Aug. 12, 1947. C. C. LOOMIS 2,425,434

FIRING PIN SUPPORTING MEANS FOR FIREARMS

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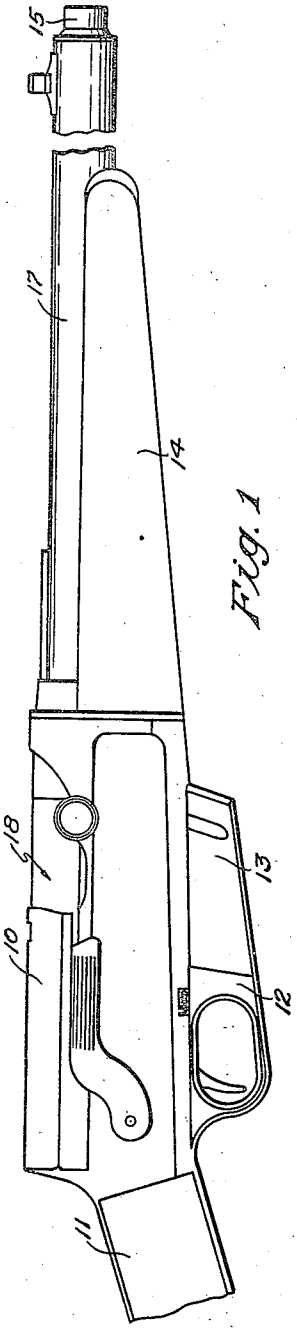


