Feb. 27, 1945. H. L. CROCKETT 2,370,233

GAS-OPERATED SELF-LOADING FIREARM

Filed Jan. 26, 1944 2 Sheets-Sheet 1

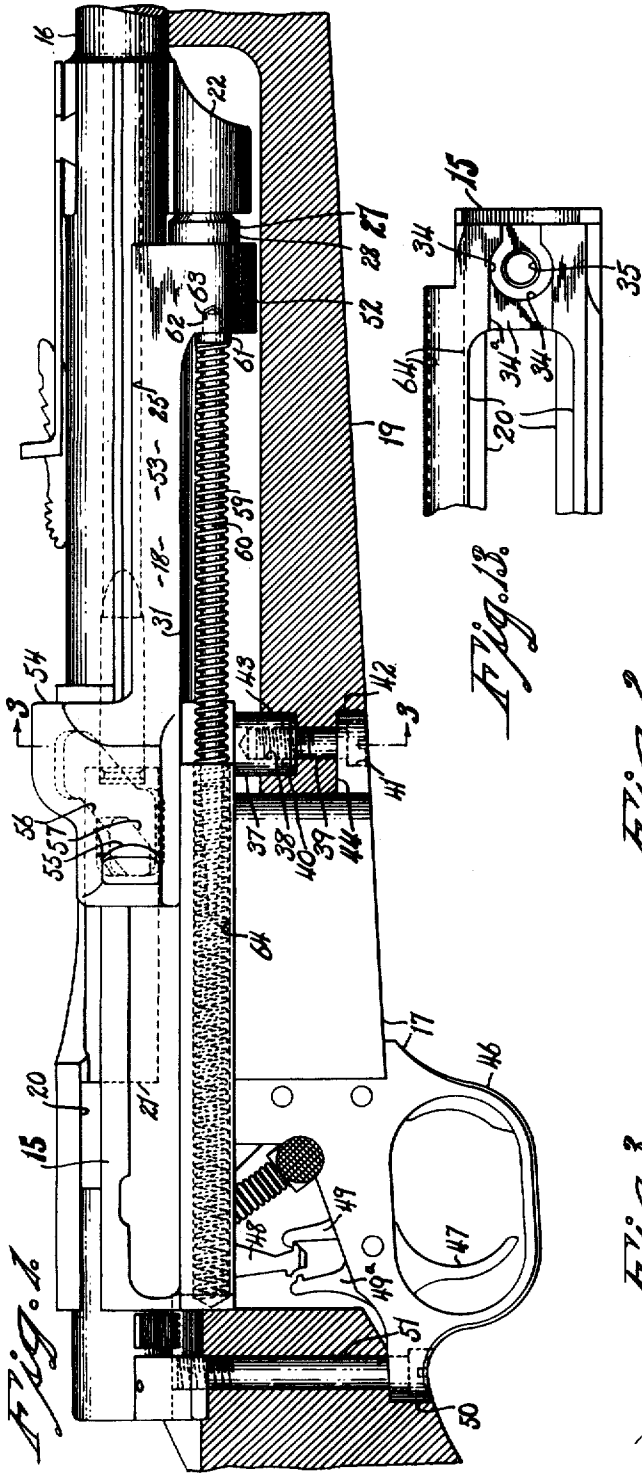


Fig. 1.

Fig. 1a.

