

J. F. MEIGS & S. A. S. HAMMAR.

FIRING MECHANISM FOR GUNS.

APPLICATION FILED JAN. 11, 1906.

958,660.

Patented May 17, 1910.

3 SHEETS—SHEET 1.

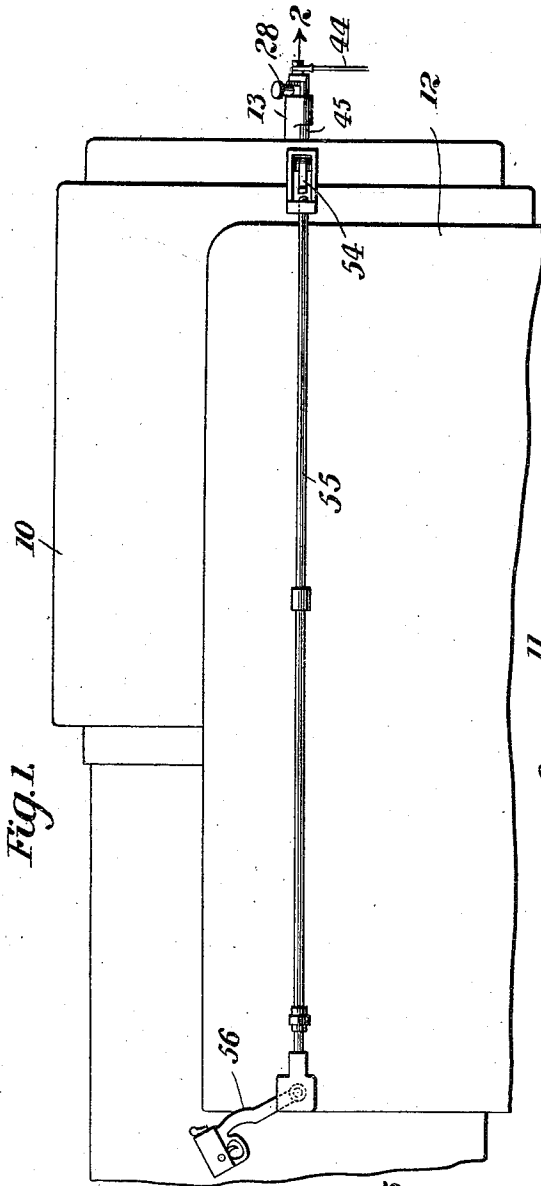


Fig. 1.

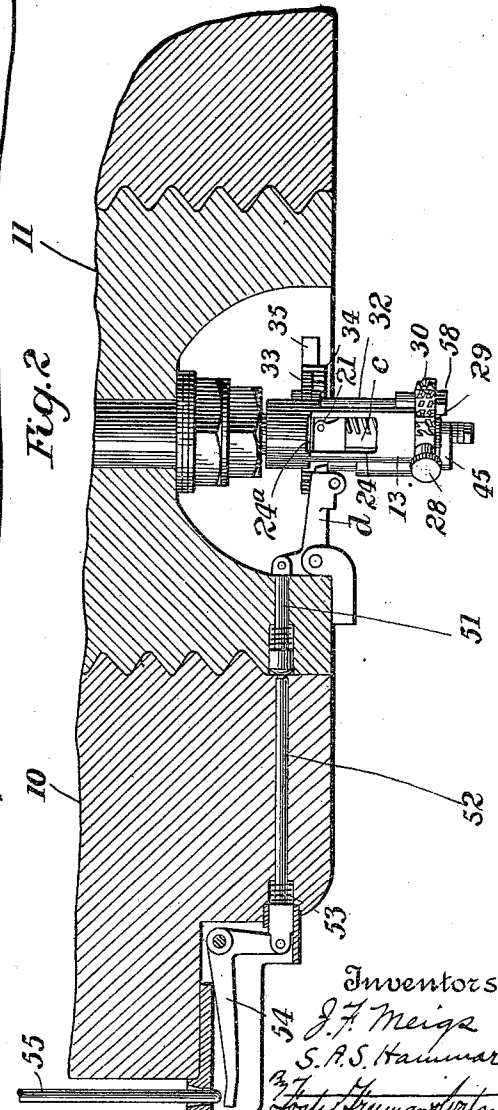
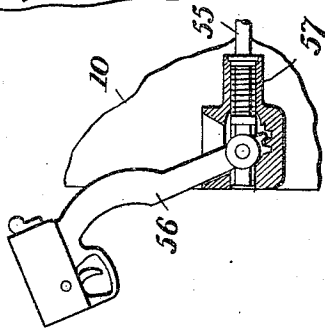


Fig. 2.