Fig. 1

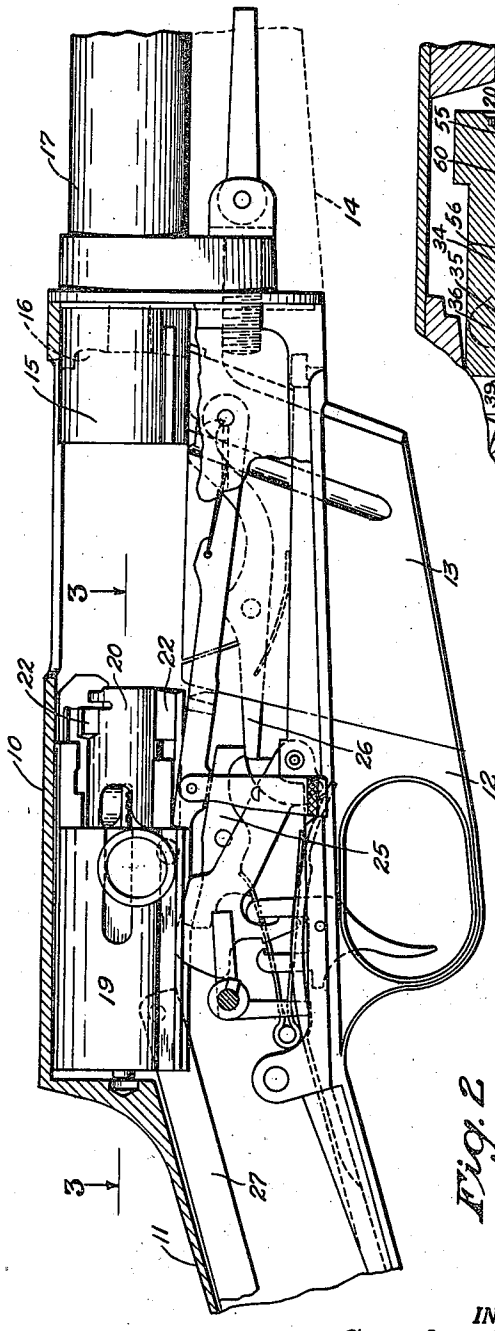


Fig. 2

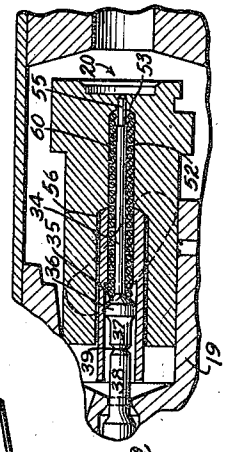


Fig. 2a

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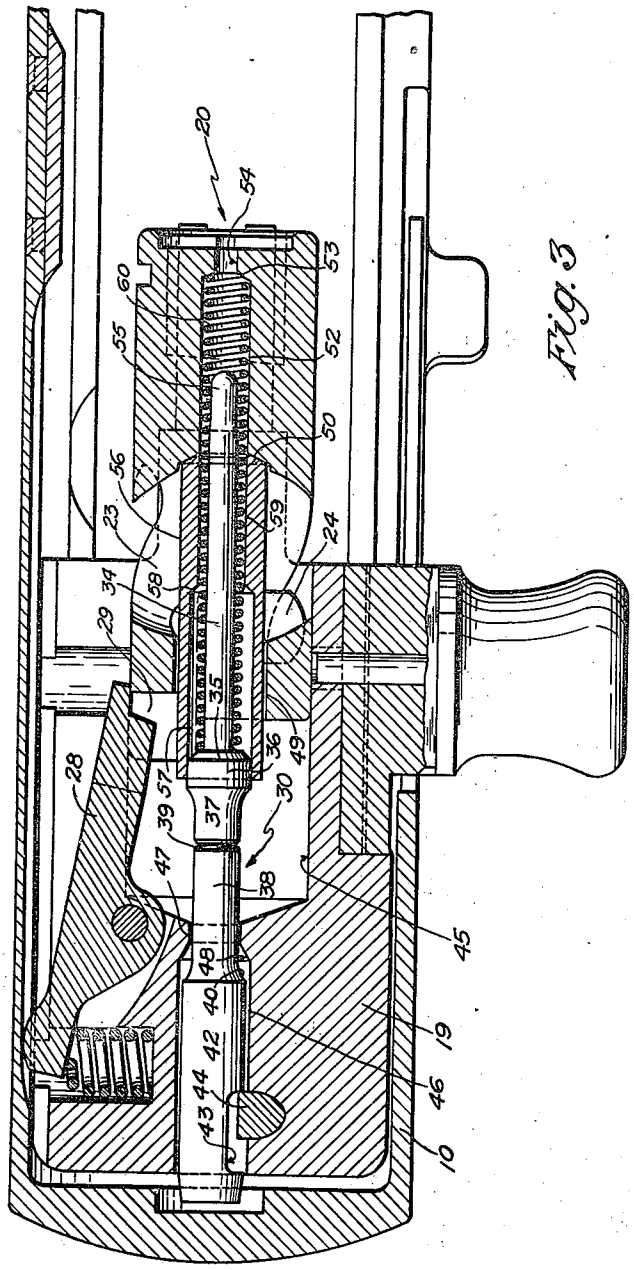


Fig. 3

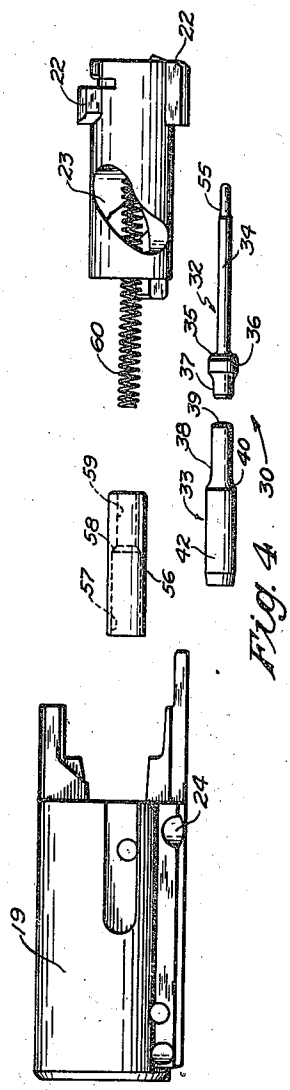


Fig. 4

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FIRING PIN SUPPORTING MEANS FOR FIREARMS

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3 Claims. (Cl. 89—132)

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The present invention relates, in general, to firing pin supporting means for firearms, and, in particular, to an improved firing pin for a recoil operated firearm, and, while it is applicable generally to guns of this class, the invention will be illustrated and described herein in connection with the gun mechanisms shown in the Browning patents, No. 659,786, October 16, 1900, No. 701,288, June 3, 1902, and No. 984,263, February 14, 1911.

An object of the invention is to provide a firing pin of improved construction for that class of breech closing mechanisms which embody members movable relative to each other. A further object is to provide an automatic firearm having a bolt and bolt carrier with an improved firing pin which is adapted to accommodate itself without binding to axial misalignment of the bolt and carrier. A further object is to provide a bolt and carrier breech closing mechanism with a two-part firing pin and improved means for supporting the firing pin in the bolt.

