Dec. 6, 1938. W. H. CHAMBERS 2,139,648

GUN

Filed Dec. 24, 1936 2 Sheets-Sheet 1

Fig. 1.

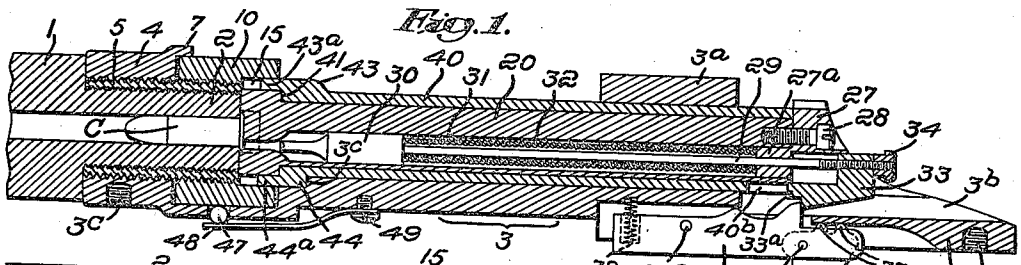


Fig. 2.

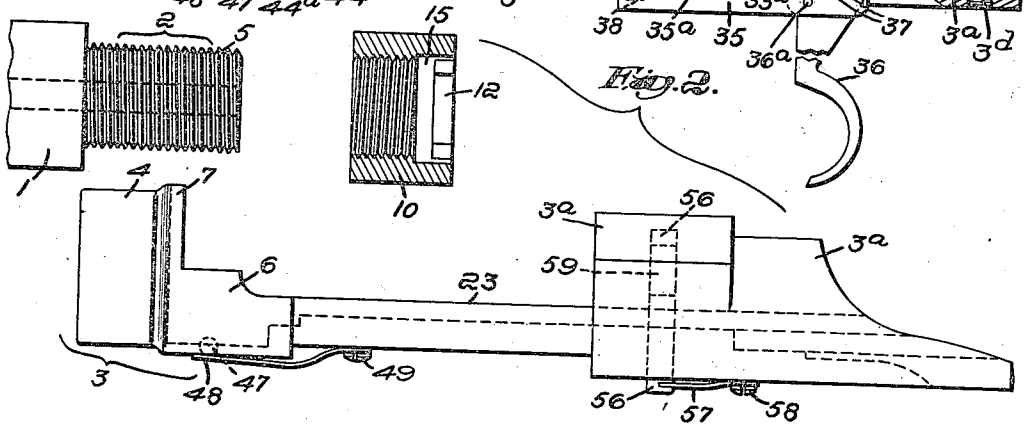


Fig. 3

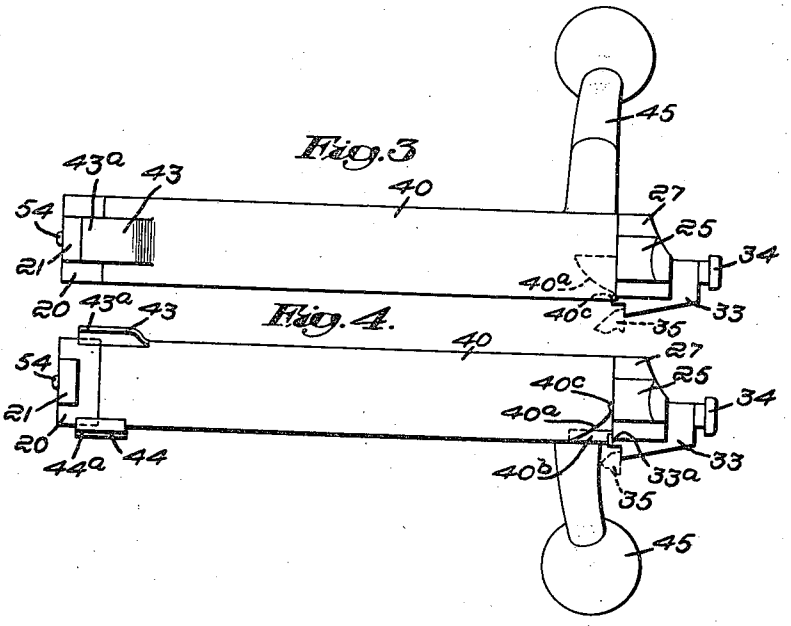


Fig. 4.