Fig. 1^a.



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Fig. 3.

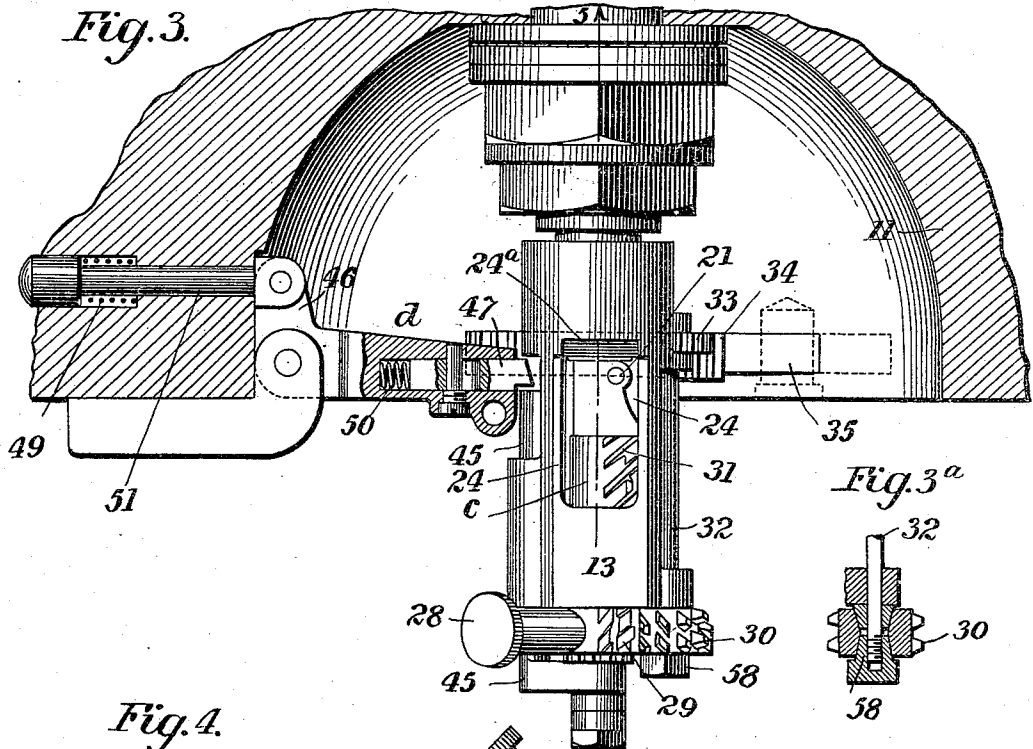


Fig. 3^a.

