March 22, 1966 D. I. DWYER, SR 3,241,449

BARREL BIASING MEANS FOR AUTOMATIC FIREARM

Filed July 23, 1964 2 Sheets-Sheet 1

FIG. 1

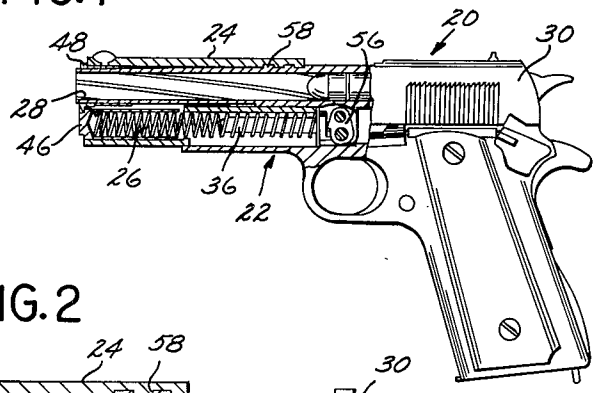


FIG. 2

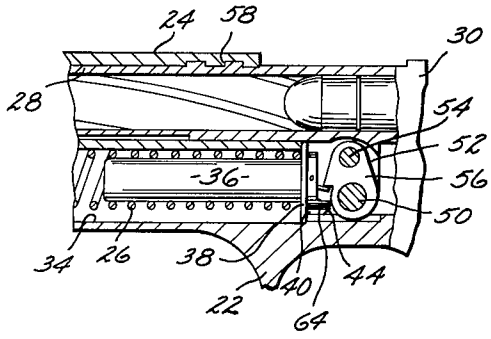


FIG. 4

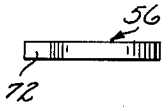


FIG. 3

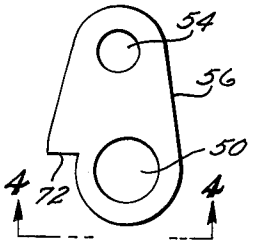
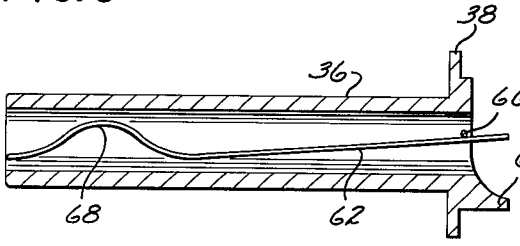