Inventor:
Walter H. Chambers,
by Emery, Booth, Townsend, Miller & Weidner
Attys

Dec. 6, 1938. W. H. CHAMBERS 2,139,648

GUN

Filed Dec. 24, 1936 2 Sheets-Sheet 2

Fig. 5.

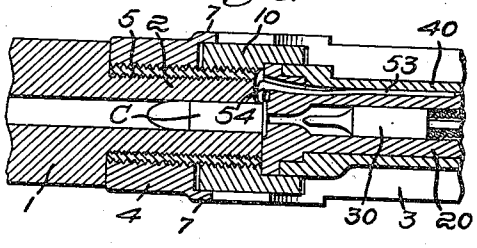


Fig. 6.

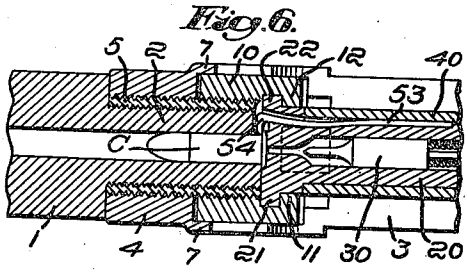


Fig. 7.

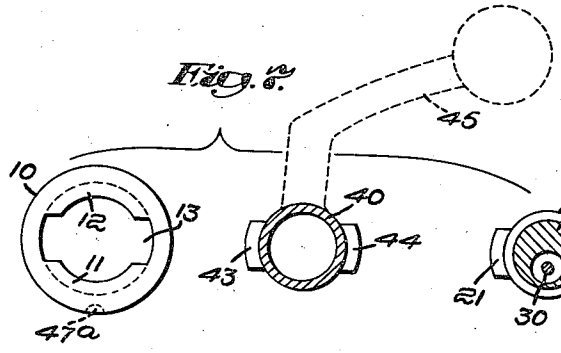


Fig. 8.

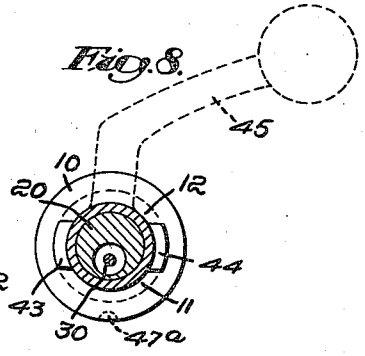


Fig. 9.

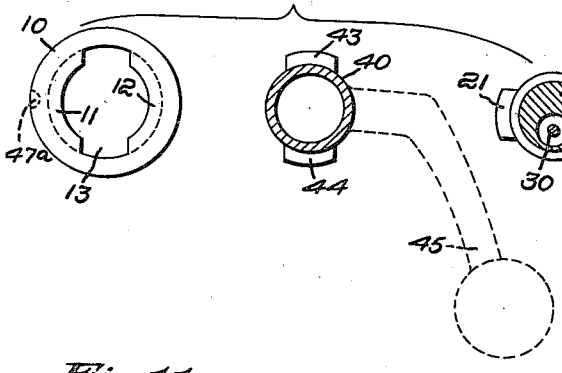


Fig. 10.

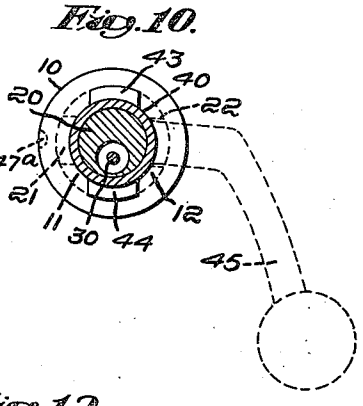


Fig. 11.