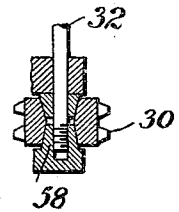
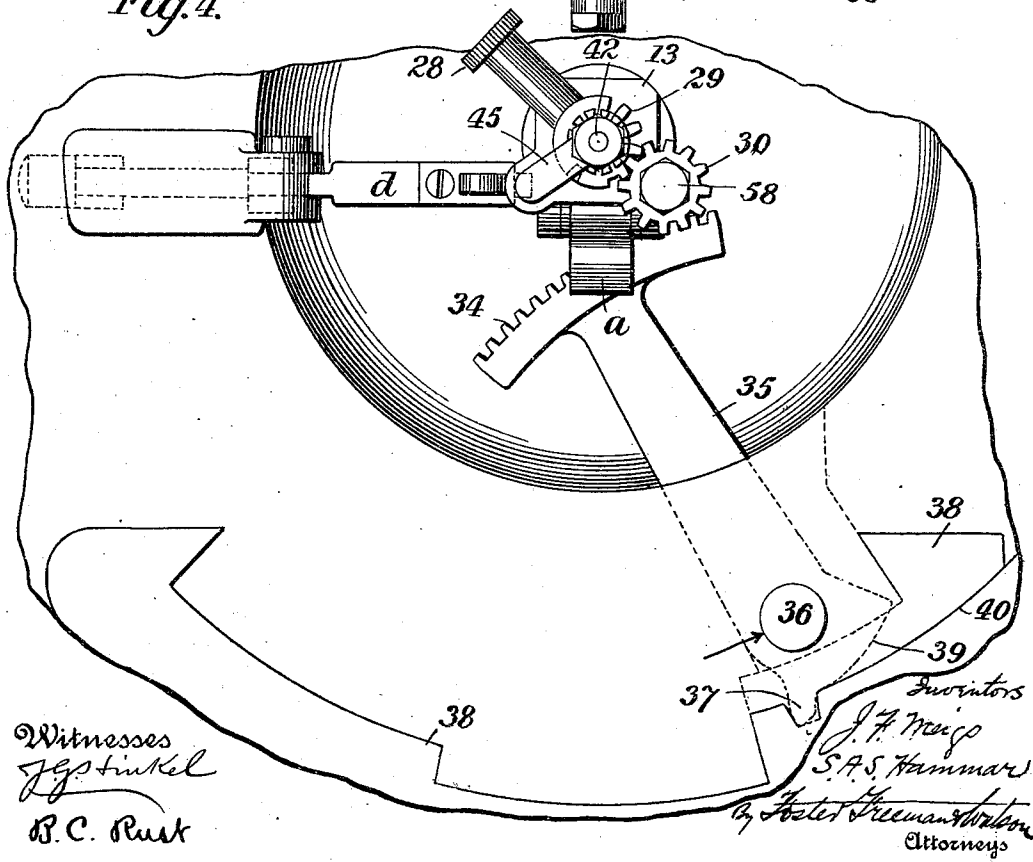


Fig. 4.



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3 SHEETS—SHEET 3.

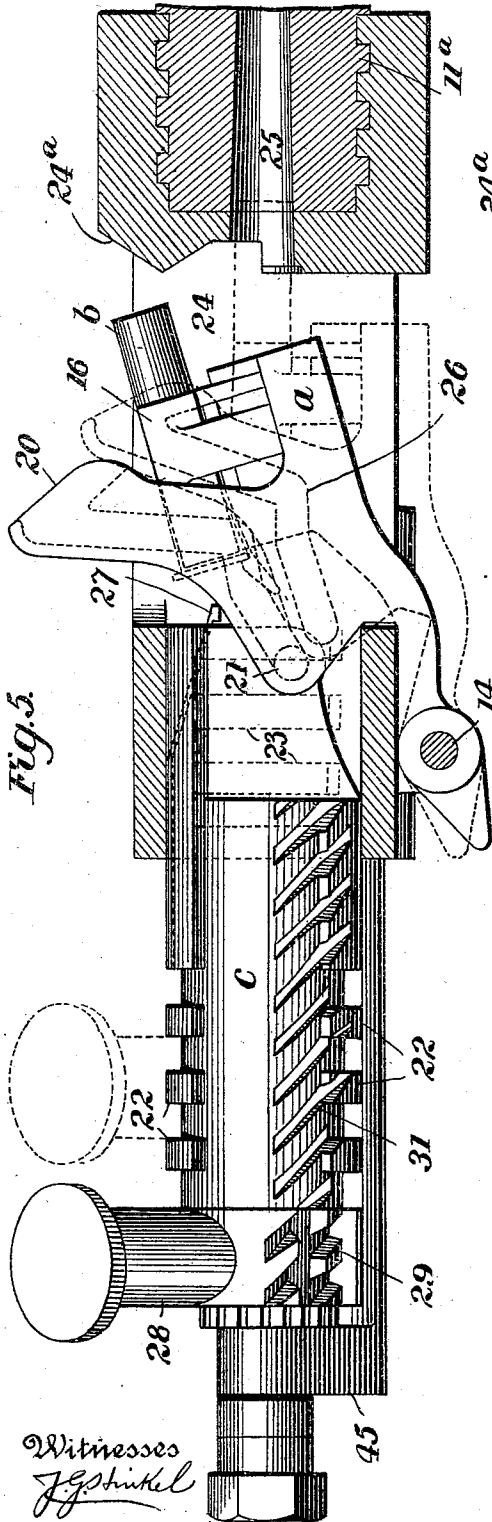


Fig. 5.

