Aug. 31, 1965 H. H. FRIEND 3,203,128

GUN HAMMER-SPRING MECHANISM

Filed Feb. 3, 1964

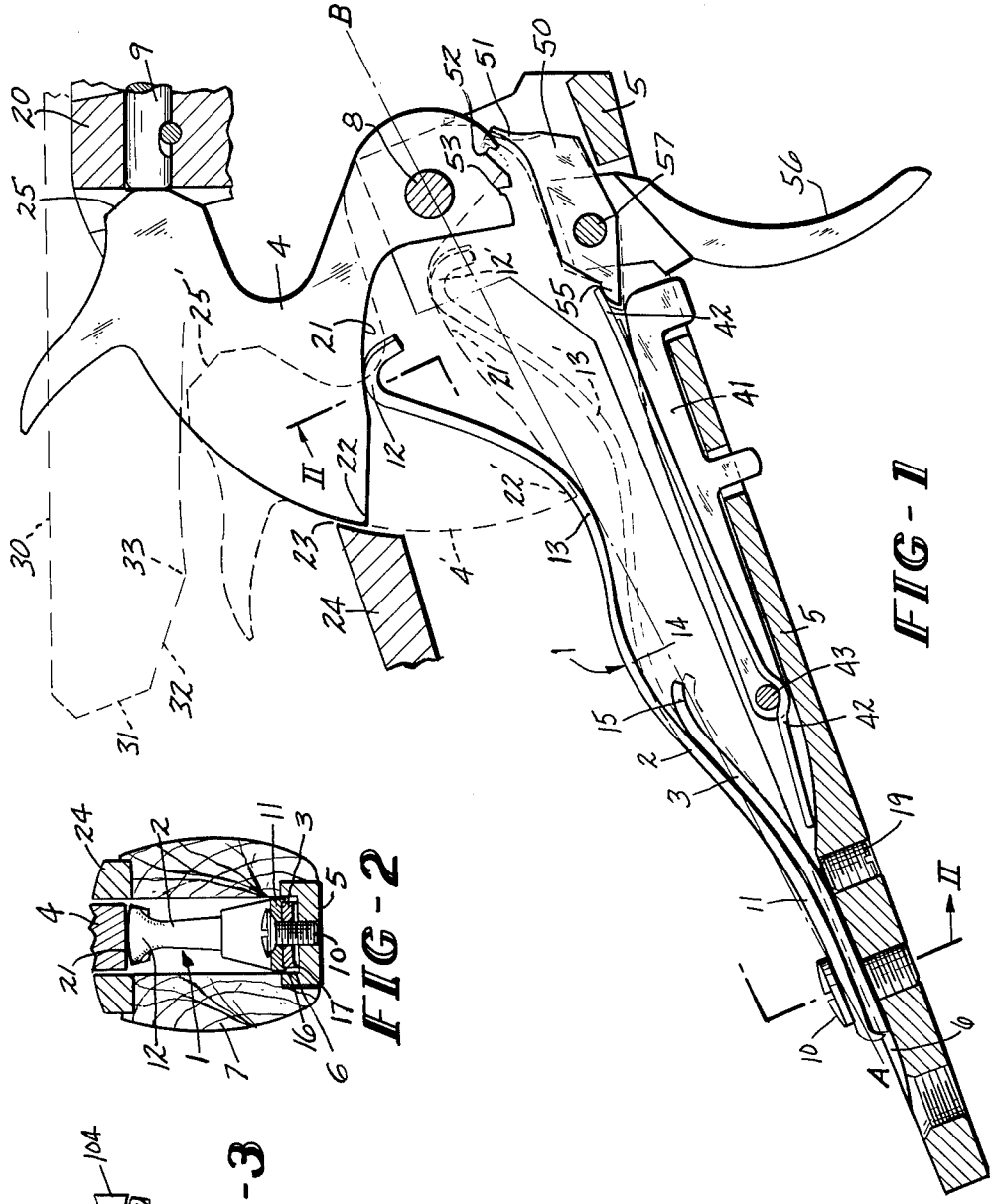


FIG - 1

FIG - 2



FIG - 3

INVENTOR.
HARVEY H. FRIEND

BY

John D. Wilkins
ATTORNEY

United States Patent Office 3,203,128 Patented Aug. 31, 1965

3,203,128

GUN HAMMER-SPRING MECHANISM

Harvey H. Friend, Hamden, Conn., assignor to Olin Mathieson Chemical Corporation, a corporation of Virginia

Filed Feb. 3, 1964, Ser. No. 342,189
6 Claims. (Cl. 42—69)

This invention relates to firearms and more specifically to an improved spring actuation for the firing pin operating hammer of guns.