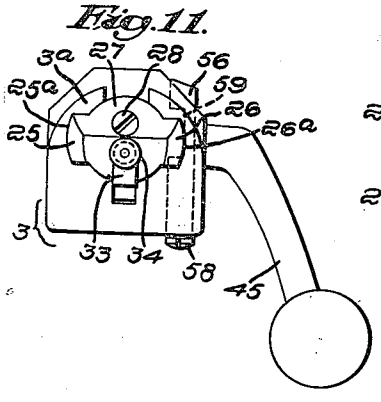
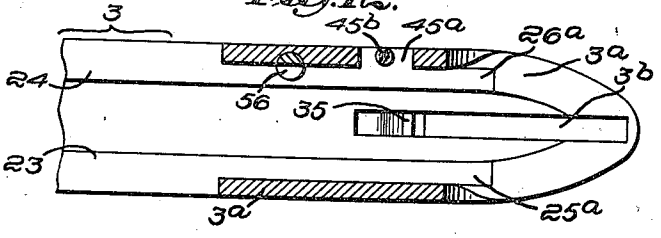


Fig. 12.



Inventor:
Walter H. Chambers,
by Emery, Booth, Townsend, Miller and Weidner
Attys

Patented Dec. 6, 1938 2,139,648

UNITED STATES PATENT OFFICE

2,139,648

GUN

Walter H. Chambers, Stoneham, Mass.

Application December 24, 1936, Serial No. 117,438

11 Claims. (Cl. 42—16)

My present invention relates to guns, more particularly to breech closures and breech mechanism therefor, and aims to provide simplified and otherwise improved means affording and maintaining a strong, efficient and uniform closure action with avoidance of inaccuracies commonly resulting from variations with respect to the so-called headspace between the firing chamber or barrel and the closure element. While especially concerned with such mechanism as pertaining to firearms and small arms, including particularly rifles, whether hand-operated, semi-automatic or full-automatic, in its broader aspects the invention is applicable in connection with guns in general.

In the drawings illustrating by way of example one embodiment of the invention,

Fig. 1 is a longitudinal vertical section through the breech and receiver of a rifle in accordance with one form of the invention;

Fig. 2 is an expanded view showing the receiver and the rear portion of the barrel in side elevation and a locking element in vertical section;

Figs. 3 and 4 are side elevational views of the bolt and lock operating element, respectively in the unlocked and the locked positions;

Figs. 5 and 6 are horizontal sections in the plane of the barrel axis, the bolt appearing in closed but non-locked position in Fig. 5 and in locked position in Fig. 6;

Figs. 7 and 8 are partially diagrammatic views, Fig. 7 representing the locking element, the lock operating element and the bolt as when unlocked and Fig. 8 showing said parts in the same position but superposed, as viewed from the rear;

Figs. 9 and 10 are views similar to Figs. 7 and 8 respectively, but with the parts in their locked position;

Fig. 11 is a rear elevation of the receiver and closure, with the operating element in locked position; and

Fig. 12 is a horizontal section through the rear portion of the receiver.

Referring more particularly to the drawings, and first to Figs. 1 and 2, the invention is there illustrated as embodied in a rifle comprising a barrel 1 having at its rear an elongated, integral portion or extension 2 adapted for fixed connection with the receiver, which latter is indicated as a whole by the numeral 3. In some instances said rear portion 2 of the barrel may be screwed directly into the sleeve-like front end 4 of the receiver but in the present example I have shown an intermediate adjustable and replaceable barrel sleeve 5 threaded in fixed position on the barrel and itself externally threaded for engagement in a like threaded formation at said front end 4 of the receiver.

It will be noted that the rear extension of the barrel, which provides the actual firing chamber, extends through and rearwardly of said sleeve-like front end 4 of the receiver, in their assembled position as in Fig. 1, and into a cylindrical recess in the receiver, herein defined by lower side and bottom wall portions 6 and a complementary upper portion 7, illustrated as of relatively short rearward extent but which may be prolonged rearwardly to any length desired. This recessed portion of the receiver, adjacent the extended rear end of the barrel, is adapted to receive rotatably a rotary locking element or locking sleeve 10. As best seen in Fig. 2, this locking element is internally threaded, in this instance for reception on the barrel or on the fixed sleeve 5 which in effect is an integral portion of the barrel.