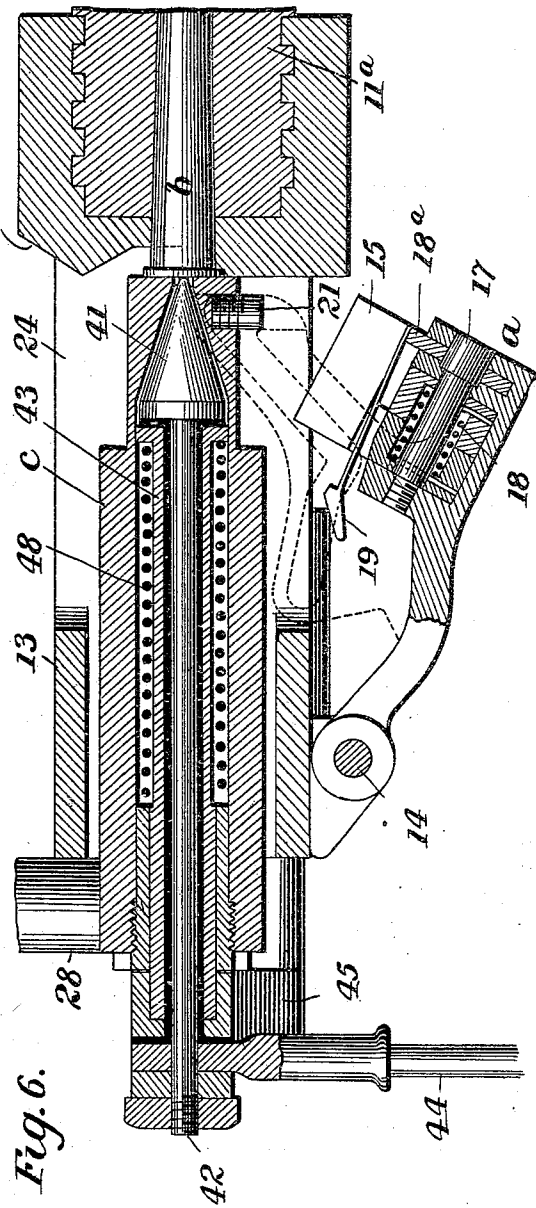


Fig. 6.

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UNITED STATES PATENT OFFICE.

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FIRING MECHANISM FOR GUNS.

958,660.

Specification of Letters Patent.

Patented May 17, 1910.

Application filed January 11, 1906. Serial No. 295,598.

To all whom it may concern:

Be it known that we, JOHN F. MEIGS, a citizen of the United States, and SIGARD A. S. HAMMAR, a subject of the King of Sweden, both residing at South Bethlehem, Northampton county, Pennsylvania, have invented certain new and useful Improvements in Firing Mechanism for Guns, of which the following is a specification.

This invention relates to various improvements in the firing mechanism of heavy guns.

The invention comprises a movable carrier for the primer adapted to hold the primer out of register with the primer seat until the breech block is screwed home and automatic means for seating the primer during the final locking of the breech block.

It also comprises automatic means for moving the firing bolt which carries the firing pin to and from the primer and for locking the firing bolt in position during the final locking movement of the breech block.