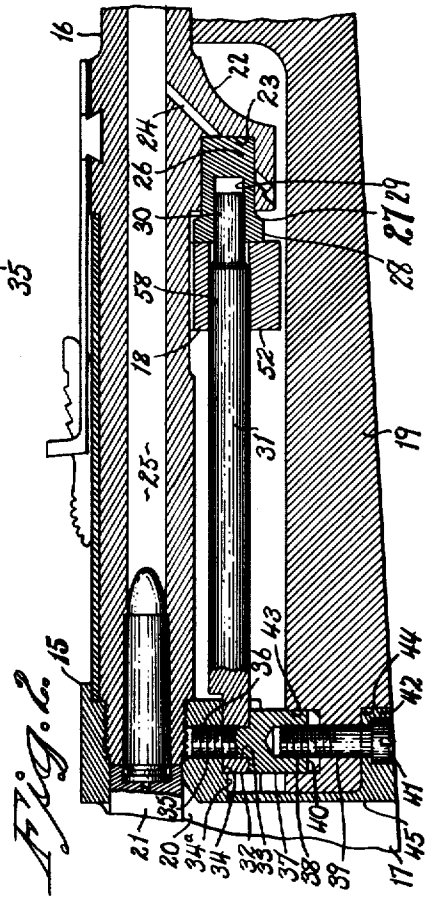


Fig. 2.

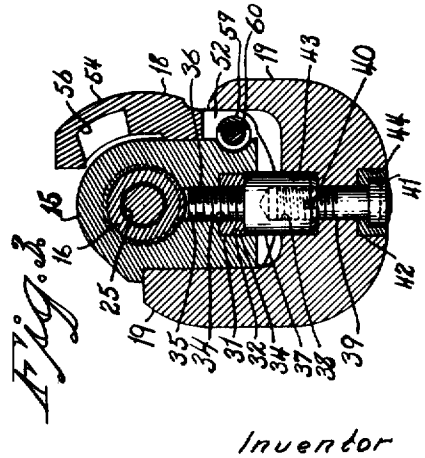


Fig. 3.

Inventor
by Harry L. Crockett
Seymour Earl Nichols
Attorneys

Feb. 27, 1945. H. L. CROCKETT 2,370,233

GAS-OPERATED SELF-LOADING FIREARM

Filed Jan. 26, 1944 2 Sheets-Sheet 2

Fig. 1.

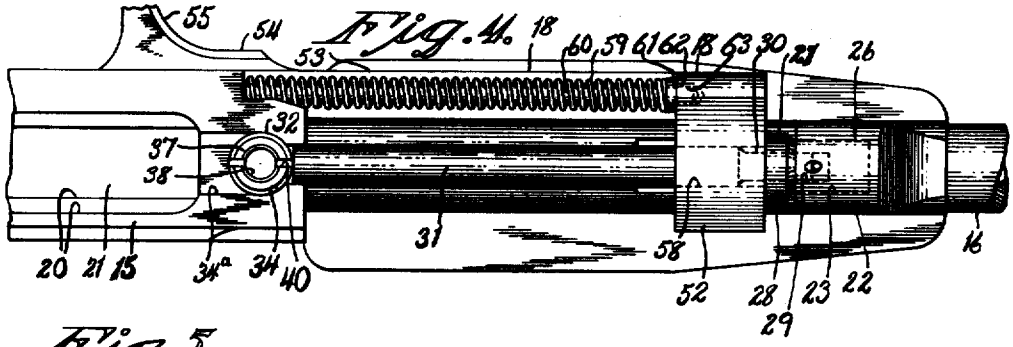


Fig. 5.

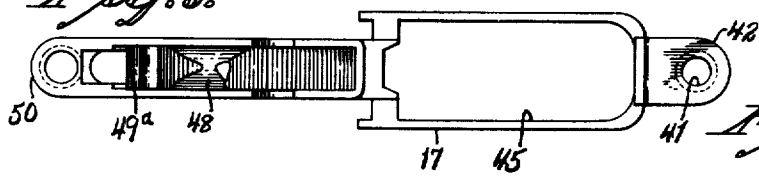


Fig. 8.

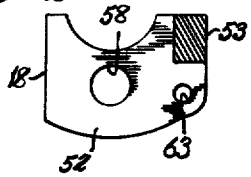


Fig. 6.