As will be understood from the further description this locking element or collar and its inclined-plane or threaded connections with the barrel, or with the movable closure element or bolt to be described, are so constructed and arranged as to permit ready turning of the collar on and relatively to the barrel, herein through 90°, to bring the breech closing element or bolt forcibly into intimate locked abutting contact directly with the rear face of the barrel or firing chamber itself, without attendant turning of the head of the bolt, and in such manner as to afford substantially complete uniformity of head space under all operating conditions. It will also be understood that while I have herein illustrated and refer to inclined-plane or threaded formations between the locking element and the barrel, and abutments or lugs between said locking element and the bolt, the reverse or interchanged construction may be employed.

Accordingly, in the illustrated embodiment, the locking element 10 is formed with interrupted abutment means comprising angularly spaced and herein oppositely disposed arcuate lugs or flanges 11, 12 having between them an operating recess or slot 13; see Figs. 7 and 9. In the unlocked position of the parts, in the present example, said locking lugs 11, 12 and operating slot 13 of the locking element 10 stand horizontally, as in Fig. 7, while in the locked position they are vertical, as in Fig. 9. Forwardly of said lugs 11, 12 the locking element or collar 10 has an annular recess 15, between the lugs and its

threaded portion, for reception of locking lugs on the bolt, in the manner to be described.

The breech closure element proper comprises a bolt or block 20 illustrated as an elongated member having oppositely disposed locking lugs 21, 22 projecting laterally, herein horizontally, at its front end or head; see particularly Figs. 3, 4, 6 and 7 to 10. The bolt 20 is supported for longitudinal reciprocating movement in the receiver 3 but is held against rotary or turning movement. Hence the lateral locking lugs 21, 22 at the bolt head at all times occupy their substantially horizontal position as in the figures.

Turning of the bolt is prevented in part by said locking lugs 21, 22, which during opening and closing movement of the bolt ride on longitudinal ways 23, 24 in the receiver, see Fig. 12. It is further prevented in the closed position of the bolt as by means of lateral lugs 25, 26, Figs. 3, 4 and 11, on an end piece 27 fitted at the rear of the bolt 20, secured to it by the screw 28, Figs. 1 and 11. In the closed position of the bolt said lugs 25, 26 are received in corresponding slots 25^a, 26^a, Fig. 11, in the enclosing rear portion 3^a of the receiver. The bottom walls of said slots 25^a, 26^a are in line with and are in effect extensions of the ways 23, 24.

Referring to Fig. 1, said fixed but detachable end piece 27 of the bolt has a depending front portion 27^a which is longitudinally apertured to provide a bearing for the stem 29 of the firing pin 30 slidably received in a longitudinal cylindrical recess 31 in the bolt, herein having its axis at a level below the axis of the bore, for cooperation of the firing pin with cartridges C of the rim-fire type. A shallow recess is formed either in the rear wall of the barrel or firing chamber, or in the front face of the bolt—at said latter location in the illustrated example—to receive the head of the cartridge. A firing pin spring 32 surrounds and is guided by the stem 29 of the firing pin, bearing between the firing pin proper 30 and said depending portion 27^a of the bolt end piece 27.

The firing pin stem 29 carries at its rear end a cocking piece 33 in which the stem 29 is threaded and secured as by a nut 34. The receiver has a longitudinal slot 3^b in the rear portion of its bottom wall, for sliding reception of said cocking piece. The latter cooperates with a sear 35 pivoted as at 35^a on the receiver or other fixed part. Suitable trigger means is provided, herein including a trigger 36 operatively connected with the sear as by a pivot 36^a and having fulcrum points 37 engaging the adjacent overlying portion of the receiver. A sear spring 38 normally holds the sear elevated, in position to engage in front of the cocking piece 33. It will be understood that the firing mechanism as shown and described is merely illustrative, may be widely varied within the contemplation of my invention, and may be arranged for single-shot action as shown, or for semi-automatic or full-automatic action where the gun is equipped with a magazine. While the rifle as illustrated is of the single-loading type, particularly adapted for target work, any known or preferred magazine and loading mechanism may be supplied.