It also consists in various improvements in the details of the firing mechanism, all of which will be described in the following specification, reference being had to the accompanying drawings, in which,

Figure 1 is a partial side elevation of a gun to which the present invention is applied; Fig. 1^a is a detail of part of Fig. 1; Fig. 2 is a sectional plan view about on the line 2 of Fig. 1; Fig. 3 is an enlarged plan view partly in section of the firing mechanism which is connected to the breech block; Fig. 3^a is a detail of Fig. 3; Fig. 4 is a rear elevation of the parts shown in Fig. 3; Fig. 5 is a side elevation, partly in central section on the line 5 of Fig. 3; and Fig. 6 is a section on the line 5 of Fig. 3;

Referring to the drawing, 10 indicates a gun, 11 its breech block, and 12 a portion of the carriage. The firing mechanism proper is supported in a casing 13 which is supported by the breech block and extends rearwardly in line with the axis of said block. As shown, the casing is carried upon the stem or shank 11^a of the obturator.

The carrier *a* for the primer is pivotally mounted upon a horizontal pin 14 upon the lower side of the casing 13. The carrier *a* comprises a pair of jaws 15, 16, carried by arms which are pivoted on a pin 17. The jaws are normally pressed toward each other

by a spring 18 and they are adapted to grip the primer shell *b*. A rest 18^a is provided for the forward end of the primer and its rear end is supported by a spring hook or pawl 19. The carrier *a* has a cam plate 20 at one side, in which is a cam groove which coöperates with a pin 21 upon the firing bolt *c*.

The firing bolt *c* has a reciprocating and a rotary or rocking movement in the casing 13. As shown in Fig. 5, the bolt is withdrawn and as shown in Fig. 6, it is moved into the casing and locked. The locking is effected by means of interrupted annular ribs 22 upon the bolt which coöperate with grooves 23 in the casing 13. As shown, a quarter turn is required to lock the firing bolt in the casing.

The carrier *a* moves up and down through an opening 24 in the casing 13, in a plane which is radial to the primer seat. When the carrier is in its uppermost position, as shown in Fig. 5, the primer *b* is inserted between the jaws 15, 16. Should the primer be accidentally fired while in this position, it will discharge against an inclined surface 24^a, at one end of the opening 24, and the flame of the discharge will be directed away from the primer opening or seat 25 which communicates with the interior of the gun. It is therefore practically impossible to ignite the charge in the gun by premature firing of the primer prior to the insertion of the primer in its seat 25. As the firing bolt *c* is moved forward from the position shown in Fig. 5, the cam 20 rocks the carrier down to the position shown in dotted lines in Fig. 5, in which the primer is in line with its seat. At this point a dwell 26 in the cam holds the carrier stationary while the bolt *c* advances and pushes the primer partially into its seat, as indicated in dotted lines in Fig. 5. The further inward movement of the firing bolt *c* causes the primer carrier to move down to the position shown in full lines in Fig. 6. During this movement the primer, from which the carrier has been withdrawn, is pushed fully into its seat, as indicated in Fig. 6, by the forward end of the bolt. When the bolt is fully home it is given a quarter turn to lock the ribs 22 with the grooves 23. The bolt and primer are then in position for firing. After the gun is fired, bolt *c* is rotated in

the reverse direction to unlock it and then withdrawn. As the bolt is withdrawn a spring-hook or pawl 27 engages the flange on the rear end of the primer shell and ejects the shell from the gun. The continued rearward movement of the firing bolt brings the primer carrier again to the position shown in Fig. 5 and a new primer is inserted.

