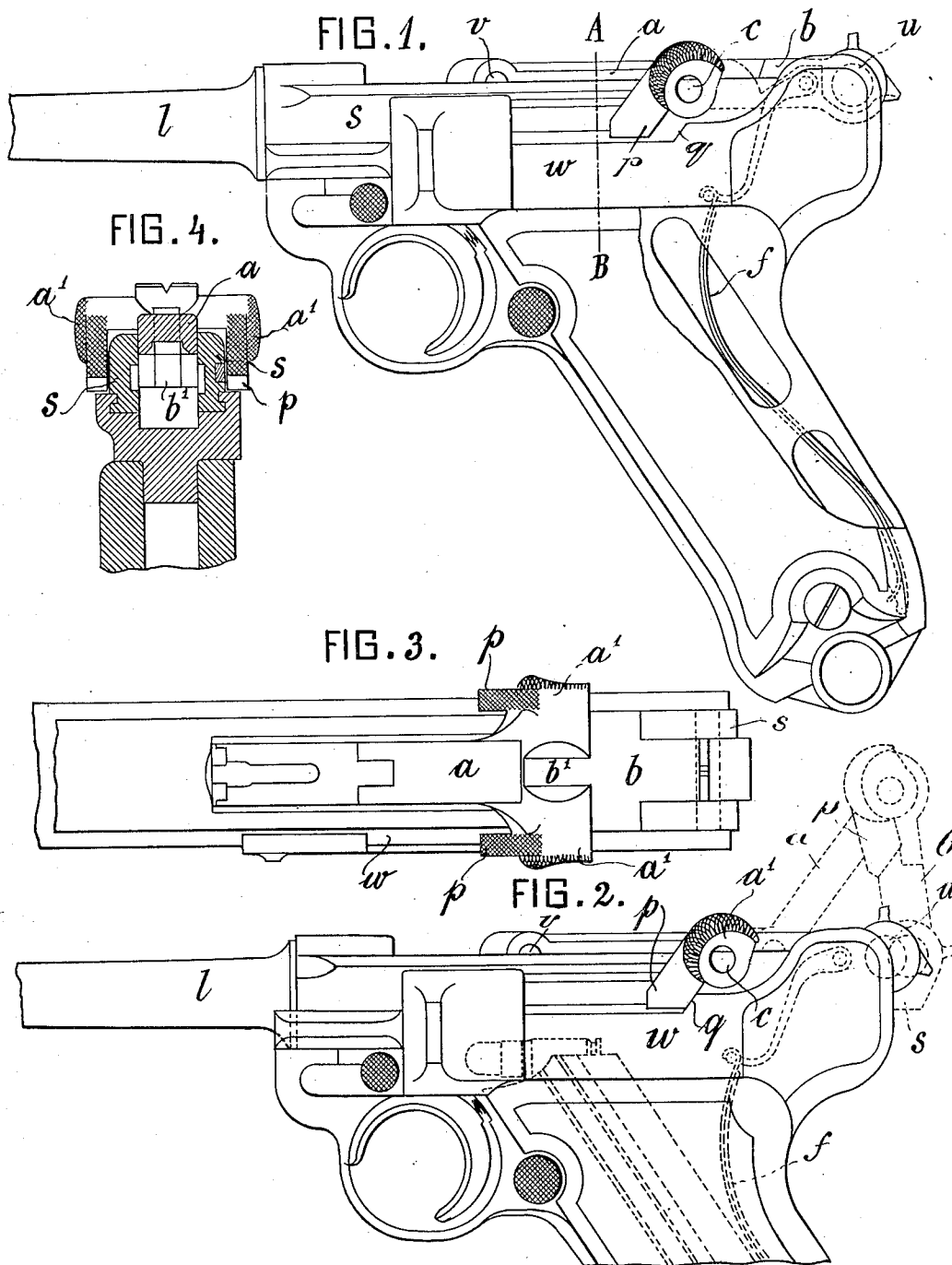


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G. LUGER.
RECOIL OPERATED FIREARM.

APPLICATION FILED DEC. 31, 1903.



Witnesses.

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UNITED STATES PATENT OFFICE.

GEORG LUGER, OF CHARLOTTENBURG, GERMANY.