FIG. 5



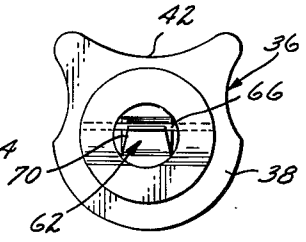


FIG. 6

FIG. 7



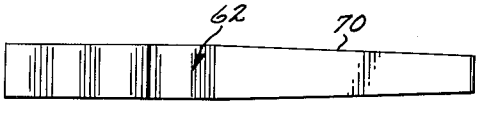


FIG. 8

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BARREL BIASING MEANS FOR AUTOMATIC FIREARM

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FIG. 9

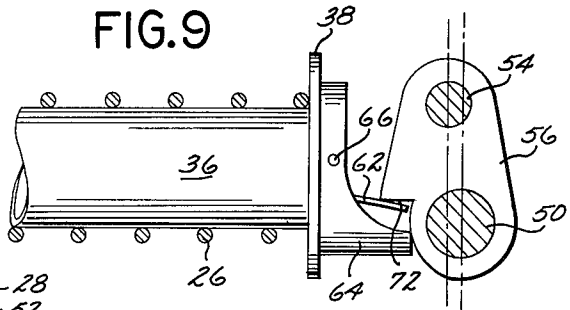


FIG. 13

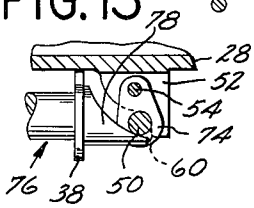


FIG. 10

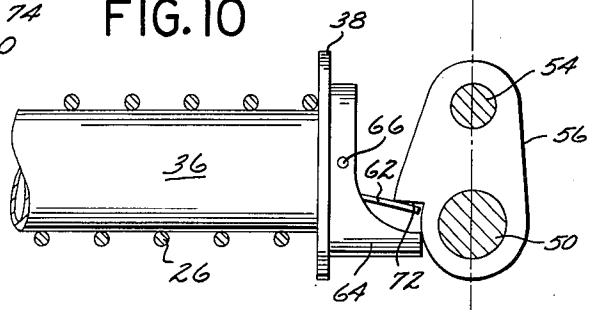


FIG. 17

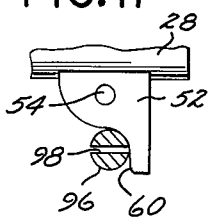


FIG. 14

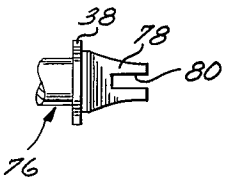
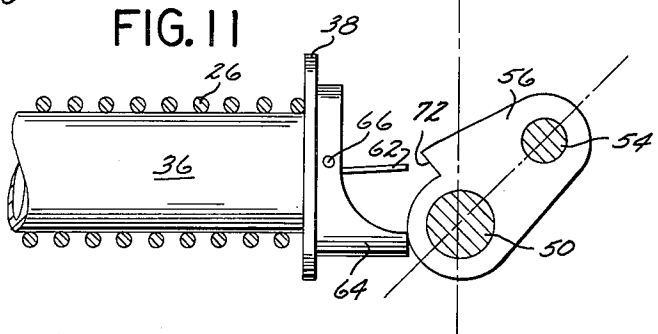


FIG. 11



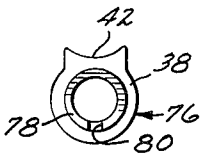


FIG. 15

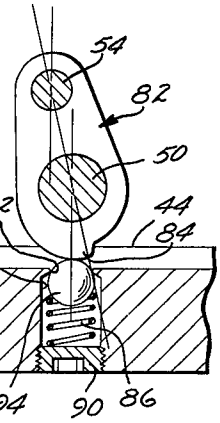
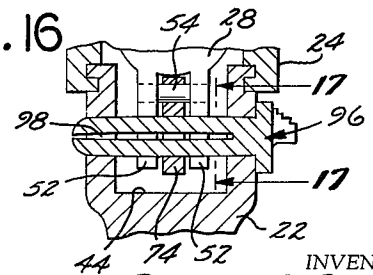


FIG. 12

FIG. 16



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3,241,449
BARREL BIASING MEANS FOR AUTOMATIC FIREARM

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Filed July 23, 1964, Ser. No. 384,956
10 Claims. (Cl. 89—196)

The present invention relates to a barrel biasing means for an automatic firearm, and more particularly to a biasing means operative to maintain the barrel of such a firearm in its firing axis until the bullet has left the barrel.

Automatic firearms necessarily are characterized by a number of loose-fitting parts in order to facilitate mass production and provide reliable automatic operation. This is particularly true in the case of military weapons such as the standard .45 caliber automatic pistol, such as is described in War Department Technical Manual TM9–1295 under the designation M1911. This weapon is recoil-operated, magazine-fed, and self-loading. The gas generated from a cartridge fired in the pistol is utilized to extract and eject the empty cartridge case, cock the hammer, and force the slide to its rearmost position, thereby compressing a recoil spring. The action of the recoil spring forces the slide forward to feed a live cartridge from the magazine into the chamber for another firing operation. It is in connection with maintenance of the barrel in its firing axis upon initial recoil of the barrel and slide that the present invention is concerned.

More particularly, the slide and barrel in the standard .45 caliber M1911 pistol are interlocked in their forward firing positions by cooperating ribs and grooves provided thereon, and the barrel is mounted to the slide for tilting at the rearward portion of the slide to unlock the barrel from the slide. When the slide is driven rearwardly upon detonation of a cartridge charge, the barrel is carried rearwardly with it by reason of the interlocking ribs and grooves. However, the barrel moves only a short distance, approximately one-eighth of an inch, at which point the rearward extremity of the barrel is pivoted or tilted downwardly relative to the slide to unlock the slide and permit it to continue rearwardly to pick up a fresh cartridge from the magazine.

