BREECHBOLT CHECKING CONSTRUCTION FOR AUTOMATIC FIREARMS

Filed March 21, 1939

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Patent by Attorney
BREECH-BOLT CHECKING CONSTRUCTION FOR AUTOMATIC FIREARMS

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Application March 21, 1939, Serial No. 263,128

2 Claims. (Cl. 42—1)

This invention relates to improvements in automatic firearms and relates more particularly to a construction and arrangement of parts whereby the breech-bolt and associated parts (commonly referred to as the “firearm-action”) have their rearward travel (occasioned by the discharge of the firearm) checked or stopped in an improved manner.

One of the objects of the present invention is to provide an automatic firearm with a superior construction and arrangement of parts whereby the rearward travel of the breech-bolt and associated parts is checked or stopped without undue strain and wear upon the parts.

A further object of the present invention is to provide an automatic firearm with superior means whereby the rearward travel of the breech-bolt and associated parts is effectively checked without occasioning the rapid rebound thereof.

Another object of the present invention is to provide a superior and reliable automatic firearm-construction wherein the rearward travel of the breech-bolt and associated parts, following the discharge of the firearm, is effectively but gradually checked or stopped preparatory to the return movement of the said breech-bolt and its associated parts to their normal positions.

A still further object of the present invention is to provide a superior automatic firearm-construction wherein the return movement of the breech-bolt and associated parts to their normal positions, after having been operated by the discharge of the firearm, is sufficiently delayed or retarded to permit the complete ejection of the just-fired shell and the proper positioning of a fresh cartridge preparatory to the automatic insertion of such fresh cartridge into the cartridge-chamber of the firearm.

With the above and other objects in view, as will appear to those skilled in the art from the present disclosure, this invention includes all features in the said disclosure which are novel over the prior art and which are not claimed in any separate application.

In the accompanying drawings, in which certain modes of carrying out the present invention are shown for illustrative purposes:

Fig. 1a is a broken view partly in side elevation and partly in vertical, central, longitudinal section of the rear portion of an automatic firearm embodying the present invention;

Fig. 1b is a similar view of the forward portion of the firearm;

Fig. 2 is a view corresponding to Fig. 1a but showing the positions which the parts assume when the firearm-action is in its rearmost position immediately following the discharge of the firearm;

Fig. 3 is a fragmentary view in vertical, central, longitudinal section of the portion of the firearm immediately adjacent the junction of the buttstock-portion and the rear portion of the receiver, and showing the parts in the positions in which they are shown on a smaller scale in Fig. 2;

Fig. 4 is a transverse sectional view taken on the line 6—6 of Fig. 5;

Fig. 5 is a broken view in side elevation of the rear portion of the receiver and the forward portion of the receiver-extension;

Fig. 6 is a transverse sectional view taken on the line 6—6 of Fig. 5;

Fig. 7 is a broken view in side elevation of the rear portion of the action-slide; and

Fig. 8 is a rear elevation thereof.

The particular automatic firearm herein chosen for the purpose of illustrating the present invention is of the gas-operated type, in which the gas pressure developed by the firing of a cartridge is utilized to effect the rearward travel of the breech-bolt, accompanied by the extraction and ejection of the just-fired cartridge preparatory to the return movement of the said breech-bolt to effect the reloading of the firearm with a fresh cartridge in readiness for again discharging the firearm.

The automatic firearm shown in the accompanying drawings includes a receiver 10 rigidly secured at its forward end to the adjacent rear portion of a barrel 11, which latter is provided with the usual axial bore 12 through which the bullets are forwardly propelled in the usual manner of firearms. Attached to the receiver 10 and the barrel 11 is a stock 13 preferably formed of wood or other heat-insulating and shock-absorbing material.

The stock 13, just above referred to, includes a buttstock-portion 14 and a forestock-portion 15, both of which are integrally united with each other, though, if desired, a separate buttstock and a separate forestock may be employed, in accordance with common practice in firearm constructions.

The receiver 10 is provided in its interior with a longitudinal bolt-receiving chamber 16 in which is adapted to reciprocate, in any approved manner, a breech-bolt 17, not requiring detailed description herein. The bolt-receiving chamber 16, just referred to, is flanked on each of its respective opposite sides by side walls 18—18 depend-
ing from a top wall 19 of the receiver 10 and skeletonized at their rear portions by apertures 20 to reduce the over-all weight of the said receiver. As will be seen by reference to Figs. 1, 2, 5 and 21, the top wall 19 of the receiver 10 is cut away at its forward portion to accommodate the upper portion of the breech-bolt 17 when the same is in its closed position, and to provide a locking-abutment 21 which faces forwardly and which is adapted to be engaged by a rearwardly-facing locking-abutment 22 formed upon the upper rear portion of the breech-bolt 17.