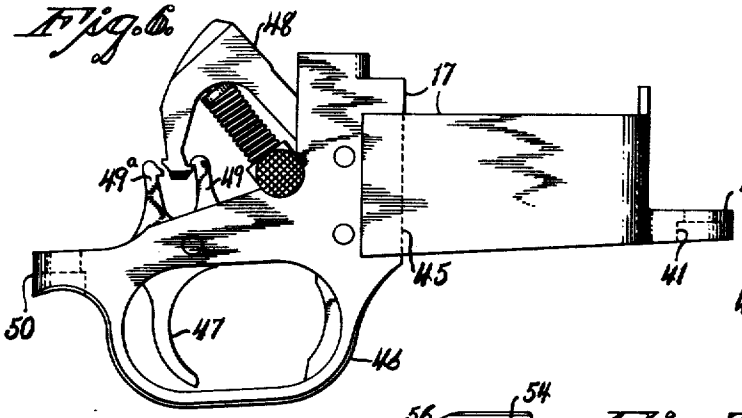


Fig. 12.

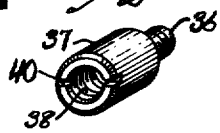


Fig. 7.

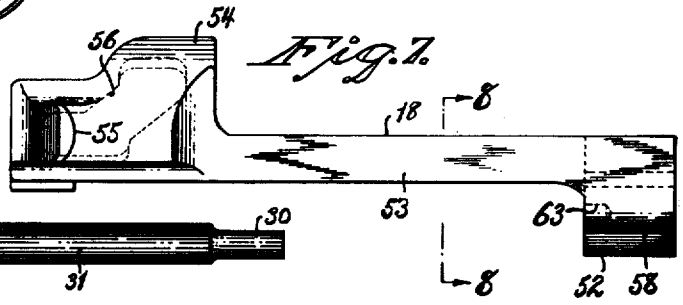


Fig. 2.



Fig. 10.



Fig. 11.



Inventor
by Harry L. Crockett
Seymour Earle Nichols
Attorneys

Patented Feb. 27, 1945

2,370,233

UNITED STATES PATENT OFFICE

2,370,233

GAS-OPERATED SELF-LOADING FIREARM

Harry L. Crockett, New Haven, Conn., assignor to Western Cartridge Company, New Haven, Conn., a corporation of Delaware

Application January 26, 1944, Serial No. 519,741

8 Claims. (Cl. 42—3)

The present invention relates to improvements in self-loading firearms and relates more particularly to improvements in gas-operated self-loading firearms, i. e., firearms of the type wherein gas pressure from the bore of the barrel actuates a piston which, in turn, actuates the breech-bolt and associated features of the firearm to effect the extraction and ejection of the just-fired cartridge, preparatory to the automatic reloading of the firearm with a fresh cartridge.

One of the objects of the present invention is to provide a superior gas-operated self-loading firearm having a stationary guide-rod and an action-slide guided thereby and in which the construction and arrangement of parts is such that the same means as is employed for mounting the said guide-rod may be utilized to retain the stock in place.

Another object of the present invention is to provide a gas-operated self-loading firearm with superior means whereby a guide-rod, stock and trigger-plate may be releasably secured in place by common means.

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.

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

Fig. 1 is a broken view of the central portion of a gas-operated self-loading firearm embodying the present invention and showing the same in side elevation, save for the stock which is shown in vertical central-longitudinal section;

Fig. 2 is a broken view in vertical central-longitudinal section of the elements of the firearm which are located adjacent the cylinder-lug of the barrel and the forward portion of the trigger-plate unit;

Fig. 3 is a transverse sectional view taken on the line 3—3 of Fig. 1;

Fig. 4 is a broken underside view of a portion of the firearm-structure with the stock and the trigger-plate unit removed;

Fig. 5 is a top or plan view of the trigger-plate unit, detached;

Fig. 6 is a view thereof in side elevation;

Fig. 7 is a view in side elevation of the action-slide-detached;

Fig. 8 is a transverse sectional view taken on the line 8—8 of Fig. 7;

Fig. 9 is a top or plan view of the guide-rod, detached;

Fig. 10 is a view thereof in side elevation;

Fig. 11 is a perspective view of the guide-rod;

Fig. 12 is a perspective view of the attaching-stud, detached; and

Fig. 13 is a broken underside view of the forward portion of the receiver.