As shown in U.S. Patent No. 524,702 and U.S. Patent No. 2,703,943, in guns of this type the hammer-spring usually has taken the form of a complex cantilever spring curved and tapered in thickness to develop a pull on the hammer. This was done through a fairly complex hammer actuating linkage involving a rather small stirrup-type link connected at one end to the hammer by a tiny hammer-link pin and at the other end to the spring by another tiny link pin, or by opposed pin lugs on the link, fitting in a spring link pin groove formed across the flexing end of the hammer pin, which must also be precisely slotted at this end to receive the link interconnecting the hammer and the hammer-spring. The hammer must be slotted to form two ears and these pierced to receive the ends of one of these pins and the link must be formed with such lugs integrally and one hole or with two holes to receive the pins. This arrangement is costly to make and assemble with the extreme precision required for these parts.

One object of this invention is to provide a hammer biasing means using sheet stock of uniform thickness. Another is to provide a smoother hammer action in guns of the type described. Still another is provision of a simple direct contact connection between the hammer and hammer-spring.

Other objects and advantages will appear from a description in greater detail taken in connection with the accompanying drawing in which:

FIG. 1 is a side elevational view partly in cross section of a support plate carrying a trigger and showing the hammer and hammer-spring arrangement of this invention at the moment of firing (solid lines) and when cocked (broken lines);

FIG. 2 is a rear view, taken on a smaller scale on line II—II of the embodiment of FIG. 1 showing the alignment of the parts mounted in a hollow in the gun; and

FIG. 3 is a fragmentary view showing a modification forming another operative connection between the hammer-spring and the hammer.

According to this invention the hammer is actuated by a hammer-spring designed for developing a direct push instead of a pull on a pivotally mounted hammer, thereby abolishing the need for a pull linkage of diminutive parts manufactured at great expense. The hammer-spring takes the form of a cantilever plate spring, hereinafter called the mainspring, bent over the distance between its ends, at one of which it is of uniform thickness and fixed and at the other of which it is movable, so as to have a length between these ends in excess of the distance. The mainspring is flexibly supported at a point between the ends to allow for spring flexing without interference of the spring with the necessary movement of either the hammer or adjacent fire-control mechanism. At the movable end, the mainspring is provided with a bend defining a concavity for receiving a rearwardly extending portion of the hammer at its full-cock position; in the absence of the bend a uniformly thick straight plate spring would bow into interference with that portion of the hammer.

The mainspring is flexibly supported by a base spring which is of stiffened, preferably leaf, construction and is mounted to apply a secondary or assisting force to the

mainspring especially when the hammer is in the last third of its travel to the firing position thereby holding the hammer snugly against the locking bolt and striker. The addition of a base leaf is to compensate for flexibility due to the added length resulting from the bending.

The spring is mounted at one end including the base leaf so as to align the movable end to bear against the hammer at all times in centered and guided relationship as well as with desired variation in bias of the mainspring while avoiding excessive peaks of force, particularly at the maximum strain of the mainspring.

This is done with a uniformly thick mainspring tapered in width and which is concavely bent adjacent the narrow movable end with respect to the hammer and convexly bent adjacent the wide fixed end with respect to the hammer. The concave bend is somewhat sharper and more work hardened and, therefore, more resistant to flexing than the convex bend.

A supporting base leaf preferably is provided at the fixed end to provide for the convex bend a flexible fulcrum about which the movable end pivots the more the mainspring and leaf are pressed by the hammer. This allows for desired flexural movement with clearance at the concave bend without excessive flexing of it with respect to its own angle and an action line A–B, running from the fixed end of the hammer-spring to the center about which the hammer pivots.

For operative connection in the gun, the movable end or tip of the hammer-spring is curved upwardly providing an upper surface which makes sliding contact with a corresponding lower surface on the hammer. This contact surface is slightly curved to provide desired force without excessive friction and retarding components of force.

The hammer is configured with a concave surface for contacting the rounded movable end of the mainspring, which is tapered to least width adjacent the movable end, the latter taking the form of a head enlarged in width and preferably also curved laterally to form a crown.