In the M1911 military pistol the rearward extremity of the barrel is pivotally connected to the frame by a barrel link to effect the downward tilting of the barrel relative to the slide. The barrel link rotates about pins carried by the barrel and frame, and reliability of operation requires that generous clearances be provided at these pins. On the other hand, these clearances are undesirable in that during actual firing the barrel can deviate from its true firing axis by the amount of such clearances. Since these deliberate clearances, as well as manufacturing tolerances and deflections of the pistol components under load, are cumulative, the rearward extremity of the barrel is often out of alignment with its true firing axis two or three thousandths of an inch or more when it is in its firing position. Moreover, immediately upon initiation of the barrel recoil movement with the slide, the rearward extremity of the barrel tends to be prematurely pushed downwardly even farther out of its firing axis by the recoil forces. That is, the barrel is undesirably driven out of its firing axis prior to the time the barrel link positively tilts it, and hence prior to the time the bullet has left the barrel.

Accordingly, it is an object of the present invention to provide a biasing means to urge the rearward portion of the barrel upwardly against the slide, including the period of initial recoil of the barrel and slide, whereby the barrel is maintained in its true firing axis until it is positively tilted out of its interlocked relation with the slide. In this regard, although the present invention is particularly

adapted for use in connection with the standard military .45 caliber pistol in which the slide and barrel are connected by a barrel link, it is to be understood that the biasing means of the present invention has broader utility in substantially eliminating or taking up ordinary manufacturing tolerances and undesirable clearances resulting from wear and the like occurring in pistols in which the rearward portion of the barrel is guided by means other than a barrel link, such as by slots or camming openings provided on the barrel and cooperative with pins mounted to the frame.

Another object of the invention is to provide a biasing means of the aforementioned character which may be quickly and easily incorporated in a standard military type .45 caliber pistol by merely replacing the conventional barrel link and recoil spring guide thereof with a barrel link and spring guide modified in accordance with the invention.

A further object of the invention is the provision of a biasing means of the aforementioned character which, in another embodiment, is adapted for incorporation in the standard .45 caliber military type pistol by replacing only the recoil spring guide with a modified guide, or, in yet another embodiment, by replacing only the usual slide stop pin with a modified stop pin.

Another object of the invention is the provision of a biasing means of the aforementioned character which is relatively inexpensive to manufacture, easily installed in existing firearms, extremely reliable in operation, and adapted to significantly improve the accuracy of the firearms with which it is associated.

Other objects and features of the invention will become apparent from consideration of the following description taken in connection with the accompanying drawings, in which:

FIG. 1 is a side elevational view of a standard .45 caliber military pistol embodying a biasing means according to the present invention, the forward portion of the pistol being sectioned for clarity;

FIG. 2 is an enlarged detail view of the barrel link, recoil spring guide, and surrounding portions of the pistol which is illustrated in FIG. 1;

FIG. 3 is an enlarged detail view of a modified barrel link according to the present invention;

FIG. 4 is a view taken along the line 4—4 of FIG. 3;

FIG. 5 is an enlarged longitudinal cross-sectional view of a modified recoil spring guide according to the present invention;

FIG. 6 is an enlarged end elevational view of the recoil spring guide of FIG. 5;

FIG. 7 is a side elevational view of the leaf spring forming a part of the recoil spring guide of FIG. 5, the leaf spring being illustrated in its relaxed state;

FIG. 8 is a plan view of the leaf spring of FIG. 7;

FIGS. 9 through 11 are enlarged detail views of the barrel link and recoil spring guide of FIG. 1, illustrating progressive changes in the positions of these components during travel from their firing positions to their recoil positions;

FIG. 12 is an enlarged side elevational view, partially in section, showing a differently modified barrel link and biasing means, which constitutes a second embodiment according to the present invention;

FIG. 13 is a partial view of another form of modified recoil spring guide, which constitutes a third embodiment of the present invention;

FIG. 14 is an end elevational view of the rearward extremity of the recoil spring guide of FIG. 13;

FIG. 15 is an end elevational view of the recoil spring guide of FIG. 14;

FIG. 16 is a transverse cross-section of a modified form

of slide stop pin constituting a fourth embodiment of the present invention; and

FIG. 17 is a view taken along the line 17—17 of FIG. 16.

Referring now to the drawings, and particularly to FIGS. 1 and 2 thereof, there is illustrated a standard .45 caliber military pistol 20 of the M1911 type, and incorporating the biasing means of the present invention. In order to better understand the operation of the present biasing means, a brief explanation will first be made of the components and operation of the pistol 20.