The movements above described may be performed by hand and for this purpose a handle 28 may be provided for the firing bolt. It is preferred however to move the firing bolt and its connected parts automatically as the breech is opened and closed. For this purpose the firing bolt is provided with teeth 29 forming a partial pinion, which teeth engage with the spur teeth of a pinion 30. The teeth 29 and the teeth of the pinion 30 are intersected by spiral grooves giving to the ends of said teeth spiral surfaces. These spiral teeth are adapted to engage a series of partial threads 31 on the firing bolt. Pinion 30 is mounted on a shaft 32 having bearings in the casing 13. On the forward end of the shaft is a pinion 33 which engages with a sector gear 34 upon an arm 35 which is pivoted to the breech block of the gun at 36. The arm 35 has a tooth 37 which coöperates with a notch in a plate 38 upon the breech block carrier. Arm 35 also has a curved surface 39 coöperating with a similarly grooved surface 40 upon the plate 38. As the breech block is turned in the usual manner to unlock it, the pivot 36 is moved in the direction of the arrow, Fig. 4. During this movement, the tooth 37 causes the arm 35 to rock about its pivot until the surfaces 39 and 40 come together, after which the arm is carried bodily without further movement upon its pivot. This rocking of the arm rotates the pinion 30 causing it first to rock the firing bolt through a quarter turn to unlock it and then to move the bolt endwise by engagement of the pinion 30 with the threads 31. The teeth of pinion 30 first act as spur teeth upon the teeth 29 and then enter the spiral grooves between the teeth 29 and start the firing bolt endwise. The unlocking of the breech therefore unlocks the firing bolt and moves it to the rear throwing the primer carrier up into its loading position, as shown in Fig. 5, which position it retains until the breech block is again seated in the breech of the gun and partially locked. As the breech block is turned to lock it, sector gear 34 is operated in the reverse direction, first moving the firing bolt forward and then rotating and locking it in position.

Within the firing bolt is a firing pin 41 having a shank 42 arranged within and suitably insulated from a sleeve 43, Fig. 6. A conductor 44 may be connected with the firing pin for firing electrically. For firing

mechanically the firing pin 41 is connected with a right angled arm 45 which coöperates with a trigger *d*. The trigger *d* comprises an elbow lever 46 pivotally connected with the breech of the gun and provided at its free end with a spring pawl 47 adapted to engage the arm 45. When the lever 46 is rocked, the pawl 47 moves the firing pin rearward compressing a spring 48, Fig. 6. After the trigger has been moved out to a certain extent, the pawl 47 swings free from the arm 45 and the spring 48 drives the firing pin forward, detonating the primer. The trigger is returned to the rear automatically by a spring 49, a spring 50 permitting the pawl 47 to move back as it slides over the arm 45.

Referring to Figs. 1 and 2, it will be seen that the firing mechanism heretofore described is mounted on the breech block and adapted to swing with it. The plunger 51 which operates the trigger has its end normally at the periphery of the breech block and adapted to be engaged by a pin 52 sliding in the gun proper. When the breech block is unlocked the pins 51, 52, are out of register and it will therefore be seen that the primer cannot be fired mechanically until the breech block is fully home and locked. The rod 52 is normally held with its inner end at the periphery of the breech block cavity by means of a spring 53. It is moved to operate the trigger by an elbow lever 54 which is operated by a rod 55 longitudinally arranged upon the gun or its carriage. The rod 55 is operated by a lever 56 which may be conveniently moved by the gunner when sighting the gun. Rod 55 is held in normal position by a spring 57 and it is suitably connected with the operating lever 56, as indicated in Fig. 1^a. The pinion 30 is detachably connected to the shaft 32 by means of a cone friction clutch 58, Fig. 3^a. By loosening this clutch the firing lock is disengaged from the lever 35 and may be operated by hand by means of the lever and knob 28. This mode of operation becomes necessary after a misfire when it is desirable to insert a new primer without opening the breech.

Having described our invention what we claim and desire to secure by Letters Patent is,

1. The combination with a gun having an openable breech block provided with a seat for a primer, of a carrier for the primer adapted to hold the primer out of alinement with the axis of the primer seat when the breech block is open, and means for moving the carrier to seat the primer by the closing movement of the breech block, for the purpose set forth.

2. The combination with a gun having an openable breech block provided with a seat for a primer, of a carrier for the primer

adapted to hold the primer out of alinement with the axis of the primer seat when the breech block is open, and means connected with the breech block for moving the carrier to seat the primer during the final stage of the closing movement of the breech block, for the purpose set forth.

3. The combination with a gun having an openable breech block provided with a seat for a primer, of a carrier for the primer adapted to hold the primer at an angle to the axis of the primer seat when the breech block is open, and means whereby the primer is brought into alinement with and inserted in the seat during the final stage of the closing of the breech block, for the purpose set forth.

4. The combination with a gun having an openable breech block provided with a seat for a primer, of a primer carrier adapted to support a primer in position to be seated in said breech block, and means for deflecting the discharge from the primer from said primer seat should said primer be accidentally discharged prior to the closing of the breech block, whereby accidental discharge of the gun prior to the closing of the breech block is prevented.

