L. W. TAYLOR.

FIRING MECHANISM FOR GUNS.

APPLICATION FILED OCT. 2, 1909.

1,008,091.

Patented Nov. 7, 1911.

4 SHEETS—SHEET 1.

Fig. 1

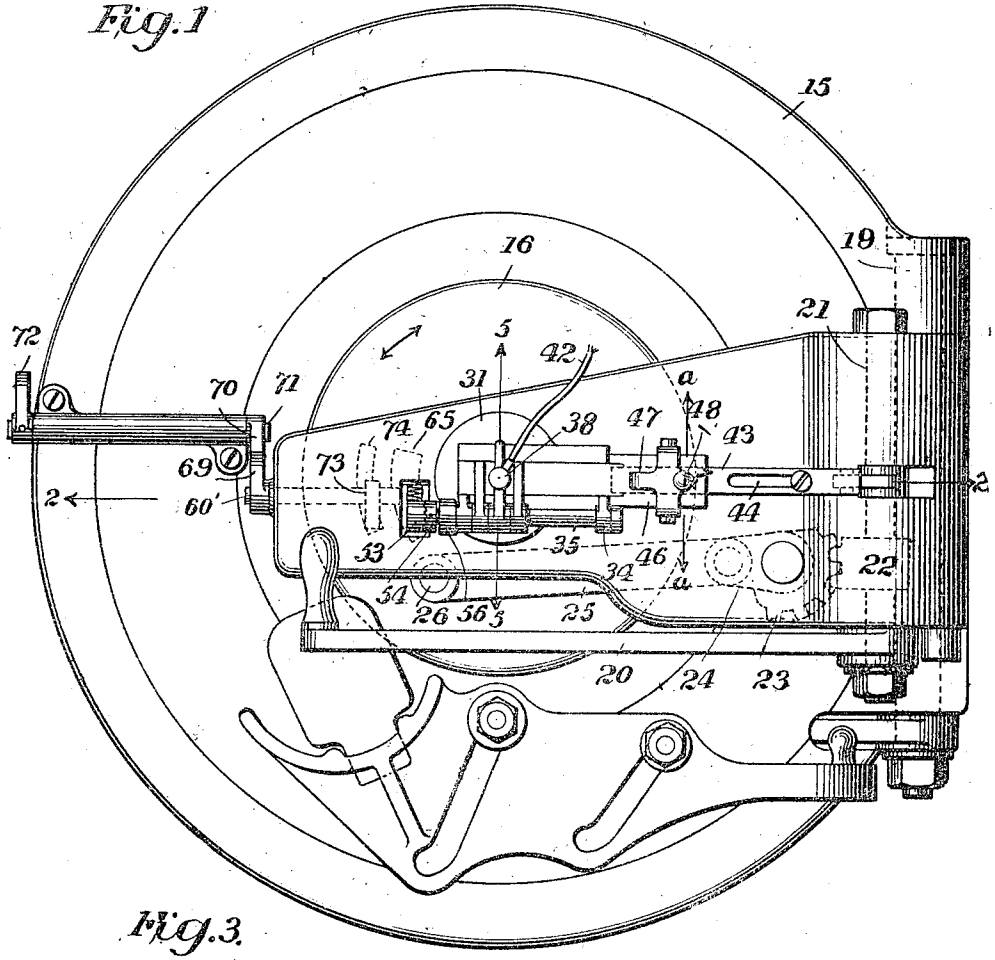



Fig. 3.