The pistol 20 comprises a receiver or frame 22 which includes longitudinally oriented ribs and grooves (not shown) which slidably cooperate with complemental ribs and grooves (not shown) of an elongated breech slide 24, and also comprises an elongated reaction or recoil spring 26 which biases the slide 24 toward its forward position, as illustrated in FIG. 1. The slide 24 mounts an elongated barrel 28 for tilting movement relative to the slide, and includes a rearward breech block portion 30 having a vertical front face (not shown) which is engaged with the rearward end of the barrel 28 when the slide 24 is in battery, that is, in its forward firing position.

The rearward portion of the recoil spring 26 is located within an upwardly open, longitudinally oriented spring recess 34 provided in the forward portion of the frame 22, as best illustrated in FIG. 2, and a recoil spring guide 36 is positioned within the recess 34 for mounting the rearward extremity of the spring 26. The guide 36 includes at its rearward extremity a peripheral flange 38 which abuts against a shoulder 40 defining the rearward end of the spring recess 34. Such abutment limits rearward movement of the spring guide 36 under the impetus of the spring 26 and serves as a reaction surface for the compressive force of the spring 26 against the frame 22. The upper portion of the peripheral spring guide flange 38 includes an arcuate saddle 42, as best illustrated in FIG. 6, which underlies and engages the undersurface of the adjacent barrel 28 to prevent upward movement of the spring guide 36 relative to the frame 22. In addition, the rearward extremity of the spring guide 36 includes a cylindrical portion which projects rearwardly of the peripheral flange 38 and seats at its lower periphery against an arcuate, complementally contoured wall which defines a recess 44 in the frame rearwardly of the shoulder 40 and terminating in a rearward wall (not shown).

The forward extremity of the barrel 28 is mounted to the forward extremity of the slide 24 for relative longitudinal slidable movement and for limited transverse movement to permit slight tilting of the rearward portion of the barrel relative to the slide. More particularly, an elongated recoil spring plug 46 receives the forward extremity of the recoil spring 26 within its hollow interior and transfers the bias of the spring 26 to the slide 24 by means of a cylindrical barrel bushing 48 suitably removably secured to the forward end of the slide 24 in encompassing relation relative to the forward end of the barrel 28. With this arrangement, the recoil spring 26 acts at all times to bias the slide 24 forwardly to its firing position.

Forward movement of the slide is limited by engagement of the barrel with a slide stop pin 50 which is pivotally disposed through aligned transverse openings in the frame, generous clearances being afforded to permit the stop pin 50 to be freely inserted and removed. The stop pin 50 extends through the recess 44 adjacent the rearward extremity of the recoil spring guide 36, and cooperates with barrel means which depend from the rearward extremity of the barrel 28 for guiding the movement of the barrel 28 as desired. In the standard .45 caliber pistol this barrel means is constituted by a pair of transversely spaced-apart barrel lugs 52 forming an integral part of the rearward portion of the barrel; a tansverse barrel link pin 54 press-fitted through suitable aligned openings provided in the lugs 52; and a barrel link 56, which is generally oval and includes openings at its upper and lower portions for pivotally receiving, respectively, the barrel link pin 54 and the slide stop pin 50.

The components described above are all standard with the military M1911 .45 caliber pistol except for the recoil spring guide 36 and the barrel link 56, which have been modified in certain respects which will hereinafter be described in detail.

In operation, the breech slide 24 and the barrel 28 are interlocked in their forward firing positions, as shown in FIG. 1, by transverse ribs and grooves formed, respectively, on the upper rear portion of the barrel and in the undersurface of the top wall of the hollow interior of the slide 24, as indicated at 58. In such firing positions of the slide and barrel, the slide is biased forwardly by the recoil spring 26, and the barrel 28 is constrained against forward movement by engagement with the slide stop pin 50 of the forward faces of a pair of depending camming surfaces 60 which are integral with the barrel lugs 52. The slide stop pin 50 thus constitutes the means by which the slide is constrained against forward movement beyond its normal firing position, it being particularly noted that the bias of the recoil spring 26 acting against the slide 24 always develops a pressure of the camming surfaces 60 against the slide stop pin 50 when the barrel and slide are in their firing positions.

Upon detonation of the cartridge charge, the breech slide 24 and the barrel 28 recoil together for approximately one-eighth of an inch, during which time the bullet theoretically leaves the barrel before the rearward portion of the barrel tilts or swings downwardly on the barrel link about the axis of the slide stop pin 50. However, as previously indicated, the cumulative tolerances and clearances between the barrel link and the slide stop and barrel link pins, and particularly the tolerances necessary to permit pivotal movement of the barrel link 56, are such that the rearward portion of the barrel is often prematurely tilted out of its firing axis under the action of the recoil forces. These tolerances are only in the order of a few thousandths of an inch, but sufficient to seriously affect the accuracy of the pistol 20.