RECOIL-OPERATED FIREARM.

No. 851,538.

Specification of Letters Patent.

Patented April 23, 1907.

Application filed December 31, 1903. Serial No. 187,326.

To all whom it may concern:

Be it known that I, GEORG LUGER, a subject of the Emperor of Austria, and a resident of No. 34 Weimarerstrasse, Charlottenburg, Germany, engineer, have invented certain new and useful Improvements in Recoil-Operated Firearms, of which the following is an exact, full, and clear description.

This invention relates to an improvement in recoil-operated firearms of the known class with a breech closing mechanism of the toggle joint type, in which the opening of the toggle joint is effected during a recoiling movement.

The present invention relates especially to means for effecting the raising of the toggle joint out of the extended or closed position.

In order to utilize the recoiling movement of the toggle joint when being opened, resort is had to the known arrangement wherein cam projections are fixed on or connected with the toggle joint and are adapted for co-acting, on the recoil stroke, with inclined shoulders or abutments or equivalent means. This known arrangement has heretofore been so carried out in practice that said cam projections were located on the rear link, either partly behind the rearward pin thereof or in front of said pin, the cam projections however being arranged without exception behind the middle toggle link pin and also sometimes on lugs of the same. Said principle of construction is omitted in the present invention and by providing the cam projections on the forward link at a suitable point in front of the middle link pin, certain advantages and new effects are attained, resulting in greater efficiency or more valuable utilization of the firearm.

The most important advantage of this improvement comprises a kind of retarding action against the beating-like recoil action, whereby whilst effectively utilizing the recoil-energy for the cranking, folding or opening of the toggle joint, the constructional parts are also preserved from excessive vibration and strain. By reason of my improvements, neither comparatively light construction of the breech members nor excessively strong loading can effect the reliable operation of the firearm.

The invention will be hereinafter fully set

forth and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of the main portion of a recoil-operated pistol embodying my invention. Fig. 2 is a similar view of the toggle joint, the cam projections being shown in the impinging position at the commencement of the opening of the toggle joint. Fig. 3 is a plan view of Fig. 1 and Fig. 4 is a cross-section on line A—B, Fig. 1.

A principal drawback to the arrangements of the cam projections behind the middle link pin, consists in the fact that no retarding-like counteraction can be produced at the commencement of the recoil during the cranking, folding or opening of the toggle joint, as is necessary when employing strong charges in order to decrease the strain, to lessen the unavoidable jerks and to enable the uniform and sure carrying out of the opening and closing of the toggle joint. Since the cam action, which effects the cranking or folding, commences in such arrangements at a distance behind the front pin of the forward link (which former serves as fulcrum and the leverage consequently extends over the entire length of the forward link,) the resistance is small at the commencement of the folding, and the folding impulse takes place quickly *i. e.* without retarding action by counteracting resistances, except that of the closing spring. Another drawback in the former arrangements consists in the fact that the recoil is not only transmitted through the entire forward link but also through the middle link joint and in a different direction in the rear link to the inclined cam surfaces, which produce the folding. This results in a detrimental jerking strain on the central pin, which leads to the loosening or distortion of such pin, while at the same time, an indirect intermediate transmissi on affects the exactness of the cam engagement which, on account of the arrangement of the cam projections in pairs (one pair on each side), must by all means be maintained, since otherwise a binding would take place in the guides. In order to obviate the said drawbacks and to secure for the initial movement, a retarding effect, which is advantageous to the function of the firearm, the cam projections, according to the pres-

ent invention, are provided at a suitable point on the forward link, that is, between the middle link pin and the forward link pin, so as to conform with the weaker or stronger charges employed.

Referring to the drawings, *a* and *b* are the two links, which are connected at the knee point by means of the central pin *c*, and which form the joint behind the movable barrel *l*.

v is the forward link pin and *u* the rear-link pin. The latter is fixed on the barrel extension *s* attached to the movable barrel, so that by this arrangement, the links *a* and *b* are capable of a sliding or recoiling movement, which takes place in consequence of the known function of the firearm. The forward link *a* is bifurcated at *a'*, to accommodate the link-eye *b'* of the rear link *b*. The bifurcated parts *a'* forming side-pieces of the forward link *a* serve as finger grips for opening the breech with the hand. Below the said bifurcated parts, on the sides of the forward link *a*, are arranged inclined forwardly extending shoulders or projections *p* of such length, breadth and thickness as to form limited cam projections for co-acting with correspondingly inclined fixed shoulders or cams *q* secured to or built up on the sides *w* of the frame. The inclined surfaces of these cams *q* are oblique so as to parallel the opposite faces of the shoulders or projections *p*, and such cams are located about in line with the folding knee-point of the links when the latter are in their normal position, at which time the shoulders or projections *p* are some distance in advance of such cams *q*.