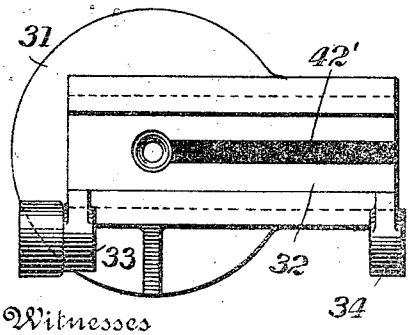
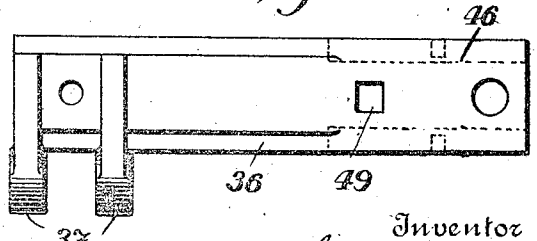



Fig. 4.




Witnesses

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4 SHEETS—SHEET 2.

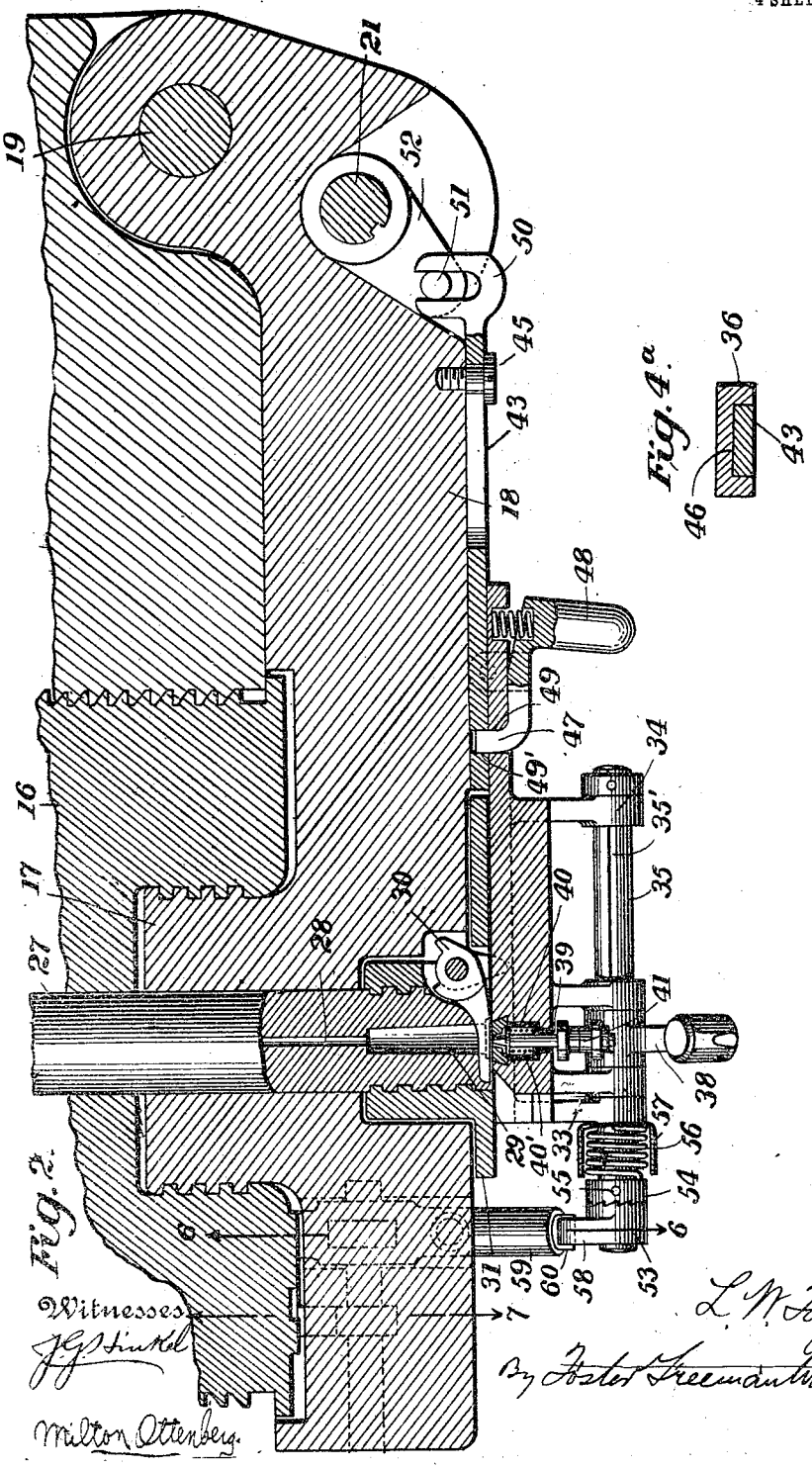


Fig. 2.