At approximately the time of passage of the bullet out of the barrel 28, the rear portion of the barrel is pivoted downwardly away from the slide by the barrel link, unlocking the breech slide 24 from the barrel. Further rearward travel of the barrel is stopped by engagement between the rearward edges of the barrel lugs 52 and the rearward wall of the recess 44. However, the momentum of the breech slide 24 carries it rearwardly for extracting and ejecting the shell and cocking the firing mechanism, all as will be apparent to those skilled in the art.

During the rearward movement of the slide 24, the recoil spring 26 is compressed and tends to return the recoiling barrel and slide to their forward firing positions as soon as the rearward movement of the slide is arrested.

Upon forward movement of the slide, the barrel 28 remains in its rearward or recoil position until the vertical front face of the breech block portion 30 engages the rearward end of the barrel 28, which upwardly swings or tilts the rearward end of the barrel about the axis of the barrel link pin 54. The barrel is thereby moved into interlocking engagement with the slide, and the barrel and slide then move forwardly together until the camming surfaces 60 of the barrel lugs 52 engage the slide stop pin 50 and stop the barrel, thereby stopping the slide as well.

The foregoing discussion of the military M1911 .45 caliber pistol is exemplary of an automatic firearm in

which necessary operating clearances undesirably permit the barrel to move out of its true firing axis, particularly during initial recoil when relatively high recoil forces are imposed upon those components linking the barrel to the frame.

In accordance with the present invention, bias means are provided for operating upon the barrel means which depend from the rearward portion of the barrel and which cooperate with means on the frame for guiding the travel of the barrel. Such barrel means in the military M1911 .45 caliber pistol are constituted by the barrel lugs **52** and the barrel link **56**, and it is upon one or the other or both of these that the present bias means acts to urge the rearward portion of the barrel upwardly and against the slide.

The bias means of FIGS. 1–11 is installed in the pistol by removing the usual recoil spring guide carried by the frame in the spring recess **34** and replacing it with the guide **36**, which is identical to the standard recoil spring guide in every respect except as follows. The guide **36** is characterized by an elongated leaf spring **62** which is secured within the hollow interior or bore of the guide **36** and projects rearwardly therefrom into the frame recess **44**. The guide **36** also includes a rearwardly projecting lower portion **64** which extends into the frame recess **44** in substantially coextensive relation with the rearwardly projecting portion of the leaf spring **62**. In addition, the modified spring guide **36** includes a transverse pin **66** disposed through the guide **36** immediately rearwardly of the peripheral flange **38** for engagement with the upper surface of the leaf spring **62** to thereby limit upward movement or travel thereof.

The spring **62** is preferably made of a spring steel characterized by resilience and high strength, and includes a bend or bowed portion **68** having an amplitude greater than the internal diameter of the spring guide **36** whereby, when the leaf spring **62** is forcibly driven into the interior of the spring guide **36**, the spring is deformed from the relaxed state illustrated in FIG. 7 to the stressed state illustrated in FIG. 5. In this stressed condition the spring tends to rigidly grip the interior walls of the spring guide bore. In addition, the width of the spring is also made such that it bites into the metal of the guide during installation to prevent the spring from moving longitudinally or rotationally relative to the guide. The rearward portion of the spring is preferably rearwardly tapered in width, as at **70** in FIG. 8, to provide free deflection of the projecting portion of the spring in an arc having a more nearly common radius throughout the arc. That is, the arc of movement of the projecting spring portion upon deflection is thereby characterized by common radii having their center in substantial vertical alignment with the lower portion **64** of the spring guide **36**. With this arrangement, when the spring is deflected downwardly the projecting guide lower portion **64** tends to afford a firmer seat for the spring guide upon the lower wall of the frame recess **44** and prevent longitudinal tilting of the spring guide. A satisfactory spring **62** has been made of $\frac{1}{32}$ inch thick spring sheet stock which is $\frac{1}{4}$ inch wide and tapers rearwardly to $\frac{1}{8}$ inch. However, it will be apparent that the material, thickness, width, and configuration may be varied as desired so long as the spring is capable of providing the described biasing action.