Crowning of the head not only gives desired friction characteristics with the hammer contact surface but also aids in keeping the hammer-spring in centered and guided relationship with respect to the hammer. For this purpose the contact surface of the hammer may also be laterally curved to provide a mating concavity for the crown, preferably of a greater radius of curvature to accentuate the centering and guiding function.

When the hammer is cocked against the spring bias, the hammer heel is put in closest proximity with the line A–B extending from the hammer pivot to the point of support of the hammer-spring; and then only the concave bend of the hammer-spring is moved to extend over the line to the opposite side of that line just enough to receive the heel in the bend without extending the concave bend more than about halfway between the cocked heel and the opposed structure on this side. Before cocking, the bent cantilever mainspring including both bends, is all generally disposed between that line and the contact surface of the hammer.

The concave bend, forming an angle of about 132°, for example, as compared to an angle of about 160° formed at the convex bend, remains relatively the same, although it moves the most, since most of the bending occurs in the convex bend with the assistance of the base leaf.

This behavior is advantageous because it provides not only the desirable clearance bend around the heel of the hammer, but also a firmer hold on the hammer at the firing position while providing the necessary force and flexibility at the full-cock position at a somewhat reduced and asymptotic high level of moment of force due to

the spring characteristics at maximum compression and force combined with the reduced moment arm of the maximum force applied at the mainspring head at the full-cock position. Thus, the work stored in the spring needed for actuation of the hammer remains at the desired level, but is applied in an improved way allowing for easier cocking.

In the embodiment of FIG. 1 the arrangement involves hammer-spring 1, including mainspring 2 and spring base leaf 3, and also the hammer 4. The mainspring and leaf are mounted upon a lower tang or trigger plate 5 in the shallow recess 6 at the rear in the topside of the trigger plate, which in turn is mounted as part of the gun on the lower side of the grip of the gun stock 7 (see FIG. 2). At the front of the plate there is carried in the gun a pin 8 pivotally mounting the hammer for hitting a firing pin striker 9. By any suitable fastener such as screw 10, one mainspring end 11 is fixed at least frictionally together with leaf 3, while the opposite mainspring end 12 is movable with respect to the plate and pin for pushing against the hammer at the contact surface 21. To develop the proper bias at all times, the mainspring is formed with concavity 13 and the convexity 14. By this peculiar configuration the hammer is urged into the firing position at which the hammer heel 22 extends sufficiently close to the hammer opening 23 formed in the upper side of the gun in a portion known as the upper tang 24 extending rearwardly from the receiver.

When the hammer is fully cocked as at 4', heel 22' extends to the straight line A–B, a construction line of action or reference extending between the mainspring fastener 10 at the one fixed end 11 to the center of the hammer pivot 8. Adjacent end 12, mainspring 2 is formed with the concavity 13 so that in the fully cocked position the concavity at 13' clears the heel at 22' when the hammer-spring is compressed as the hammer is drawn back to the fully cocked position.

Convexity 14 adjacent the base end 11 under the action of leaf end 15 tends to dispose the mainspring including its movable end 12, concavity 13, and convexity 14 on the same side of line A–B as the spring contact surface 21 and heel 22, until the hammer is cocked.

Upon cocking, the hammer spring is flexed to dispose only the concavity 13' on the opposite side of A–B preferably about halfway between cocked hammer 4' and plate 5 for optimum clearance from both the hammer and the plate. Thus, the configuration prevents interference between any part of the mainspring and the trigger plate 5, under the action of base leaf 3 and its free end 15 providing a flexible fulcrum acting on the mainspring preferably distally from end 11 and between that end and the apex of the V-bend at convexity 14. This stiffens the hammer-spring to force mostly all spring distortion to occur in the convexity 14 and leave the concave bend at 13' at about the same angle as the V-bend at 13 to prevent it from jamming down on the plate and associated gun parts such as safety catch 41 and safety spring 42 mounted on plate 5 with the aid of cross pin 43.

At the fastener 10, hammer-spring 1 is held in alignment with the hammer with the aid of the longitudinally extending recess 6 constraining base leaf 3. To facilitate alignment at this end it is preferred that mainspring 2 be formed with downwardly extending burrs 16 overhanging the sides of the base leaf both at the one end 11 and at the flexible fulcrum 15 of the base leaf. Furthermore, it is preferred that the base leaf be provided with burrs as at 17 for better than frictional retention in recess 6 under the action of fastener 10.