These and other objects, features and advantages of the invention will be described in greater detail in the following specification, wherein an exemplary embodiment of the invention is described with reference to the accompanying drawings, in which:

Fig. 1 is a side elevation of an automatic firearm particularly adapted to illustrate the present invention.

Fig. 2 is a side elevation partly in section of the firearm of Fig. 1 showing the action open.

Fig. 2a is a fragmentary plan view on line 3—3 of Fig. 2 with the action closed.

Fig. 3 is an enlarged fragmentary plan view on line 3—3 of Fig. 2.

Fig. 4 is an exploded side elevation of the bolt, bolt carrier, improved firing pin and firing pin supporting means of this invention.

The present invention comprises an improved feature of the firearms shown and described in the above-identified patents, and hence the description of the present invention will not include a detailed account of the full operation of the gun mechanism but will refer to only those features of the gun mechanism which may be necessary to a clear understanding of the invention. The firearm is of the recoiling barrel type which, as shown in Figs. 1 and 2, comprises a receiver 10 having a stock 11 secured at its rear end, a trigger guard 12 including fire control mechanism and a box magazine 13 mounted in a suitable aperture in the underside of the receiver and a fore-end or forward stock 14 on the front end of the receiver.

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The recoiling barrel 15 having a breech 16 is carried in a barrel jacket 17 which is secured to the front end of the receiver, the jacket being supported on its underside by the fore-stock 14. Slidably supported in suitable grooves in the walls of the receiver 10 is a breech closing mechanism, indicated generally at 18, comprising a reciprocable bolt carrier 19 and breech bolt 20, the carrier being cored axially, as shown in Fig. 3 and hereinafter described, to receive the rear end of the breech bolt.

The bolt is adapted to be locked to the barrel when the gun is fired, as indicated in Fig. 1, the means for locking the bolt and barrel together comprising projections or lugs 22 on the bolt and corresponding grooves (not shown) in the rear end of the barrel which are adapted to receive the bolt lugs 22 when the bolt is moved forward to close the breech. The lugs 22 are adapted to be locked in the grooves of the barrel by partial rotation of the breech bolt 20 which is effected by providing cam slots 23 in the bolt, preferably two in number and diametrically opposite each other, these slots being shaped substantially as shown in Figs. 3 and 4 to receive pins 24 which project radially into the bore of the bolt carrier 19 into corresponding slots 23 of the bolt. Thus, when the bolt 20 has been moved into breech closing position, movement of the carrier relative to the bolt rotates the bolt in the carrier thereby locking the bolt lugs 22 in the slots of the barrel.

After the gun has been fired, the recoil drives back the carrier 19, breech bolt 20 and barrel 15. At the limit of their rearward excursion, the carrier 19 is checked by a latch 25 while the barrel moves forwardly under the force of the compressed barrel spring (not shown), thereby drawing the breech bolt 20 out of the carrier 19. The relative movement of the breech bolt and carrier thereupon causes the breech bolt to rotate, the direction of rotation, in this instance, being the reverse of that which locked the breech bolt to the barrel, whereupon the breech bolt and barrel are unlocked, the breech bolt remaining in a forwardly displaced position with respect to the carrier 19.

As the barrel is stripped off of the breech bolt 20 and moved forwardly into its original or normal position, it is adapted to engage and depress a pivoted lever 26 which controls the aforesaid latch 25 causing it to release the carrier 19. The latter is then moved forward by the compressed

action spring (not shown), the force of which is transmitted to the carrier 19 by the action strut 27. Continued forward movement of the carrier thereafter moves the breech bolt forwardly due to engagement of a spring loaded lock 28 of the carrier in a notch 29 in the rear end of the bolt, the lock 28 being adapted to prevent rotation of the breech bolt in the carrier until the carrier and breech bolt are again in breech closing position at which time the bolt lock 28 is withdrawn from the notch 29 of the bolt.

As indicated in the above-identified patents, formerly both the bolt and carrier were provided with axial apertures, the aperture of the carrier being counterbored at its forward end to receive the rear end of the breech bolt and being of reduced diameter at its rear end to slidably support a relatively short rear end portion of a firing pin which was adapted to extend from the rear end of the carrier through the axial aperture thereof into the axial aperture of the breech bolt. The aperture of the latter was counterbored, the counterbore extending from the rear thereof to a point adjacent its forward end at which the aperture was reduced in diameter to slidably support a relatively short front end portion of the firing pin.