Referring again to the breech closure elements, and particularly Figs. 1, 3 and 4, means is provided for turning the locking element 10, in the forward position of the bolt, to lock the latter in direct engagement with the rear wall of the barrel, and for unlocking it. Such means may be variously constructed and arranged. In the illustrated example it comprises a generally cylindrical operating sleeve 40 rotatably carried by the bolt. Said sleeve is herein substantially coextensive with the bolt and is held in place on it between the bolt rear piece 27 and an annular shoulder 41 upon the bolt head.

At the front end of said lock operating sleeve 40 is a pair of oppositely disposed actuating lugs 43, 44 having projecting portions 43^a, 44^a extending forwardly beyond said shoulder 41 and adapted, in the closed position of the bolt, to enter the operating slot 13 of the locking collar 10. Said actuating lugs 43, 44 are similarly shaped and proportioned as the locking lugs 21, 22 of the bolt and are so located that in one position of the sleeve 40 relative to the bolt, namely the unlocking position as in Figs. 3, 5, 7 and 8, said lugs on the sleeve and those on the bolt stand in longitudinal alignment substantially in continuation of each other, and in line with the operating slot 13 of the locking collar 10, then in its horizontal or unlocked position. The operating sleeve 40 is equipped with a suitable hand lever 45 for effecting the unlocking and opening, and reverse movements, of the bolt and sleeve.

From the foregoing description taken in connection with the drawings, and referring now particularly to Figs. 3, 7 and 8, it will be seen that in the unlocked position of the parts, and throughout the non-rotating longitudinal movement of the bolt between open and closed positions, the operating slot 13 of the locking collar 10, the actuating lugs 43, 44 of the operating sleeve 40 and the locking lugs 21, 22 of the bolt 20 all stand in alignment, herein in the horizontal plane, as in said figures. Hence as the bolt and sleeve are moved forwardly together, both pairs of lugs will enter the locking collar 10. Forward movement of the bolt and sleeve is terminated by engagement of the bolt against the barrel. At such time the bolt lugs 21, 22 are transversely in line with the annular recess 15 of the locking collar, in advance of the collar lugs 11, 12, and the front ends 43^a, 44^a of the sleeve lugs 43, 44 stand in the operating slot 13 between said collar lugs. Accordingly, as the operating sleeve 40 is then turned through 90°, by swinging the operating lever 45 downwardly from its position as in Figs. 3, 7 and 8 to that of Figs. 4, 9 and 10, it imparts a like rotary movement to the locking collar 10, moving it from the horizontal position of its operating slot 13 to the substantially vertical position thereof as in Figs. 9 and 10. Since the bolt 20 is prevented from turning, this rotation of the locking collar 10 brings the lugs 11, 12 of the latter into locking position behind the lugs 21, 22 of the bolt. And by reason of the inclined plane or threaded connections between the locking collar and the barrel, the collar is moved or cammed forwardly with respect to the barrel and hence, through the described interengagement of the lugs of the locking collar and of the bolt, the latter is forcibly drawn into intimate contact with the rear wall of the barrel. It will be particularly noted, however, that no relative turning movement occurs between the bolt and the barrel or between any portion of their mutually contacting surfaces. The hand lever 45, in its down or locked position of Figs. 4, 9, 10 and 11 is received in a notch 45^a in the adjacent side wall of the rear portion 3^a of the receiver. Rearward movement of the locked bolt assembly is additionally prevented by the engagement of the squared rear face of the

lug 44 of the sleeve 40 in front of a shoulder 3c on the lower wall of the receiver 3, said shoulder constituting the rear wall of an arcuate recess providing in the receiver to take said lug 44.

Desirably suitable means is provided for holding the locking element or collar 10 in given angular position, particularly while the bolt is open, to insure that the operating slot 13 is properly aligned, herein horizontally as in Fig. 7, to receive the bolt lugs 21, 22 and the sleeve lugs 43, 44 on subsequent closing of the bolt. As best seen in Figs. 1 and 2 I have herein illustrated for the purpose a ball detent 47 set in a recess in the receiver 3 adjacent the locking collar 10 and urged inwardly toward the latter as by a spring 48 supported on the receiver as by the screw 49. At the appropriate point on the outer wall of the locking collar is a recess 47a, herein disposed at or near the bottom of said collar when the latter is in its unlocked position, Figs. 7 and 8. As the collar is rotated into its unlocked position of said figures the ball detent 47 snaps into the recess 47a and so yieldably retains the collar in the desired angular position during the rearward and return movements of the bolt assembly.