Fig. 4a.

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4 SHEETS—SHEET 3.

Fig. 5

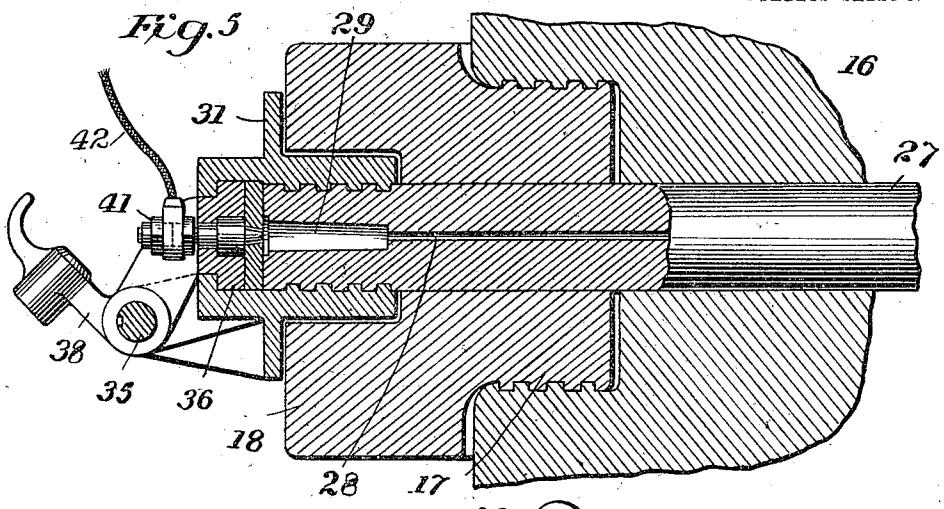



Fig. 6.

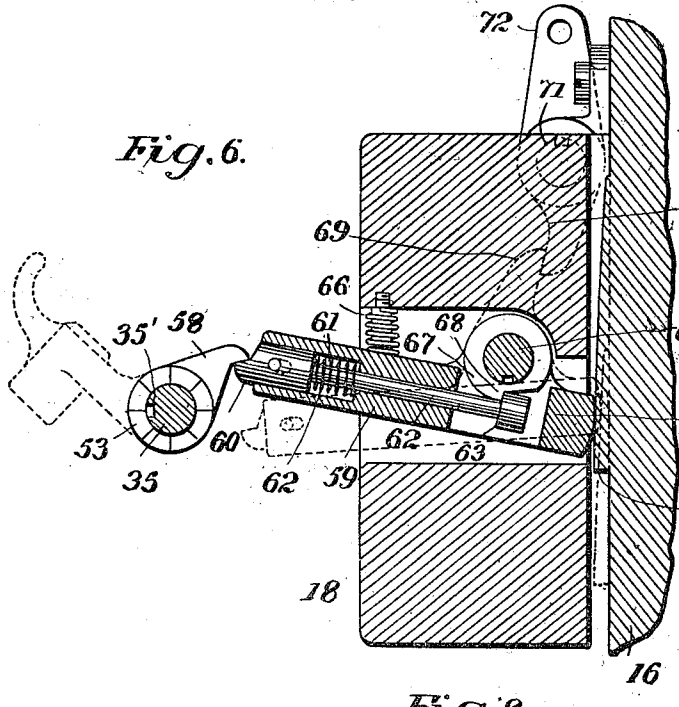



Fig. 7.