The particular gas-operated self-loading firearm-structure chosen for illustration in the accompanying drawings to make clear one form of the present invention, comprises, as its main elements, a receiver 15, a barrel 16, a trigger-plate unit 17, an action-slide 18 and a stock 19.

The forward end of the receiver 15 has rigidly connected thereto in any suitable manner, the rear end of the aforesaid barrel 16. The said receiver is formed interiorly with a mechanism-receiving chamber 20 accommodating various features of the firearm-mechanism, which latter do not require detailed description herein, other than to note that the said mechanism includes a breech-bolt 21 having both reciprocating and oscillatory movement in the upper portion of the chamber 20 in a manner broadly similar to the breech-bolt of the well-known Garand military rifle.

As is shown in Figs. 1, 2 and 3, the stock 19 is suitably recessed to accommodate portions of the receiver 15, barrel 16, trigger-plate unit 17 and associated features of the firearm.

At a point slightly forwardly of its rear end, the barrel 16 is formed with an integral depending cylinder-lug 22 having a rearwardly-opening piston-chamber 23 therein, arranged with its longitudinal axis extending in substantial parallelism with the longitudinal axis of the barrel 16. Intersecting and leading forwardly and upwardly from the rear face of the front wall of the said piston-chamber is an inclined gas-passage 24 communicating at its forward upper end with the bore 25 of the barrel 16, so as to conduct gas under pressure from the said bore to the piston-chamber 23 for the actuation of a piston in a manner as will hereinafter appear.

Mounted for reciprocation in the piston-chamber 23 of the cylinder-lug 22, is the relatively-small-diametered forward portion 26 of a cup-shaped piston generally designated by the reference character 27. Located rearwardly of the rear face of the cylinder-lug 22, is the relatively-large-diametered head 28 of the said piston 27. The said cup-shaped piston is formed with a rearwardly-opening cylindrically-contoured socket 29 receiving with a sliding fit, the stem 30 of a guide-rod 31. The said guide-rod extends beneath the barrel 16 in substantial parallelism with the bore

25 thereof and in substantially-coaxial arrangement with respect to the central-longitudinal axis of the piston 27.

At its rear end, the guide-rod 31 is formed with an integral eye-like terminal or head 32 having a vertical passage 33 extending therethrough and having its lower face substantially flush with the under face of the guide-rod 31 proper but having its upper face located in a plane below the upper surface of the said guide-rod proper.

The upper portion of the terminal 32 of the guide-rod 31 is accommodated in a shallow downwardly-opening recess 34 formed in the under face of the forward portion of the receiver 15 while the lower portion thereof is accommodated in a longitudinal groove 34a intersecting the said recess 34. The said recess 34 has its lateral boundaries shaped to conform to the lateral boundaries of the eye-like terminal 32 of the guide-rod 31, so that the rear wall of the said recess forms a seat for the rear face of the upper portion of the said terminal 32.

Axially in line with the passage 33 in the terminal 32 of the guide-rod 31, the receiver 15 is formed with a vertical threaded socket 35 receiving the threaded stem 36 of an attaching-stud 37. The stem 36 just referred to extends upwardly from the said attaching-stud, through the passage 33 in the terminal 32 of the guide-rod 31, and thence into threaded engagement with the socket 35 in the forward portion of the receiver 15, as is particularly well shown in Figs. 2 and 3. When screwed home, the said attaching-stud 37 serves to clamp the terminal 32 of the guide-rod 31 firmly in place in the recess 34 in the receiver 15, so that the said guide-rod is firmly held against displacement.

In its lower portion, the attaching-stud 37 is formed with a downwardly-opening threaded socket 38 receiving the threaded shank of an attaching-screw 39. The lower portion of the attaching-stud 37 is also formed with a diametrical kerf 40 by means of which the attaching-stud may be rotated. The attaching-screw 39 has the head at its lower end accommodated in a downwardly-opening recess or counterbore 41 formed in a tang 42 located at the forward lower corner of the trigger-plate unit 17. The threaded stem of the attaching-screw 39 extends upwardly through the tang 42 and through the adjacent portion of the stock 19 and thence into the socket 38 in the attaching-stud 37. The lower portion of the attaching-stud 37 is accommodated in an upwardly-opening clearance-recess 43 formed in the stock 19, while the tang 42 just referred to is accommodated in a downwardly-opening recess 44 formed in the under face of the said stock.