5. In a gun, the combination with the breech block having a seat for the primer, of a carrier movable in a plane which is radial to the primer seat and adapted to hold the primer out of alinement with its seat, whereby accidental discharge of the primer will not ignite the charge in the gun, and means operated by the closing movement of the breech block for moving the carrier to bring the primer into alinement with its seat.

6. In a gun, the combination with the breech block having a seat for the primer, of a carrier movable in a plane which is radial to the primer seat and adapted to hold the primer out of alinement with its seat, whereby accidental discharge of the primer will not ignite the charge in the gun, and automatic means controlled by the movement of the breech block for moving the carrier to bring the primer into alinement with its seat.

7. In a gun having a relatively movable breech block, the combination with the breech block having a seat for a primer, of a carrier for the primer movable in a plane which is radial to the primer seat, and means controlled by the rotation of the breech block for moving said carrier transversely.

8. In a gun having a relatively movable breech block, the combination with the breech block having a seat for a primer, of a carrier for the primer movable transversely of the breech block, and means controlled by the breech block during its locking and unlocking movements for moving the carrier transversely.

9. In a gun having a relatively movable breech block, the combination with the breech block having a seat for a primer, of a firing bolt movable to and from the primer seat, a primer carrier movable transversely of the breech block, and connections with the breech block whereby the primer carrier and firing bolt are automatically operated.

10. In a gun having a relatively movable breech block, the combination with the breech block having a seat for a primer, of a firing bolt movable to and from the primer seat, a primer carrier movable transversely of the breech block, a cam connected with the primer carrier and adapted to be operated by the firing bolt to move the carrier transversely and means connected with the breech block for operating said parts automatically.

11. In a gun having a relatively movable breech block, the combination with the breech block having a primer seat, of a primer carrier movable transversely of the breech block and a firing bolt provided with a firing pin, said firing bolt being movable to and from the breech block, connections between the firing bolt and the primer carrier, means for locking the firing bolt in firing position and means connected with the breech block for operating said parts automatically.

12. In a gun having a relatively movable breech block, the combination with the breech block having a primer seat, of a primer carrier movable in a plane which is radial to the primer seat to carry the primer into and out of alinement with the primer seat, means for operating said carrier, and automatic means for pushing said primer into its seat.

13. In a gun having a relatively movable breech block, the combination with the breech block having a primer seat, of a primer carrier, a firing bolt provided with a firing pin, means upon the carrier for gripping a primer, means for moving the carrier to bring the primer into alinement with its seat, means for pushing the primer into its seat, means for withdrawing the carrier from the primer and means connected with the breech block for operating said parts automatically.

14. In a gun, the combination with the breech block and its seat, of a firing bolt provided with a firing pin, and automatic means controlled by the rotation of the breech block for moving said firing bolt to and from the breech block and for rotating said firing bolt to lock and unlock the same.

15. In a gun, the combination with the breech block having a primer seat, of a firing bolt movable to and from the breech block and adapted to be locked and unlocked by a rocking movement, inclined teeth on said firing bolt, a pinion having inclined teeth,

means connected with the breech block whereby the pinion is rotated when the breech block is turned, the said pinion being adapted to intermesh with the firing bolt to
5 rotate the same and move it longitudinally.

16. In a gun, the combination with the breech block, of a firing bolt movable to and from the breech block, a sector gear connected with the breech block and arranged
10 to be rocked when the breech block is turned, and connections between said sector gear and said firing bolt whereby the latter is moved longitudinally.

17. In a gun, the combination with the
15 breech block, of a firing bolt movable to and from the breech block and rotatable to lock

and unlock, a sector gear arranged to be moved as the breech block is turned, and connections between said sector gear and said firing bolt whereby the latter is moved longitudi- 20
nally during a portion of the locking and unlocking movement of the breech block and rotated during another portion of the locking and unlocking movement of the breech block. 25

In testimony whereof we affix our signatures in presence of two witnesses.

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SIGARD A. S. HAMMAR.

Witnesses:

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