and having a longitudinal slot, a barrel guide in the form of a sleeve slidably mounted on the exterior of the tube and having means extending into the tube through said slot, a first recoil spring within the tube, friction means between said recoil spring and the extending means of the sleeve, a second recoil spring in the tube engaging the extending means of the barrel guide, and a buffer spring forwardly of said extending means supported by the tube.

2. In a firearm of the type having a receiver and a barrel mounted for reciprocation with respect to said receiver, a recoil mechanism comprising a tube extending forwardly from the receiver beneath the barrel and hav-

ing a longitudinal slot, a barrel guide in the form of a sleeve slidably mounted on the exterior of the tube and having means extending into the tube through said slot, a first recoil spring within the tube, friction means between said recoil spring and the extending means of the sleeve, a second recoil spring in the tube engaging the extending means of the barrel guide, a resilient buffer in the tube forwardly of said extending means, and an adjustable seat for the buffer on the forward end of the tube for varying the firing position of the barrel guide.

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