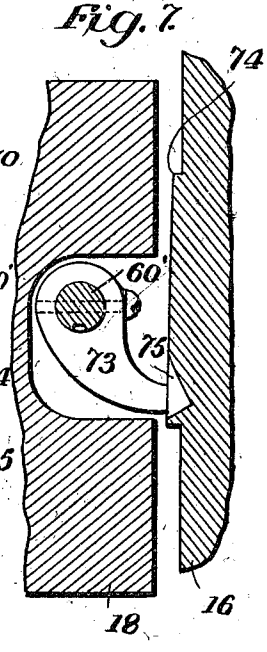
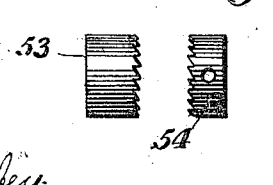



Fig. 8.

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4 SHEETS—SHEET 4.

Fig. 9.

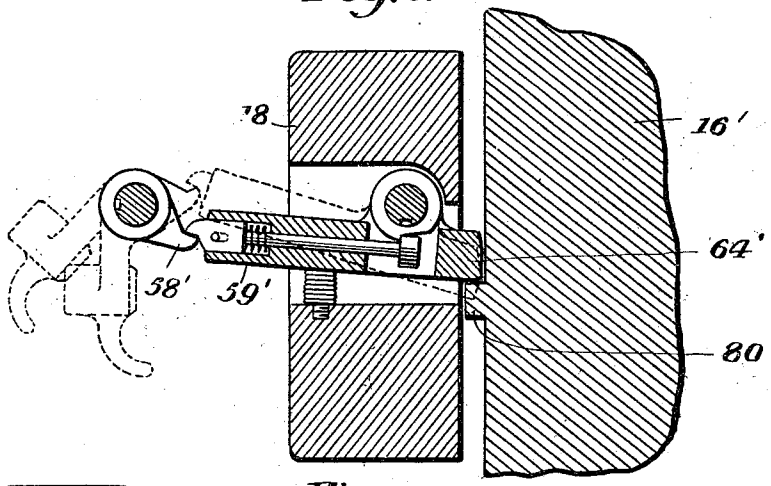



Fig. 10

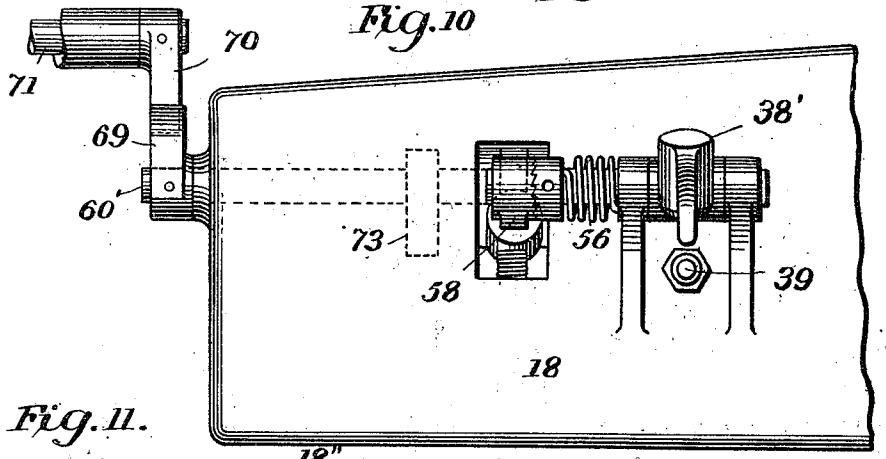
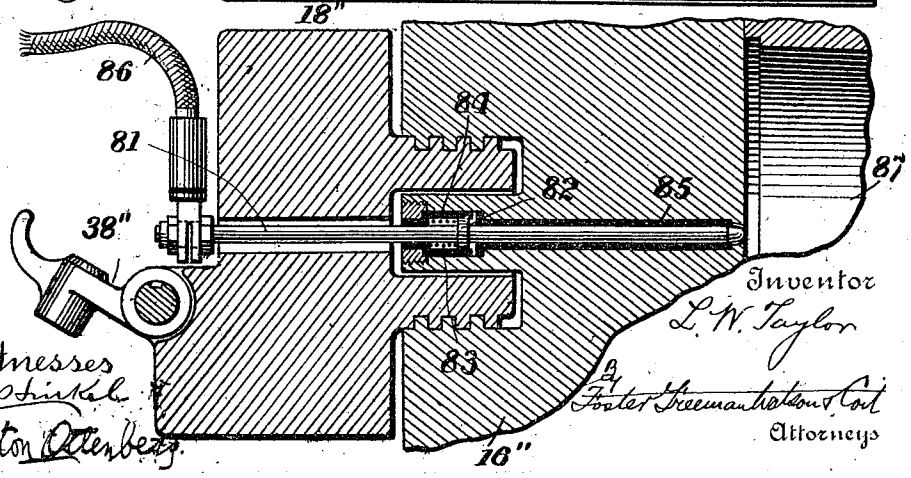