As thus constructed and arranged, the attaching-stud 37 not only serves to hold the rear end of the guide-rod 31 in place but, with the aid of the attaching-screw 39, also serves to hold the forward portion of the trigger-plate unit 17 and the stock 19 in place.

The forward portion of the trigger-plate unit 17 before referred to, is relatively wide as compared to the rear portion thereof, and is provided with a vertical magazine-receiving passage 45 into which a suitable box-magazine may be installed from the underside of the firearm structure. The lower rear portion of the trigger-plate unit 17 is formed with a depending loop-like trigger-guard 46 in which the finger-piece 47 of a suitable trigger is adapted to move. The rear portion of the trigger-plate unit 17 also carries a hammer 48 controlled by complemental sears 49 and 49a which are, in turn, controlled by the finger-piece 47 before referred to.

At its extreme rear end, the trigger-plate unit 17 is formed with a vertically-apertured tang 50 through which extends a vertical attaching-screw 51 extending upwardly through the stock 19 and threadedly engaged with the rear part of the receiver 15.

The action-slide 18 before referred to is formed at its forward end with a front-head 52, from the upper right-hand portion of which rearwardly extends an integral side-bar 53, which latter terminates at its rear end in a rear-head 54. The rear-head 54 is formed with an outwardly-extending operating-handle 55 by means of which the firearm may be cocked and otherwise prepared for discharge. In its inner face, the rear-head 54 is formed with a cam-recess 56 into which fits a lug 57 laterally offsetting from the forward end of the breech-bolt 21. The coaction of the lug 57 and the surfaces of the cam-recess 56, serves to operatively interconnect the action-slide 18 and the breech-bolt 21 in a manner broadly similar to the connection employed in the well-known Garand military rifle.

The front-head 52 of the action-slide 18 is formed substantially centrally with a longitudinally-extending bearing-passage 58, which is proportioned to receive with a free sliding fit, the main or intermediate portion of the guide-rod 31. Normally engaged with the front face of the front-head 52 is the rear face of the cup-shaped piston 27, which latter functions to drive the action-slide rearwardly to effect the operation of the breech-bolt 21, in a manner as will hereinafter appear.

For the purpose of yieldingly urging the action-slide 18 forwardly into its foremost position and hence also urging the breech-bolt 21 into its breech-closing position, a helical breech-closing spring 59 is employed. The forward portion of the said breech-closing spring 59 encircles a breech-closing plunger 60 and has its forward end seated against the rear face of an integral collar 61 adjacent the forward end of the said plunger. Extending forwardly from the collar 61 is an integral stem 62 releasably fitting into a rearwardly-opening socket 63 formed in the rear face of the front-head 52 of the action-slide 18.

The rear portion of the breech-closing spring 59 and the rear portion of the plunger 60 extend within a forwardly-opening spring-chamber 64 formed in the lower portion of the right-hand wall of the receiver 15. The rear end of the breech-closing spring 59 thrusts against the rear wall of the spring-chamber 64 and thereby exerts a constant-but-yielding effort to maintain the action-slide 18 in its full forward position.

Normally, the breech-closing spring 59 acting through the breech-closing-plunger 60, maintains the forward face of the front-head 52 of the action-slide 18 in engagement with the rear face of the piston 27 and, in turn, maintains the forward end of the said piston against the front wall of the piston-chamber 23, as is especially well shown in Fig. 2.