Provision desirably is made for automatically cocking the firing pin. For this purpose, referring to Figs. 1, 3 and 4, I have shown the operating sleeve 40 as formed with a cocking cam 40a for cooperation with a nose 33a on the cocking piece 33. In Figs. 3 and 4 the firing pin is seen in cocked position, the elevated position of the sear 35 being indicated in dotted line. It will be understood that when the rifle is fired the firing pin 30 and cocking piece 33 move forward, the cocking nose 33a of the latter advancing into a recess 40b provided for it in the sleeve 40. In this fired position the cocking nose 33a is adjacent the forward portion of the cam 40a, seen at the bottom of the sleeve 40 in Fig. 4. As the sleeve is rotated from the locked position of Fig. 4 to the unlocked position of Fig. 3, by swinging the operating handle 45 upwardly, the cocking piece 33 and the attached firing pin 29, 30 are cammed rearwardly, the nose 33a riding along the edge of the cam formation 40a until received in a notch 40c at the rear thereof. Said notch affords an additional safety feature, preventing forward movement of the pin until the bolt is closed and the locking sleeve 40 has been turned toward its position in Fig. 4. It also serves, in cooperation with the firing pin spring, to retain the main parts of the bolt assembly in their proper relative alignment when in unlocked position, and particularly when said assembly is removed from the gun.

The bolt is suitably equipped with an extractor, one form of which is seen in Figs. 4 and 6. As there illustrated it comprises an elongated spring shank 53 received in a recess intermediate the bolt and the locking sleeve and carrying at its front end a radially movable hook 54 received in a corresponding recess in the rear wall of the barrel or firing chamber and adapted to snap over the rim of the cartridge C. Because of the non-rotary relation between the bolt head and the barrel the recess in the barrel for the extractor head can be confined substantially to the size of the latter, thus avoiding the necessity either for an extended arcuate recess in the barrel or for building the extractor onto the outside of the bolt in a manner permitting relative angular movement between the bolt and extractor. For the same reason, objectionable turning of the extractor relative to and while engaged with the cartridge is avoided. Any preferred means may be provided for ejecting the empty shells upon withdrawal of the bolt.

In the illustrated construction the longitudinal slots 25a, 26a at the rear of the receiver for the rear guide lugs 25, 26 of the bolt are proportioned to permit the lugs 43, 44 of the locking sleeve and the locking lugs 21, 22 of the bolt to pass rearwardly through said slots, thus allowing ready removal of the entire bolt assembly as a unit, for cleaning, inspection and replacement purposes. Normally the bolt assembly is retained in the receiver by suitable means, which may be variously constructed and arranged. As best seen in Figs. 2, 11 and 12 such means herein comprises a plunger or detent 56 slidable vertically in a recess in one side wall of the receiver 3. This detent is normally held up in bolt-stopping position, as in Fig. 11, by a spring 57 having slotted connection with the lower end of the detent and fixed on the receiver as by a screw 58. At the inner face the detent is a notch 59 of the height of the several lugs of the bolt assembly. The bottom wall or shoulder of said notch stands in the path of the lug 44 of the sleeve, in the normal elevated position of the detent as in Fig. 11, thus blocking the withdrawal of the bolt assembly, it being again noted that said lug 44 has a substantially perpendicular rear face. To withdraw the bolt assembly it is necessary merely to depress the exposed upper end of the detent 56 so as to bring its notch 59 in line with lugs of the sleeve and bolt.

It will be understood that any known or preferred form of stock, grip, sight and other usual parts and accessories for a complete gun or rifle, not necessary to illustrate herein, may be provided. The receiver is adapted to be secured in the stock by suitable screws, threaded apertures for their reception being indicated in Fig. 1 in the under portion of the receiver, at both front and rear, as at 3c and 3d.