Fig. 11.

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# UNITED STATES PATENT OFFICE.

LEWIS W. TAYLOR, OF WASHINGTON, DISTRICT OF COLUMBIA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, TO OLIVER H. BRIGGS, TRUSTEE, OF WASHINGTON, DISTRICT OF COLUMBIA.

## FIRING MECHANISM FOR GUNS.

1,008,091. Specification of Letters Patent. Patented Nov. 7, 1911.

Application filed October 2, 1909. Serial No. 520,624.

*To all whom it may concern:*

Be it known that I, LEWIS W. TAYLOR, a citizen of the United States, and resident of Washington, District of Columbia, have invented certain new and useful Improvements in Firing Mechanism for Guns, of which the following is a specification.

This invention relates to firing mechanism for guns, which may be operated either mechanically or electrically, and the objects of the invention are to improve such firing mechanism in construction and operation and to provide means for preventing accidental discharge of the gun, or discharge when the breech block is not properly seated in the breech.

The invention will be particularly described hereinafter in connection with the accompanying drawings, in which,

Figure 1 is an elevation of the breech; Fig. 2 is a section on the line 2—2, Fig. 1; Fig. 3 is a detail of the firing mechanism carrier support; Fig. 4 is a detail of the firing mechanism carrier; Fig. 4ª is a section on line *a—a* Fig. 1; Fig. 5 is a section on the line 5—5, Fig. 1; Fig. 6 is a section on the line 6—6, Fig. 2; Fig. 7 is a section on the line 7—7, Fig. 2; Fig. 8 is a detail of the hammer spring tension device; Fig. 9 is a section showing another form of this invention; Fig. 10 is an elevation of the form shown in Fig. 9; Fig. 11 is a section showing another form of this invention.

Referring to the drawings, 15 designates the breech of the gun which is provided with a breech block 16 connected by means of a stud 17 to the breech block carrier 18 pivoted at 19 to the gun. An operating handle 20 is rigidly connected to an operating shaft 21 mounted in the carrier and the shaft is provided with a worm 22 which meshes with the coöperating sectional worm gear 23. An arm 24 rigidly secured to the worm gear 23 is pivoted to a link 25 pivotally connected to the breech block at 26. An obturator stem 27 is provided with a vent 28 and with a recess 29 for a primer cartridge. A shell extractor 30 of well known form is provided. The mechanism so far described is of a well known construction. The breech is opened by moving the operating lever 20 toward the gunner and this movement of the handle will partially rotate the breech block in order to throw the interrupted threads upon the breech block and the breech out of operative relation.