When the firearm is discharged, gas under pressure will pass downwardly and rearwardly from the bore 25 of the barrel 16 and impinge against the forward end of the piston 27. Under these conditions, the piston 27 will be moved violently rearwardly until the rear face of the

front wall of the socket 29 therein engages with the front end of the stem 30 of the guide-roll 31. The movement imparted to the piston 27 as just described, will cause the piston to, in turn, impart rapid movement to the action-slide 18, which latter will be thrown rearwardly against the tension of the breech-closing spring 59.

During its rearward travel as above described, the action-slide 18 will, through the intermediary of its cam-recess 56 and the lug 57 of the breech-bolt 21, effect the unlocking and retraction of the said breech-bolt. This movement will, in the usual manner of firearms, effect the extraction and ejection of the just-fired cartridge. Following the completion of the actions just above described, the breech-closing spring will act to again restore the parts to the positions in which they are shown in Figs. 1, 2 and 4.

During the reciprocating movement of the action-slide 18, the forward portion thereof will be guided by the sliding of the surface of the bearing-passage 58 in the front-head 52 upon the guide-rod 31. The rear portion of the action-slide may be guided in any desired manner such, for instance, as by means on the receiver 16.

When it is desired to separate the elements of the firearm for purposes of inspection, repair or cleaning, the trigger-plate unit 17 and the stock 19 may be removed by first removing the attaching-screws 39 and 51. Following the removal of the two elements just mentioned, the guide-rod 31, action-slide 18 and associated elements still remain operatively connected to the firearm-structure for test, if desired. When, however, it is desired to dismount the guide-rod 31 and the action-slide 18, the attaching-stud 37 may be unscrewed and removed, whereupon the rear end of the guide-rod 31 may be slightly depressed to disengage its eye-like terminal 32 from the rear wall of the recess 34 in the receiver 16. Under these conditions, the guide-rod 31 may now be removed by moving the same rearwardly in the groove 34a, so as to slide its forward portion out of the piston 27 and out of the front-head 52 of the action-slide 18.

The breech-closing spring 59 and the breech-closing plunger 60 may be removed by first moving the said breech-closing plunger sufficiently rearward to disengage its stem 62 from the socket 63 in the front-head 52 and then deflecting the forward end of the said guide-rod laterally beyond the side wall of the said front-head 52. Under these conditions, the breech-closing spring 59 and the breech-closing plunger 60 may be withdrawn forwardly from the spring-chamber 64 in the receiver and totally disconnect it from the firearm-structure.

The action-slide 18 as thus freed from connection with the guide-rod 31 and the spring-closing plunger 60, may now itself be dismounted from the remainder of the firearm-structure.

The invention may be carried out in other specific ways than those herein set forth without departing from the spirit and essential characteristics of the invention, and the present embodiments are, 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. A gas-operated self-loading firearm-structure, including in combination: a receiver-unit; a breech-bolt movable in the said receiver-unit; a barrel projecting forwardly from the said receiver-unit; a cylinder adjacent the said barrel and having a rearwardly-opening piston-chamber communicating with the bore of the said barrel; a piston reciprocating in the piston-chamber of the said cylinder; a guide-rod formed separately from and arranged substantially coaxially with respect to the said piston and extending rearwardly from a point adjacent the same, the said guide-rod having an apertured rear end adjacent the said receiver-unit; an action-slide operatively interconnecting the said breech-bolt and the said piston and having a portion sliding on the said guide-rod; first attaching-means having a portion extending through the apertured rear end of the said guide-rod and coupling the same to the said receiver-unit; a trigger-plate unit adjacent the said receiver-unit and having a portion located in a plane below the said guide-rod; and second attaching-means extending through and releasably attaching the said trigger-plate unit to the said first attaching-means.