It will be apparent that the dominant feature of the breech closure means of my invention, is the provision for direct locking of the non-rotated closure or bolt to the walls of the firing chamber or rear end of the barrel by a third or separately movable element having a cam or screw engagement with one of said parts and an abutting engagement with the other. Said closure means may be arranged for operation otherwise than by a hand-lever such as illustrated, which the operator moves angularly and longitudinally, and, for example, is readily adapted for use with straight-pull, pump, and lever types of actions.

Instead of the removable or adjustable barrel sleeve 5, or in addition to such provision for take-up and adjustment to compensate for possible wear, means may be supplied for variably limiting the down turning movement of the bolt handle 45, such as set screw 45b or like vertically adjustable element at the base of the handle notch 45a in the receiver. As previously noted, the breech mechanism of my invention permits the bolt to be locked at its head, and directly against the rear of the barrel or firing chamber, without turning of the bolt. Various structural advantages in that connection, such as the overcoming of mechanical difficulties associated with cartridge extraction common with head-locked bolts as heretofore known, have been pointed out in the foregoing description. But of even greater importance is the fact that in accordance with the construction and arrangement as herein de-

scribed and illustrated by way of example there is a resultant uniform locking at the head of the bolt, and a practical elimination of objectionable head-space. These several factors all contribute to afford for my gun a maintained accuracy of fire in a remarkable degree and in the presence of full safety of operation.

My invention is not limited to the particular embodiment thereof as illustrated and described herein, and I set forth its scope in my following claims:

1. A bolt assembly for a hand-operated gun comprising an elongated cylindrical bolt, one or more lateral locking lugs fixed on the bolt head, an operating sleeve rotatably mounted on the bolt, means on the bolt holding the sleeve against longitudinal movement relative thereto, and one or more lateral lugs at the front end of the sleeve, said sleeve lugs adapted to aline lengthwise with the bolt lugs in one relative angular position of the sleeve and bolt.

2. In combination, in a hand-operated gun having a barrel and a receiver, a bolt assembly comprising an elongated cylindrical bolt, one or more lateral locking lugs fixed on the bolt head, an operating sleeve rotatably mounted on the bolt, means on the bolt holding the sleeve against longitudinal movement relative thereto, one or more lateral lugs at the front end of the sleeve, said sleeve lugs adapted to aline lengthwise with the bolt lugs in one relative angular position of the sleeve and bolt, and a rotary locking element engageable with the barrel and having abutment means adapted for reception behind the locking lug or lugs of the bolt in one angular position of said element, the latter constructed and arranged for engagement by the lug or lugs of the sleeve, whereby turning of the sleeve effects a like turning of said element to lock the bolt at its head to the barrel.

3. In a hand-operated gun, in combination, a receiver, a barrel secured in the front end of the receiver, a recess formation in the front portion of the receiver, the rear portion of the barrel including its firing chamber being extended to project into said recess formation, a locking collar rotatably positioned in said recess and supported on the barrel, cooperating threaded formations directly engaging each other, one on the barrel and the other on said collar, an abutment locking formation on the collar and spaced from the rear wall of the barrel, a longitudinally slidable bolt non-rotatably supported in the receiver, the head of said bolt having an abutment locking formation and being receivable in the collar with its said locking formation in advance of that of the latter, and means for turning the collar to align said locking formations thereby to lock the bolt to the barrel.

4. In a gun in accordance with claim 3, the construction wherein the means for turning the collar comprises a sleeve member rotatable on the bolt and an operating lever connected with said sleeve member.

5. In a manually operated gun, in combination; a receiver; a barrel secured in the receiver; a bolt mounted for non-rotary reciprocating movement in the receiver; a sleeve-like locking element rotatably supported concentrically by a rear portion of the barrel for directly interlocking the barrel and the head of the bolt in the closed position of the latter, said locking element having interrupted abutment locking means and inclined-plane connecting means; other abutment means and inclined-plane connecting means respectively corresponding with those of the locking element, one of said second-mentioned means being formed directly on the barrel and the other on the bolt head, whereby rotation of the locking element forcibly locks the bolt head against the rear face of the barrel and directly to said rear portion of the latter through said locking element interlocking therewith while avoiding rotational movement between the abutting faces of the bolt head and barrel; and means for turning the locking element.