The extreme rear portion of the receiver 10 is formed integrally with a depending L-shaped arm generally designated by the reference character 31 and comprising a substantially-vertical reach 24 and a substantially-horizontal forwardly-extending reach 25. The substantially-vertical reach 24 of the L-shaped arm 31 at the rear end of the receiver 10 is provided with a threaded bore 26 receiving the externally-threaded forward end of a tubular receiver-extension 27 having at its rear end a relatively-thick end-wall 22. The said end-wall is provided with an axial threaded passage receiving the adjacent threaded end of a screw 29 extending forwardly as a slightly upwardly-inclined shaft through a similarly inclined passage 30 formed in the buttstock-portition 15. The extreme rear or head-end of the screw 29 is seated in a suitable recess in a buttplate 31 mounted against the butt-end of the buttstock-portion 14 as indicated in Figs. 1a and 2.

The tubular receiver-extension 27 is accommodated in a bore 32 formed in the buttstock-portion 14 and intersected at its rear end by the bore 30 as is also indicated in the figures just above referred to.

Seated against the front face of the end-wall 23 of the receiver-extension 27 is the rear end of a helical breech-closing spring 33 having its forward end engaged with a rearwardly-facing spring-seat 34 formed adjacent the forward end of a spring-guiding plunger 35 which latter is adapted, on occasion, to substantially fully engage the hollow interior of the tubular receiver-extension 27, as is indicated in Fig. 2.

The spring-guiding plunger 35, above referred to, constitutes a rigid extension of a cross-head 36 forming the rear part of an action-slide generally designated by the reference character 37, and including also two parallel laterally-spaced-apart side-bars 33—34 extending in substantial parallelism with the axis of the receiver-extension 27. Each of the said side-bars is adapted to reciprocate, in a manner as will hereinafter appear, against the lower edge 35 of the adjacent one of the two side-walls 13—15 of the receiver 10, and against an upwardly-facing supporting-ledge 35 forming a feature of the adjacent side-arm 41, one of which latter depends from each of the side-walls 13—15 of the receiver 10.

At their forward ends, each of the side-bars 33—34 of the action-slide 37 are pivotally connected by means of a screw 42 to the rear end of an actuating-rod 43. The said actuating-rod 43 reciprocates beneath the barrel 11 and extends through a clearance 44 formed in a barrel-lug 45 and is provided with a checking-surface 65 which is inclined forwardly and downwardly with respect to the complementary checking-surface 66 formed by the particular portion of the under face of the receiver 10 which is located just forwardly of the junction of the L-shaped arm 23 with the receiver 10 proper, as is indicated particularly well in Fig. 5. The angular relationship between the checking-surfaces 65 and 66, just referred to, may vary under dif-
ferent conditions, but in the particular instance illustrated, approximately a seven degree depart- 5
ure from parallelism has been found to be satisfactory.

By reference to Figs. 7 and 8, in particular, it will be observed that the upper surface of the cross-head 36 and the adjacent upper surfaces of the side-bars 33-33 of the action-slide 37 constitute a checking-surface 67 engageable with the checking-surface 60 of the receiver 10, while 10 the under-face of the said cross-head 36 constitutes a checking-surface 68 engageable with the checking-surface 65 of the horizontal reach 25 of the L-shaped arm 23. The engagement of the respective checking-surfaces just referred to, is clearly shown in Figs. 2, 3 and.

As will be seen by reference to Figs. 1a, 2 and 3, in particular, the under face of the L-shaped arm 23 of the receiver 10 is provided with a transverse locating-groove 59 which receives a locating-rib 70 upstanding from the rear portion of a trigger-plate 11. The said rear portion of the trigger-plate 11 is secured to the receiver 10 by means of an attaching-screw 72 extending upwardly through the trigger-plate 71 and into a threaded bore 73 (Fig. 3) in the horizontal reach 25 of the L-shaped arm 23.

About midway of its length the trigger-plate 71 is formed with an integral loop-like trigger-guard 74 in which is located a trigger 75 by means of which later the firearm may be discharged in any suitable manner, such, for instance, as is shown and described in my copending application Ser. No. 129,652, filed April 13, 1897.

The forward end of the trigger-plate 71 is formed with an attaching-finger 76 which is secured in any suitable manner to the adjacent portion of the receiver 10 and which overlies the adjacent portion of the bottom wall of the fore- 70
stock portion 15, as shown in Figs. 1a, 2 and 3.

In order to make clear the operation of the automatic firearm above described and illustrated in the accompanying drawings, let it be assumed that the firearm is loaded preparatory to being fired and that the tubular-piston 50 and the connected parts are in their forward positions as indicated in Figs. 1a and 1b.

With the parts in the position just above referred to, when the trigger 75 is pulled the rearward movement of the receiver 10, with the result that the projectile or bullet will be propelled forwardly through the bore 12 of the barrel 11 and gas- 70
under-pressure will pass radially outwardly from the said bore 12 through the gas-port 52 into the forward end of the gas-chamber 51 with the result that the tubular-piston 50 will receive a rearward "kick" so to speak.

The rearward movement of the tubular-piston 50 will correspondingly move the actuating-rod 43, action-slide 37, spring-guiding plunger 53 and the associated parts. The rearward movement of the action-slide 37 will compress the breech-closing spring 33 in the tubular receiver-extension 27 and will, through the intermediary of the link 64, first rock the rear end of the breech-bolt 11 downwardly to disengage its locking-abutment 22 from the rearward end 21 of the receiver 10, following which the said breech-bolt will be moved bodily rearwardly in the bolt-receiving chamber 16 of the said receiver 10 and will effect the extraction and ejection of the just-fired cartridge.