2. A gas-operated self-loading firearm-structure, including in combination: a receiver-unit; a breech-bolt movable in the said receiver-unit; a barrel projecting forwardly from the said receiver-unit; a cylinder adjacent the said barrel and having a rearwardly-opening piston-chamber communicating with the bore of the said barrel; a piston reciprocating in the piston-chamber of the said cylinder; a guide-rod formed separately from and arranged substantially coaxially with respect to the said piston and extending rearwardly from a point adjacent the same, the said guide-rod having an apertured rear end adjacent the said receiver-unit; an action-slide operatively interconnecting the said breech-bolt and the said piston and having a portion sliding on the said guide-rod; first attaching-means having a portion extending through the apertured rear end of the said guide-rod and coupling the same to the said receiver-unit; a trigger-plate unit adjacent the said receiver-unit and having a portion located in a plane below the said guide-rod; a stock having a portion covering parts of both the said guide-rod and the said trigger-plate unit; and second attaching-means extending through and releasably attaching the said trigger-plate unit and the said stock to the said first attaching-means.

3. A gas-operated self-loading firearm-structure, including in combination: a receiver-unit; a breech-bolt movable in the said receiver-unit; a barrel projecting forwardly from the said receiver-unit; a cylinder adjacent the said barrel and having a rearwardly-opening piston-chamber communicating with the bore of the said barrel; a cup-shaped piston reciprocating in the piston-chamber of the said cylinder and formed with a rearwardly-opening socket; a guide-rod formed separately from and arranged substantially coaxially with respect to the said cup-shaped piston and having a forward portion fitting into the socket therein, the said guide-rod having an apertured rear end adjacent the said receiver-unit; an action-slide operatively interconnecting the said breech-bolt and the said piston and having a portion sliding on the said guide-rod; first attaching-means having a portion extending through the apertured rear end of the said guide-rod and coupling the same to the said receiver-unit; a trigger-plate unit adjacent the said receiver-unit and having a portion located in a plane below the said guide-rod; and second attaching-means extending through and releasably

attaching the said trigger-plate unit to the said first attaching-means.

4. A gas-operated self-loading firearm-structure, including in combination: a receiver-unit; a breech-bolt movable in the said receiver-unit; a barrel projecting forwardly from the said receiver-unit; a cylinder adjacent the said barrel and having a rearwardly-opening piston-chamber communicating with the bore of the said barrel; a cup-shaped piston reciprocating in the piston-chamber of the said cylinder and formed with a rearwardly-opening socket; a guide-rod formed separately from and arranged substantially coaxially with respect to the said cup-shaped piston and having a forward portion fitting into the socket therein, the said guide-rod having an apertured rear end adjacent the said receiver-unit; an action-slide operatively interconnecting the said breech-bolt and the said piston and having a portion sliding on the said guide-rod; first attaching-means having a portion extending through the apertured rear end of the said guide-rod and coupling the same to the said receiver-unit; a trigger-plate unit adjacent the said receiver-unit and having a portion located in a plane below the said guide-rod; a stock having a portion covering parts of both the said guide-rod and the said trigger-plate unit; and second attaching-means extending through and releasably attaching the said trigger-plate unit and the said stock to the said first attaching-means.

5. A gas-operated self-loading firearm-structure, including in combination: a receiver-unit formed adjacent its forward end with a downwardly-opening threaded socket; a breech-bolt movable in the said receiver-unit; a barrel projecting forwardly from the said receiver-unit; a cylinder adjacent the said barrel and having a rearwardly-opening piston-chamber communicating with the bore of the said barrel; a piston reciprocating in the piston-chamber of the said cylinder; a guide-rod formed separately from and arranged substantially coaxially with respect to the said piston and extending rearwardly from a point adjacent the same, the said guide-rod having an apertured rear end adjacent the threaded socket in the said receiver-unit; an action-slide operatively interconnecting the said breech-bolt and the said piston and having a portion sliding on the said guide-rod; an attaching-stud having a threaded stem extending upwardly through the apertured rear end of the said guide-rod and into the threaded socket in the said receiver-unit to couple the said guide-rod to the said receiver-unit; a trigger-plate unit adjacent the said receiver-unit and having a portion located in a plane below the said guide-rod and the said attaching-stud; and an attaching-screw extending upwardly through the said trigger-plate unit into threaded engagement with the said attaching-stud to releasably connect the forward portion of the said trigger-plate unit to the said attaching-stud.