One other component of the standard military pistol is also replaced. The usual barrel link is removed, and the link **56** is installed instead. The link **56** is similar to the usual barrel link in all respects except that the link **56** is characterized by a forwardly projecting camming knee or surface **72**, as best illustrated in FIGS. 3 and 9 through 11.

In FIG. 9 the positions of the leaf spring **62** and barrel link **56** are illustrated in their firing positions, in which the axis of the barrel link pin **54** is slightly forward of the axis of the slide stop pin **50**. In this position of the barrel link **56**, it is to be particularly noted that the camming surfaces **72** is urged downwardly against the spring **62** by reason of the biasing of the slide and barrel forwardly by the recoil spring **26**. The bias developed by reason of the downward deflection of the leaf spring **72** urges the barrel link **56** upwardly, taking up the clearances or "play" between the openings in the link **56** and the pins **54** and **50**, and particularly at the slide stop pin **50**. As will be apparent, the upward urging of the spring **62** against the barrel link **56** operates to urge the rearward portion of the barrel **28** into close engagement with the upper interior wall of the slide **24**. A satisfactory leaf spring **62** has been tested which is characterized by a bias force on full deflection of approximately 15 pounds, which is more than ample to take up the few thousandths of an inch in clearances which usually are present.

FIG. 10 illustrates the position of the spring **62** and barrel link **56** immediately subsequent firing of a cartridge and during initial recoil of the barrel and slide. It is to be noted that the leaf spring **62** remains deflected downwardly to a considerable extent for imposing a continuing bias upon the barrel **28** to urge it upwardly against the slide and maintain it in a straight line path until positive tilting thereof by the barrel link **56**.

FIG. 11 illustrates the spring **62** and link in their recoil positions, wherein the camming surface or knee **72** is out of engagement with the spring **62**. As will be apparent, when the slide subsequently moves forwardly into engagement with the barrel, the barrel is pivoted about the axis of the slide stop pin **50**, and the camming knee **72** again engages and deflects the leaf spring **62**. Thus, the interengagement between the barrel link **56** and the leaf spring **62** provides what might be termed a straight line motion of the barrel **28** during initial recoil, prior to positive downward tilting of the rearward portion of the barrel by the barrel link **56**. Accordingly, the barrel is maintained in its true firing axis until the bullet has left the barrel.

Referring now to FIGS. 13 through 15, there is illustrated another means for spring-loading the barrel so as to obtain the desired straight line motion during initial recoil. The standard M1911A pistol components are used, including the barrel **28** with its usual depending lugs **52** mounting the barrel link pin **54**, and including a standard barrel link **74** pivotally mounted to the barrel link pin **54** and pivotally mounted to the usual slide stop pin **50**. However, a modified form of recoil spring guide **76** is utilized which includes a rearwardly projecting lower camming portion **78** which tapers rearwardly and downwardly from the usual peripheral flange **38** to form a camming surface which is upwardly inclined in a forward direction. The base of the camming portion **78** includes a longitudinal slot **80** for freely accommodating the pivotal movement of the barrel link **74** therewithin.

In operation, the barrel **28** in its firing position is urged forwardly by the slide, which is itself biased forwardly by the recoil spring **26**. This brings the camming surfaces **60** of the barrel lugs **52** into engagement with the spring stop pin **50** and limit forward travel of the slide beyond its normal firing position, as previously described. However, the camming portion **78** projects rearwardly sufficiently to engage and exert an upward bias against the underside of the slide stop pin **50** because of the rearward bias of the recoil spring **26**. That is, upon engagement of the camming portion **78** within the stop pin **50**, the forwardly and upwardly tapering surface of the camming portion **78** tends to urge the stop pin **50** upwardly under the bias of the recoil spring **26**.

Inasmuch as the stop pin **50** is mounted in openings in the frame which have generous clearances relative to the stop pin, as previously described, the stop pin **50** is movable upwardly relative to the frame **22** by the previously described bias force for forcibly engaging the barrel link and biasing it upwardly. This takes up existing clearances and urges the barrel upwardly against the

slide affording the improved pistol accuracy previously adverted to.

Referring now to FIG. 12, there is illustrated still another embodiment of the present invention wherein the conventional components of the standard military pistol are utilized except for replacement of the usual barrel link with a modified barrel link **82** which is characterized by a bottom camming surface or cam lobe **84**. In addition, a bias means constituted by a compression spring **86** is mounted within a vertical bore **88** provided in the frame **22** and opening into the frame recess **44**. The lower end of the bore **88** is threaded to receive a threaded spring-retaining plug **90**, which is also rotatable to adjust the bias of the spring. The upper end of the bore **88** is characterized by a diminished diameter portion or ball seat **92** which retains a ball **94** within the bore **88**, while permitting a portion of the ball to project above the frame **22** for engagement with the cam lobe **84** when the barrel and slide are in their firing positions.