6. In a manually operated gun, a receiver, a barrel secured therein, a bolt having non-rotatable longitudinal reciprocating movement in the receiver, a rotary locking element supported on and having direct threaded connection with the barrel and having angularly spaced abutment means disposed circumferentially of the bolt, a locking formation on the bolt head adapted for reception in a transverse plane in advance of said abutment means when the bolt is closed, and means to turn the locking element to bring its abutment means into locking position behind said head locking formation of the closed bolt.

7. In a manually operated gun, a receiver, a barrel secured therein, a bolt having non-rotatable longitudinal reciprocating movement in the receiver, a rotary locking element supported on and having direct threaded connection with the barrel and having angularly spaced abutment means disposed circumferentially of the bolt, a locking formation on the bolt head adapted for reception in a transverse plane in advance of said abutment means when the bolt is closed, means to turn the locking element to bring its abutment means into locking position behind said head locking formation of the closed bolt, and a spring-pressed detent for holding the locking element in bolt-releasing and receiving position.

8. In a gun having a barrel and a receiver, in combination, a longitudinally slidable bolt, means to prevent rotation of the bolt, a rotary locking collar supported on and having direct-threaded engagement with the barrel and adapted to receive and positively interlock with the front end or head of the bolt, interengageable abutment formations on the collar and on the bolt head for effecting said interlocking engagement, means to turn said collar relatively to position said formations so as to lock and unlock the bolt at its head, and automatic means releasable to retain the locking collar in unlocking position during retraction and return of the bolt.

9. In a hand-operated gun, in combination, a receiver, a barrel fixed in the receiver, a bolt slidably and non-rotatably supported in the receiver, a rotary locking collar upon and having threaded connection directly with a rear portion of the barrel and adapted to receive the head of the bolt, interengageable circumferentially interrupted abutments on the bolt head and on the locking collar constructed and arranged to align longitudinally in the closed and locked positions of the bolt and collar and acting to draw the bolt head non-rotatably into intimate locked contact directly with the rear face of the barrel by turning of the collar on the barrel in one direction and to release the bolt for rearward opening withdrawal thereof by turning of the collar on the barrel in the opposite direction, and means for so turning the collar.

10. In a manually-operated gun, in combination, a receiver having a forward sleeve-like por-

tion and a recessed portion rearwardly thereof, a barrel fixed in said forward portion of the receiver and extending rearwardly into said recessed portion, a bolt mounted in the receiver for non-rotary longitudinal reciprocating movement and having a head engageable behind the rear end of the barrel to close the firing chamber therein, transverse locking lugs fixed on said head of the bolt, a locking element concentrically surrounding the rear end of the barrel and rotatable thereon to locking and unlocking positions, said element having an internal annular recessed portion and spaced abutments rearwardly thereof arranged to admit the bolt head and its locking lugs into said recessed portion, in one angular position of the locking element, and to stand behind said bolt head lugs and block rearward movement of the bolt in another angular position of the locking element, threaded interlocking connections between the locking element and said barrel rear end adapted to advance and retract the locking element axially to urge the locked bolt head into uniform closing engagement with the barrel and its firing chamber, and manual means mechanically associated with the bolt for engaging and turning the locking element.

11. A bolt assembly for a hand-operated gun comprising an elongated cylindrical bolt, one or more lateral locking lugs fixed on the bolt head, an operating sleeve rotatably mounted on the bolt, means holding the sleeve against longitudinal movement relative to the bolt, one or more lateral lugs at the front end of the sleeve, said sleeve lugs adapted to aline lengthwise with the bolt lugs in one relative angular position of the sleeve and bolt, a firing-pin channel eccentrically disposed in the bolt, and a firing-pin in said channel.

WALTER H. CHAMBERS.

CERTIFICATE OF CORRECTION.

Patent No. 2,139,648. December 6, 1938.

WALTER H. CHAMBERS.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, second column, line 52, claim 8, for the word "releasable" read releasably; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 31st day of January, A. D. 1939.

Henry Van Arsdale

(Seal) Acting Commissioner of Patents.