6. A gas-operated self-loading firearm-structure, including in combination: a receiver-unit formed adjacent its forward end with a downwardly-opening threaded socket; a breech-bolt movable in the said receiver-unit; a barrel projecting forwardly from the said receiver-unit; a cylinder adjacent the said barrel and having a rearwardly-opening piston-chamber communicating with the bore of the said barrel; a piston reciprocating in the piston-chamber of the said cylinder; a guide-rod formed separately from and arranged substantially coaxially with respect to the said piston and extending rearwardly from a point adjacent the same, the said guide-rod having an apertured rear end adjacent the threaded socket in the said receiver-unit; an action-slide operatively interconnecting the said breech-bolt and the said piston and having a portion sliding on the said guide-rod; an attaching-stud having a threaded stem extending upwardly through the apertured rear end of the said guide-rod and into the threaded socket in the said receiver-unit to couple the said guide-rod to the said receiver-unit; a trigger-plate unit adjacent the said receiver-unit and having a portion located in a plane below the said guide-rod and the said attaching-stud; a stock extending intermediate the forward portion of the said trigger-plate unit and the said receiver-unit; and an attaching-screw extending upwardly through the said trigger-plate unit and the said stock into threaded engagement with the said attaching-stud to releasably connect the said trigger-plate unit and the said stock to the said attaching-stud.

7. A gas-operated self-loading firearm-structure, including in combination: a receiver-unit formed adjacent its forward end with a downwardly-opening threaded socket; a breech-bolt movable in the said receiver-unit; a barrel projecting forwardly from the said receiver-unit; a cylinder adjacent the said barrel and having a rearwardly-opening piston-chamber communicating with the bore of the said barrel; a cup-shaped piston reciprocating in the piston-chamber of the said cylinder and formed with a rearwardly-opening socket; a guide-rod formed separately from and arranged substantially coaxially with respect to the said cup-shaped piston and having a forward portion fitting into the socket therein, the said guide-rod having an apertured rear end adjacent the threaded socket in the said receiver-unit; an action-slide operatively interconnecting the said breech-bolt and the said piston and having a portion sliding on the said guide-rod; an attaching-stud having a threaded stem extending upwardly through the apertured rear end of the said guide-rod and into the threaded socket in the said receiver-unit to couple the said guide-rod to the said receiver-unit; a trigger-plate unit adjacent the said receiver-unit and having a portion located in a plane below the said guide-rod and the said attaching-stud; and an attaching-screw extending upwardly through the said trigger-plate unit into threaded engagement with the said attaching-stud to releasably connect the forward portion of the said trigger-plate unit to the said attaching-stud.

8. A gas-operated self-loading firearm-structure, including in combination: a receiver-unit formed adjacent its forward end with a downwardly-opening threaded socket; a breech-bolt movable in the said receiver-unit; a barrel projecting forwardly from the said receiver-unit; a cylinder adjacent the said barrel and having a rearwardly-opening piston-chamber communicating with the bore of the said barrel; a cup-shaped piston reciprocating in the piston-chamber of the said cylinder and formed with a rearwardly-opening socket; a guide-rod formed separately from and arranged substantially coaxially with respect to the said cup-shaped piston and having a forward portion fitting into the socket therein, the said guide-rod having an apertured rear end adjacent the threaded socket in the said receiver-unit; an action-slide operatively interconnecting the said breech-bolt and the said pis-

ton and having a portion sliding on the said guide-rod; an attaching-stud having a threaded stem extending upwardly through the apertured rear end of the said guide-rod and into the threaded socket in the said receiver-unit to couple the said guide-rod to the said receiver-unit; a trigger-plate unit adjacent the said receiver-unit and having a portion located in a plane below the said guide-rod and the said attaching-stud; a stock extending intermediate the forward portion of the said trigger-plate unit and the said receiver-unit; and an attaching-screw extending upwardly through the said trigger-plate unit and the said stock into threaded engagement with the said attaching-stud to releasably connect the said trigger-plate unit and the said stock to the said attaching-stud.

HARRY L. CROCKETT.