The construction hereinbefore-described operates as follows:—After discharging the fire-arm, the barrel *l* with its extension *s* slides backwards on account of the recoil, and the toggles take part in this movement being in an extended closed position. As soon as this sliding movement—opposed to the action of a closing spring *f* shown in Figs. 1 and 2—has been carried out for a short distance, the shoulders or projections *p* on both sides of the forward link *a* engage with the cam shoulders *q* of the fixed side-pieces *w* (Fig. 2) resulting in an upwardly directed movement owing to the momentum derived from the co-action of the two sets of cam surfaces in consequence of the rearward sliding movement of the parts. The middle link pin *c* is thereby lifted relatively to the pins *u* and *v*, and the humping up of the toggle joint begins, which results in an entire opening (Fig. 2) on account of the continuous recoiling action. The re-closing of the toggle links *a* and *b* and the forward sliding movement of the barrel extension *s* to closing position are effected by the recoil of spring *f*.

It is obvious that, with this arrangement,

the jerking strain which arises from the co-action of the parts *p* and *q* is directly taken up exclusively by the forward link *a* forming a massive piece with the side-projections *a'* and shoulders or projections *p*. Only the forward-link pin *v* takes part in this direct strain, whilst the middle joint at *c* is not subjected to the direct jerking or arresting action. This relieving of the central pin *c* is of decided advantage, and another advantage resides in avoiding multiple link connections, by which the jerking action would necessarily be transmitted in the event of shifting the cam projections on the rear link *b*. Above all, the effect of a certain uniform retardation during the folding action, which effect is necessary especially for the reliable function of the folding, results from the present arrangement, as the side pieces *a'* and shoulders *p*, respectively, of the forward link *a*, which take up the sudden impulse, remove all vibration and the impinging motion is counteracted by the braking inertia of the middle pin and rear link parts, which are unaffected at the outset by the jerking action and need only be moved upward directly by the forward link. Moreover, the folding is impeded at first on account of the shortened leverage acting through the front part of the forward link measured from the point of co-operation of the parts *p q* to the front pin *v*. The uniform engagement on both sides is likewise insured by the combination of the cam projections with the forward link *a*, the latter being thereby positively guided. The parts forming the guide at the rear of the toggle joint are not subjected to any strain during the jerking action.

The fact that the impinging surfaces at *p* are arranged closer to the forward link pin *v* than has heretofore been done, enables the forward link *a* to permanently withstand the jerking strains. This is of great importance, as well as the further advantage that the bending of the toggle joint is effected with the leverage of a one armed lever, whereby the previously explained retarding effect is assisted, as the jerking energy is partly consumed in the lever mechanism.

I claim as my invention:—

1. In a recoil-operated fire-arm, the combination with a rearward moving barrel and its extension, of a non-recoiling frame, a breech block, linked levers pivoted to the breech-block and to said extension, the forward one of said linked levers being provided with cam projections in front of the central pin, and cam projections on said frame with which the former cam projections are designed to engage on the rearward sliding movement of the barrel.

2. In a recoil-operated fire-arm, the combination with a rearward moving barrel and

its extension, of a non-recoiling frame, a breech block, linked levers pivoted to the breech-block and to said extension, the forward one of said linked levers being provided
5 at points forward of the central pin with downwardly and forwardly inclined shoulders or projections, and cam projections on said frame, likewise downwardly and forwardly inclined, with which said shoulders or projec-

tions are designed to engage on the rearward sliding movement of the barrel.

In testimony whereof I have hereunto set my hand in presence of two witnesses.

GEORG LUGER.

Witnesses:

HENRY HASPER,
WOLDEMAR HAUPT.