A support 31 is connected to the breech block carrier 18 and is provided with a dovetail slideway 32 and a pair of bearing lugs 33, 34. A hammer shaft 35 provided with a keyway 35′ is mounted for rotation in these bearing lugs but restrained against endwise movement. A slide or support 36 slides in the slideway 32 and is provided with spaced bearing lugs 37, 37, which receive the shaft 35. A hammer 38 is mounted on the shaft 35 and between the spaced lugs 37, the hammer being splined on the shaft 35 by means of a key engaging the keyway 35′. A firing pin 39 is mounted for endwise movement in a sleeve 40 of insulating material and is normally pressed against the cartridge by means of a light spring 40′. The firing pin is provided with a head 41 adapted for electrical connection with a flexible connector 42. The firing pin and the electrical connector therefore form one of the terminals of the firing circuit, the other terminal being electrically connected to the gun or the mount, as is usual in these constructions.

A link 43 is provided with a slot 44 which engages a pin 45 screwed into the carrier 18. The link extends into a recess 46 in the slide 36 and is removably connected thereto by means of a toe 47 of a latch 48 pivotally mounted upon the slide. This toe extends through an aperture 49 in the slide and engages a recess 49′ in the link. The link is provided with a slotted head 50 which engages a pin 51 mounted on an arm 52 rigidly secured to the shaft 21.

The shaft 35 has rigidly secured thereto a collar 53 and loosely mounted thereon a collar 54, the adjacent faces of the collars being provided with ratchet teeth and the collar 54 being provided with holes 55 adapted to be engaged by a suitable wrench. A spring 56 is connected at one end to the collar 54 and at the other end to the bearing lug 33 and a casing 57 incloses the spring. The collar 53 has rigidly secured thereto a toe 58 adapted to be engaged by the toe 60 of a cocking lever 59 which is loosely mounted on a shaft 60′; the toe 60 is normally held outward by means of a spring 61 surrounding the shank 62 and the other end of the shank is provided with a head 63. An

extension 64 of the cocking lever is adapted to be engaged by a cam 65 on the breech block and the spring 66 normally holds the cocking lever in dotted position, shown in Fig. 6. A trigger collar 67 is rigidly connected to the shaft 60′ by means of a key and is provided with a shoulder 68 adapted to engage the head 63. The shaft 60′ has also rigidly connected thereto a finger 69 which is adapted to engage a finger 70 secured to a shaft 71 mounted in bearings on the breech of the gun, the shaft 71 being provided with a finger 72 having a hole therein adapted to receive a lanyard rod or other connection to the firing key. A safety device comprising a finger 73 is also rigidly connected to the shaft 60′ and is adapted to engage a cam 74 on the breech block which is provided with a recess 75.

The operation of the firing mechanism is as follows: By moving the operating handle 20 to close the breech, the cam 65 on the breech block will in its movements with the breech block engage the extension 64 of the cocking lever and move it from dotted to full line position, shown in Fig. 6. During this movement of the cocking lever it will by the engagement of its toe 60 with the toe 58 on the hammer move the same to cocking position. As the breech closes the finger 69 on the shaft will come into alinement with the finger 70 on the shaft 71. The hammer is released by operating the shaft 60′ so that the shoulder 68 on the trigger 67 will engage the head 63 and move the toe 60 inwardly. This movement of the trigger shaft 60′ can however only take place when the breech is fully closed, because, while the safety finger 73 is on the rise of the cam 74, the shaft 60′ and therefore the releasing collar 67 can not be operated to release the hammer. When, however, the breech is fully closed, the finger 73 will be opposite the recessed portion 75 and in this position the shaft 60′ may be operated by the finger 72 so as to release the hammer.