In accordance with this construction, the firing pin was supported at substantially its rear and front ends only, the relatively long body portion of the pin being unsupported.

It has been found that this construction causes frequent breakage of the firing pins, a circumstance which arises due to the fact that the supporting elements of the rear and front ends of the firing pin, namely the carrier and breech bolt respectively move relative to each other as explained above, and, consequently, are designed with considerable working clearance which allows slight deviations of the carrier from axial alignment with the breech bolt, thus introducing bending forces in the unsupported length of the firing pin. Repetition of this stress causes metal fatigue which soon results in the deterioration and failure of the firing pin. The present invention provides an improved firing pin which is not susceptible to breakage due to these causes.

Referring to Figs. 3 and 4, the improved firing pin of this invention is indicated generally at 30 and comprises two parts hereinafter identified as a fore-pin 32 and an aft-pin 33.

The fore-pin 32 comprises a shank portion 34 which graduates at its rear end into a bevelled shoulder 35 of an enlarged rear portion or hub 36 which is provided with a rearwardly extending bumper portion 37 of slightly reduced diameter.

The aft-pin 33 is somewhat shorter than the fore-pin 32 and of relatively heavier construction comprising a short shank portion 38 rounded at its forward end to provide a bumper or abutting surface 39. The rear end of the shank 38 graduates into a bevelled shoulder 40 of an enlarged hub portion 42, the rear end of which is slightly tapered as shown in Fig. 4. The hub portion 42 is provided with the usual type of slot 43, see Fig. 3, to receive a stop pin 44 mounted in the carrier which is adapted to engage in the slot 43 to confine the aft-pin within an axial aperture of the carrier, but to enable the aft-pin to have limited forward and backward sliding movement therein. The axial aperture of the bolt carrier 19 comprises a counterbore 45 in the forward end of the carrier of sufficient diameter to slidingly receive the rear end of the bolt 20; and a bearing 46

which is slightly greater in diameter than the diameter of the hub 42 of the aft-pin so that the hub 42 makes a free sliding fit therein. The bearing 46 is provided with a restriction 47 at its forward end to support the shank 38 of the aft-pin, the bevelled shoulder 40 of which is adapted to engage a bevelled shoulder 48 of the restriction 47. The shoulder 48 constitutes a stop to limit the forward movement of the aft-pin.

The fore-pin 32 is adapted to be slidably mounted in an axial aperture in the bolt 20. This aperture comprises a counterbore or bearing 49 in the rear of the bolt provided with a bevelled shoulder 50 adjacent the forward end thereof; and an axially aligned bore 52 of reduced diameter provided in turn with a shoulder 53 and an aperture 54, the latter being adapted to slidably support the reduced forward extremity 55 of the fore-pin.

Floatingly supported within the bearing 49 of the breech bolt is a cylindrical sleeve 56 having a slight bevel on its forward end adapted to seat on the bevelled shoulder 50 of the counterbore 49. The sleeve 56 is drilled or bored axially to provide a counterbore or bearing 57 having a bevelled shoulder 58 at its forward end which constitutes a stop for the fore-pin; and an axially aligned aperture 59 substantially equal in diameter to the diameter of the bore 52 of the breech bolt.

The fore-pin 32 is adapted to be slidably supported in the floating sleeve 56 of the breech bolt, the hub 36 of the fore-pin making a nice sliding fit in the sleeve bearing 57. The forward movement of the fore-pin in the sleeve is limited by engagement of the bevelled shoulder 35 of the hub 36 with the bevelled shoulder 58 of the sleeve. The forward end of the fore-pin is supported within a suitable firing pin spring 60 which makes a nice fit in the bore 52 of the breech bolt and extends rearwardly into and is supported by the similarly dimensioned bore 59 of the sleeve 56. The forward end of the coil spring 60 is adapted to seat on the shoulder 53 of the breech bolt bore 52 while the rear end of the coil spring engages the bevelled shoulder 35 of the fore-pin hub. The coil spring 60 is thus adapted to hold the forward extremity 55 of the fore-pin retracted within the breech bolt when the action is open as shown in Fig. 3, the fore-pin being held from sliding rearwardly out of its supporting sleeve 56 by engagement of the bumper 37 of the fore-pin with the abutting surface 39 of the aft-pin 33 which, as described above, is positively held against rearward displacement in the carrier by engagement of the aforesaid carrier stop pin 44 in the slot 43 of the aft-pin.