As shown in FIG. 2 at the movable end 12 the spring is not only convexly bent to form an upwardly protruding head but is also formed with a lateral crown which wears into centering and guiding relationship with the contact surface 21 of the hammer.

According to FIG. 3 a modified hammer 104 may be

provided, like hammer 4, except for the lateral concavity 121 instead of 21. Concavity 121 has a larger radius of curvature than the crown of head 12 to limit the area of contact and for further centering and guiding action at this area.

For a finer adjustment of the hammer-spring, there is provided an adjusting screw 19.

The curved contact surface 21 shown in FIG. 1 and the sliding action of the hammer-spring head 12 from the firing position to the position shown at 21', at which the head is moved into contact at 12', together with the novel hammer-spring 1 facilitate lever action cocking. By this action the gun breech locking bolt 20 carrying striker 9 is moved down out of the way and the gun breech block 30 is moved back, carrying a firing pin, to place its rear end at the position shown at 30 at which block cam surfaces 31 and 32 acting on hammer follower surface 25 rock the hammer back until block detent 33 overrides the surface and leave it at 25'. The hammer at this stage is held at 4' by the action of sear 50 as its lip 51 overrides half-cock notch 52 and drops into full-cock notch 53 under the bias of safety spring 42 acting on sear tongue 55, until safety catch 41 is moved up and trigger 56 is pulled to pivot the sear about the sear pin 57, also mounted on plate 5, to release the hammer.

Other embodiments and modifications may occur to those skilled in the art, without departing from the spirit and scope of the invention claimed.

What is claimed is:

1. In a firearm, the combination of a hammer pivotally mounted about an axis for movement between a full cock position and a firing position, said hammer including a spring contact surface terminating in a heel extending rearwardly from the pivot axis, and a spring member for biasing said hammer into firing position, said spring member comprising an elongated mainspring connected at one end to the firearm rearwardly of said hammer with the other end extending forwardly into contact with said spring contact surface and having intermediate its ends a concavely bent portion and a convexly bent portion, and a base leaf spring connected at one end to said firearm and having a head portion at the other end in contact with said mainspring at a point intermediate its ends.

2. In a firearm, the combination of a hammer pivotally mounted about an axis for movement between a full cock position and a firing position, said hammer including a spring contact surface terminating in a heel extending rearwardly from the pivot axis, and spring means for biasing said hammer into firing position, said spring means comprising an elongated flexible spring connected at one end to the firearm rearwardly of said axis and the other end having a laterally enlarged head for sliding engagement with said spring contact surface, said head being curved convexly and being laterally curved to provide a crown, and a resilient base spring member attached at one end to the firearm and having its other end in contact with said mainspring at a point intermediate the ends thereof.

3. The combination of claim 2 wherein the spring contact surface is laterally curved to provide means for laterally retaining said crown of said mainspring.

4. The combination of claim 3 wherein the radius of curvature of the spring contact surface is greater than the radius of lateral curvature of the crown.

5. The combination of claim 2 wherein said mainspring overlies said base spring and said connection to said firearm includes burrs extending downwardly from the edges of the base spring and burrs extending downwardly from the edges of the mainspring and overhanging the sides of the base spring.

6. In a firearm, the combination of a hammer pivotally mounted about an axis for movement between a full cock position and a firing position, said hammer including a spring contact surface terminating in a heel extending rearwardly from the pivot axis and spring means for

biasing said hammer into firing position, said spring means comprising an elongated flexible mainspring connected at one end to the firearm rearwardly of said axis and having its other end in sliding engagement with said spring contact surface and a base leaf spring underlying said mainspring and having one end attached to the firearm and its other end in engagement with said mainspring, said mainspring further including a concave bent portion and a convex bent portion, said portions being constructed such that only the concave bent portion is positioned below a reference line extending from said pivot axis to the point of connection of said mainspring when said hammer is in its full cock position,

and said other end of said base spring contacting said mainspring at a point within the convex portion thereof.

References Cited by the Examiner

UNITED STATES PATENTS

162,224	4/75	Freund	42—70
245,888	8/81	Street et al.	42—41 X
754,210	3/04	Fyrberg	42—70
774,712	11/04	Vold	42—70
978,144	12/10	Dunham	42—70
1,313,073	8/19	Donadio	42—70

BENJAMIN A. BORCHELT, *Primary Examiner.*