The spring **86** urges the ball **94** upwardly against the cam lobe **84** to thereby bias the barrel link **82** upwardly and remove or compensate for undesirable clearances, as previously described. The bias against the barrel link tends to urge the barrel against the slide and thereby maintain the barrel in its firing axis during the firing and initial recoil phases of the pistol operation.

Referring now to FIGS. 16 and 17, yet another embodiment of the present biasing means is illustrated. Again, the standard components of the military .45 caliber pistol are utilized for the most part. However, a modified slide stop pin **96** is utilized, being disposed through the usual transversely aligned openings provided in the frame for the conventional slide stop pin. The pin **96** is radially compressible or resilient at its midportion, which is achieved in the present embodiment by providing a longitudinal slot or split **98** in the pin **96**, and outwardly bowing the split portions of the pin so that disposition of the pin **96** through the lower opening in the barrel link **74** can only be had by resiliently compressing the central portion of the pin.

The slide stop pin **96** is radially compressible to allow the barrel link **74** to pivot about the axis of the pin **96** upon rearward movement of the barrel, and also to exert an upward bias upon the barrel link **74** in the firing position of the barrel. That is, the outwardly bowed configuration of the central portion of the slide stop pin **96** necessarily reduces the normal distance between the axes of the pin **96** and the usual barrel link pin **54** so that when the barrel is pivoted into battery or firing position, the barrel link **74** squeezes or axially compresses the stop pin **96**. This in turn imposes an upward bias upon the barrel link **74**, and consequently upon the barrel, to thereby tend to maintain the barrel in its firing axis both when the barrel is in its firing position and when it is undergoing initial recoil.

There are certain types of automatic pistols in which no barrel link is employed, such pistols employing what is often referred to as an inclined plane arrangement, in which a cammed slot is provided on a depending portion of the rearward extremity of the barrel for cooperation with a usual slide stop pin carried by the frame. The split stop pin **96** is equally adapted for use with this style of automatic pistol, although the mode of operation is slightly different from that above-described in connection with FIGS. 16 and 17. More particularly, use of the split stop pin **96** effects engagement thereof with the margins of the cammed slot, depending barrel lugs, or analogous depending portion of the rearward extremity of the barrel. Such engagement biases such portion upwardly and thereby biases the barrel upwardly into snug fitting relation with the slide. This has the effect of compensating for tolerances, clearances, and the like, as above-discussed, and even though no barrel link is employed.

From the foregoing it will be apparent that there has been provided a barrel biasing means adapted to eliminate or compensate for the usual manufacturing and operational tolerances in those components of automatic firearms which cooperate to guide the travel of the barrel during its operation. This is accomplished in the several embodiments by upwardly biasing the usual barrel means which depend from the rearward portion of the barrel for cooperation with the frame to guide the barrel in its movements. This in turn upwardly biases the rearward extremity of the barrel against the slide. As previously indicated, the biasing means has broader utility, however, in that it is adapted to operate upon a variety of depending barrel means, whether or not such barrel means are constituted by a pivoting barrel link, or by an inclined plane form of barrel guidance means.

Various modifications and changes may be made with regard to the foregoing detailed description without departing from the spirit of the invention or the scope of the following claims.

I claim:

1. In an automatic pistol having a frame, a recoiling breech slide and a recoiling barrel mounted thereon for tilting at its rearward portion relative to said slide and including a depending portion mounting a transverse barrel link pin, means for interlocking said barrel and said slide, a transverse slide stop pin mounted to said frame, and a recoil spring for opposing rearward recoil movement of the slide and for then returning the slide to its forward firing position, the improvement comprising:

a recoil spring guide carried by said frame and encompassed by said recoil spring, said spring guide mounting a rearwardly projecting resilient bias element;

and a barrel link pivotally coupling said barrel link pin and said stop pin whereby said barrel and said slide are held interlocked in their forward firing position and during their initial recoil, and said barrel is tilted out of interlocked relation with said slide during their further rearward movement, said link including a camming surface engageable with said bias element for developing a progressively greater upward bias upon said link during forward movement of said barrel toward its forward firing position, said bias being operative during said initial recoil to urge said rearward portion of said barrel against said slide.