Following release of the carrier from its rearmost position, see Fig. 3, by disengagement of the latch 25, the carrier and bolt move forwardly from their open position into breech closing position, as shown in Fig. 1, at which time the bolt lock 28 is moved out of engagement with the bolt thereby freeing the latter so that it may rotate when the carrier moves forwardly relative to the bolt and be locked to the barrel. As the carrier moves forwardly relative to the bolt, the aft-pin 33 is advanced pushing the fore-pin 32 forwardly in the breech bolt, compressing the firing pin spring 60 and advancing the front end 55 of the fore-pin into the aperture 54 of the breech bolt, see Fig. 2a, until it is substantially flush with the face thereof.

When the trigger is pulled and the hammer released, the two-part firing pin is engaged and

driven forwardly substantially as a unit into sharp engagement with the cartridge primer, the blow of the hammer being sufficiently heavy to overcome the resistance of the firing pin spring **60**. Following the discharge of the cartridge and recoil of the barrel, bolt carrier and breech bolt to their rearmost position in the receiver, the carrier is locked in its rearmost position while the barrel and breech bolt move forwardly relative thereto as described above, whereupon the compressed firing pin spring **60** is enabled to force the fore-pin rearwardly in its sleeve, thus retracting the foremost extremity **55** of the firing pin into the breech bolt. The slight separation of the breech bolt and breech bolt carrier caused by the relative movement thereof is not great enough to permit the hub **36** of the fore-pin to slide out of its bearing **57**. Moreover, it will be evident that, inasmuch as the ends of the coil spring **60** are engaged with the shoulder **53** of the breech bolt and the shoulder **35** of the fore-pin respectively, the breech bolt is constantly urged forwardly with respect to the carrier, although locked thereto by the cam pins **24**, thus preventing the breech bolt from accidentally receding within the carrier and becoming crossed and locked in this position by the bolt lock **28**.

Thus, it will be clear that the improved two-part firing pin is supported throughout substantially its entire length, the sleeve **56** and enclosed spring **60** comprising floating supporting means for the fore-pin and embodying a stop therefor; the aft-pin being slidably supported in the carrier which also embodies a stop for the aft-pin. In accordance with this construction, the pin is enabled to conform to any slight axial misalignment of the carrier and bolt, and thereby to successfully avoid bending stresses and breakage.

What is claimed is:

1. In a firearm of the character described, a receiver; a barrel having a breech; breech closing means comprising a bolt having an aperture and a bolt carrier; a two-part firing pin in said bolt and carrier comprising a fore-pin and an aft-pin, said fore-pin having a hub portion and a shoulder; and means to support said firing pin in said breech closing means comprising a sleeve member mounted in said bolt aperture and arranged to have limited transverse movement therein, said sleeve having a counterbore to slidably support the hub portion only of said fore-pin, and a coil spring in said bolt aperture arranged to extend into said sleeve to align the forward end thereof with said bolt aperture and to abut the shoulder of said fore-pin, said spring having a bore to support the forward end of said fore-pin.

2. In a firearm breech closing means comprising a breech bolt having an aperture, and a carrier for said breech bolt; a two part firing pin comprising a fore pin and an aft pin; and means for supporting said firing pin in said breech closing means comprising a sleeve member received in said bolt aperture in surrounding relation to said fore pin and arranged for limited axial and transverse movement relative to said bolt and to said fore pin to support the fore pin substantially in axial alignment with said aft pin without capacity for transmitting bending stresses between said pins.

3. In a firearm breech closing means comprising a breech bolt having an aperture therein, and a carrier for said breech bolt; a two part firing pin comprising a fore pin and an aft pin, said aft pin being slidably mounted in said bolt carrier; a spring mounted in said bolt in engagement with the fore pin and arranged to urge said fore pin in the direction of the aft pin; and means for guiding said fore pin in said aperture comprising a sleeve member received in said aperture in surrounding relation to said fore pin and said spring and arranged for limited axial and transverse movement relative to said bolt and to said fore pin to support the fore pin substantially in axial alignment with said aft pin without capacity for transmitting bending stresses between said pins.

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