As the action-slide 37 nears the completion of its rearward movement, the checking-surfaces 67 and 68 at its rear end will be brought into wedging engagement with the complemental checking-surfaces 65 and 60 at the rear end of the receiver 10 as is shown in Figs. 2 and 3. The engagement of the checking-surfaces as just described will serve to check the rapid rearward movement of the action-slide and its associated parts without occasioning deformation of the parts and without causing a rapid rebound such as might so rapidly close the breech-bolt 11 as to cause the same to jam against a fresh cartridge while the same is enroute into the cartridge-chamber of the barrel 11.

Owing to its resilient character, the horizontal reach 25 of the L-shaped arm 23 of the receiver 10 will yield sufficiently as the checking-surfaces above referred to come into engagement in the manner described to further assist in relatively gradually checking the rearward movement of the action-slide 37 and its connected parts, and in avoiding an objectionable rebound of the firearm.

After having been moved rearwardly as above described, the action-slide 37 and its connected parts, including the breech-bolt 11, will be moved forwardly under the urge of the breech-closing spring 33 to effect the insertion of a fresh cartridge into the cartridge-chamber of the firearm and the closing and locking of the breech-bolt 11, preparatory to again discharging the firearm. The parts will now have again assumed the positions in which they are shown in Figs. 1a and 1b.

By so constructing and arranging the parts that the rearward movement of the breech-bolt and its associated parts is checked without undue shock, not only are the parts spared the almost inevitable deformation and excessive wear, but one of the major problems connected with automatic firearms is effectively solved inasmuch as the rebound of the breech-bolt and its associated parts is so minimized or obviated as to avoid the danger of the breech-bolt closing so rapidly as to impinge against a fresh cartridge while the same is enroute into the cartridge-chamber of the barrel 11 or its equivalent.

The invention may be carried out in other specific ways than those herein set forth without departing from the spirit and essential character- 70
istics of the invention, and the present embodiment is, therefore, to be considered in all respects as illustrative and not restrictive, and all changes coming within the meaning and equivalency range of the appended claims are intended to be embraced therein.

I claim:
1. An automatic firearm including in combination: a receiver formed at its rear end with a depending L-shaped arm extending below the under face of the receiver proper and comprising a substantially-vertical reach and a substantially-horizontal reach integral with and extend- 75
ing forwardly from the lower end of the said sub- 70
stantially-vertical reach in spaced relationship below the under face of the receiver proper, the upper face of the said substantially-horizontal reach being sloped forwardly and downwardly from the said substantially-vertical reach and facing upwardly toward the upper face of the receiver proper, the upper face of the said sub- 75
stantially-horizontal reach and the under face of the receiver proper together defining a forwardly-expanding wedge-shaped recess; a breech-bolt reciprocating in the said receiver; an action-slide operatively connected to the breech-bolt and formed at its rear with a wedge-
shaped portion normally spaced forwardly from the L-shaped arm of the said receiver and having an upper face extending substantially parallel and engaging with the under face of the said receiver when the action-slide is retired rearwardly, the said action-slide also having an under face extending substantially parallel and engaging with the sloping upper face of the said substantially-horizontal reach of the L-shaped arm of the said receiver when the action-slide is retired rearwardly; and spring-means urging the said action-slide forwardly away from the L-shaped arm of the said receiver.

2. An automatic firearm including in combination: a receiver formed at its rear end with a depending L-shaped arm extending below the under face of the receiver proper and comprising a substantially-vertical reach formed intermediate its upper and lower ends with a passage leading substantially horizontally from the front to the rear thereof, the said L-shaped arm also including a substantially-horizontal reach integral with and extending forwardly from the lower end of the said substantially-vertical reach in a plane below the said passage, the upper face of the said substantially-horizontal reach being sloped forwardly and downwardly from the said substantially-vertical reach and facing upwardly toward the under face of the receiver proper, the upper face of the said substantially-horizontal reach and the under face of the receiver proper together defining a forwardly-expanding wedge-shaped recess; a breech-bolt reciprocating in the said receiver; an action-slide operatively connected to the said breech-bolt and formed at its rear with a wedge-shaped portion normally spaced forwardly from the L-shaped arm of the said receiver and having an upper face extending substantially parallel and engaging with the under face of the said receiver when the action-slide is retired rearwardly, the said action-slide also having an under face extending substantially parallel and engaging with the sloping upper face of the said substantially-horizontal reach of the L-shaped arm of the said receiver when the action-slide is retired rearwardly; a spring-guiding plunger extending rearwardly from the said action-slide in a plane intermediate the under face of the receiver proper and the sloping upper face of the substantially-horizontal reach of the L-shaped arm at the rear of the said receiver; and a helical breech-closing spring extending through the passage in the substantially-vertical reach of the L-shaped arm of the said receiver and over the spring-guiding plunger of the said action-slide and yieldingly urging the said action-slide forwardly away from the L-shaped arm at the rear end of the said receiver.

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