2. The improvement in an automatic pistol as set forth in claim **1** wherein said recoil spring guide includes a central bore and said bias element comprises an elongated leaf spring fixed within said bore and projecting rearwardly therefrom.

3. The improvement in an automatic pistol as set forth in claim **1** wherein said bias element comprises an elongated leaf spring having a rearward portion rearwardly tapered in width for deflection in an arc having a more nearly common radius throughout the arc.

4. The improvement in an automatic pistol as set forth in claim **1** wherein said recoil spring guide mounts a transverse pin engageable by said bias element for limiting upward travel of said bias element.

5. In an automatic pistol having a frame with a recess, a recoiling breech slide and a recoiling barrel mounted thereon for tilting at its rearward portion relative to said slide and including a depending portion mounting a transverse barrel link pin, means for interlocking said barrel and said slide, a transverse slide stop pin mounted to said frame, and a recoil spring for opposing rearward recoil movement of the slide and for then returning the slide to its forward firing position, the improvement comprising:

a recoil spring guide carried by said frame and encompassed by said recoil spring, said spring guide mounting a rearwardly projecting resilient bias element and including a rearwardly projecting lower portion extending into the recess of said frame substantially coextensive with the projecting portion of

said bias element to afford a firm seat for said spring guide on said frame;

and a barrel link extending into said recess and pivotally coupling said barrel link pin and said stop pin whereby said barrel and said slide are held interlocked in their forward firing position and during their initial recoil, and said barrel is tilted out of interlocked relation with said slide during their further rearward movement, said link including a camming surface enaggeable with said bias element for developing a progressively greater upward bias upon said link during forward movement of said barrel toward its forward firing position, said bias being operative during said initial recoil to urge said rearward portion of said barrel against said slide.

6. In an automatic pistol having a frame with a recess, a recoiling breech slide and a recoiling barrel mounted thereon for tilting at its rearward portion relative to said slide and including a depending portion mounting a transverse barrel link pin, means for interlocking said barrel and said slide, and a transverse slide stop pin mounted to said frame, the improvement comprising:

a barrel link pivotally coupling said barrel link pin and said stop pin whereby said barrel and said slide are held interlocked in their forward firing position and during their initial recoil, and said barrel is tilted out of interlocked relation with said slide during their further rearward movement, said link including a lower camming surface;

and bias means mounted in the base of said recess and engageable with said camming surface for developing a progressively greater upward bias upon said link during forward movement of said barrel toward its forward firing position, said bias being operative during said initial recoil to urge said rearward portion of said barrel against said slide.

7. The improvement in an automatic pistol as set forth in claim **6** wherein said bias means comprises a ball and a compression spring seated in a bore provided in said frame, said ball being engageable by said camming surface of said link for developing said bias.

8. In an automatic pistol having a frame, a recoiling breech slide and a recoiling barrel mounted thereon, and barrel means depending from the rearward portion of said barrel, the improvement comprising:

a transverse slide stop pin carried by said frame and

positioned to cooperate with said depending barrel means for guiding the travel of said barrel, said stop pin being radially resilient and engageable at its upper periphery with said depending barrel means for developing an upward bias on said depending barrel means in the firing positions of said barrel to urge said rearward portion of said barrel upwardly against said slide.

9. In an automatic pistol having a frame, a recoiling breech slide and a recoiling barrel mounted thereon for tilting at its rearward portion relative to said slide and including a depending barrel lug mounting a transverse barrel link pin, means for interlocking said barrel and said slide, a barrel link carried by said barrel link pin for pivotal movement relative to said barrel, and a recoil spring for opposing rearward recoil movement of the slide and for then returning the slide to its forward firing position, the improvement comprising:

a transverse slide stop pin carried by said frame and disposed through an opening in said barrel link for pivotal movement relative thereto whereby said barrel and said slide are held interlocked in their forward firing position and during their initial recoil, and said barrel is tilted out of interlocked relation with said slide during their further rearward movement, said stop pin being radially resilient and engageable with said barrel lug for stopping said slide and barrel in said forward firing position and for developing an upward bias on said barrel link in the firing position of said barrel to urge said rearward portion of said barrel against said slide.

10. The improvement in an automatic pistol as set out in claim **9** wherein said stop pin is split along substantially its entire length and bowed outwardly for developing a bias upon being radially compressed against said barrel link.

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