When the breech is open and unlocked the slide 36 will be in its extreme right position so as to move the hammer and the firing pin out of alinement with the primer cartridge. The firing pin which forms one of the terminals of the electrical firing circuit will then be in engagement with the insulating strip 42′ and thus a closed circuit is avoided. In moving the breech block to locked position the slide 36 will be simultaneously moved to the left so as to aline the firing pin and the hammer with the primer. In this position the firing pin will have moved out of engagement with the insulating strip 42′ and the light spring will establish contact between the firing pin and the cartridge. However, the firing mechanism will not be placed in operative position and in alinement with the cartridge until the breech has been fully closed and locked and therefore the gun can not be accidentally fired before the breech is entirely closed and locked.

The detachable connection between the slide 36 and its operating link 43 permits the slide to be moved independently at any time for the purpose of inspection by moving the handle of the latch 48 to the right. This movement will at first disengage the toe 47 from the recess 49′ and further movement will move the entire slide and its mechanism to the right. The tension of the spring 56 may be adjusted at any time by inserting a wrench or a pin in the holes 55 and rotating the collar 54. The forked head 50 on the link 43 permits this link to be easily removed from the carrier and the entire mechanism is so arranged that the sliding support and all parts connected thereto may be easily attached to and removed from the carrier for repairs. This construction also permits the invention to be applied to existing guns. The flexible connection 42 permits free movement of the slide 36 and the firing pin and avoids objectionable sliding contacts. At the same time it permits the hammer to strike the end of the pin and thus provides a simple construction.

In the construction shown in Figs. 9 and 10, the firing pin 39′ is located below the hammer 38′. This construction, however, requires that the cocking lever 59′ be also reversed, as shown in Fig. 9. The extension 64′ of the cocking lever is engaged by a lug 80 on the breech block 16′ so as to move it from dotted to full line position. The construction of the trigger and safety device is the same as in the other figures, and further explanation is therefore unnecessary.

In Fig. 11 is shown a construction of a firing pin and hammer by means of which the gun is arranged to be fired electrically and percussively as applied to a gun arranged to be used with fixed ammunition. The firing pin 81 extends through the carrier 18″ and through the breech block 16″. This firing pin is provided with a shoulder 82, and a light spring 83 normally presses the firing pin lightly in engagement with the primer located in the cartridge case, when the breech block is closed. The spring and the shoulder 82 are located in an insulating sleeve 84 and the firing pin also extends through an insulating sleeve 85 in the breech block. A flexible connector 86 is suitably connected to the firing pin 81. The firing pin is arranged to be struck by a hammer 38″ to fire the gun percussively. This hammer and its actuating mechanism is similar to that shown in the other figures.

It is obvious that various changes may be made in the details of construction without

departing from this invention and it is therefore to be understood that this invention is not to be limited to the specific construction shown and described.

Having thus described the invention what I claim is:

1. In a breech loading gun, the combination with a breech block, of mechanism for firing the gun percussively including a firing pin and a hammer, means for locking and unlocking the breech block by rotating the same, and means operated by the locking rotating movement of the breech block for cocking the hammer.

2. In a breech loading gun, the combination with a rotating breech block, of mechanism arranged to fire the gun percussively including a firing pin and a hammer, means for locking and unlocking said breech block by rotating movement thereof, a cocking lever for the hammer, and a cam on the breech block arranged to cock the hammer during the rotating locking movement of the breech block.

3. In a breech loading gun the combination with a breech block, a carrier therefor, a primer seat on the carrier, and means including an operating shaft for locking and unlocking said breech block, of a guideway on the carrier, a rock shaft also mounted on the carrier, a slide in said guideway, a firing pin mounted in the slide, a hammer mounted on said rock shaft, means on the slide for engaging the hammer to move the same longitudinally of the rock shaft, and a connection between the slide and the operating shaft arranged to move the hammer and firing pin to and from the primer seat as the shaft is rocked.

4. In a breech loading gun, the combination with a breech block and a carrier therefor, of a firing pin arranged to fire the gun electrically, a support for said firing pin, a hammer movable with said support and arranged to strike the pin and fire the gun percussively, cocking mechanism mounted directly on said carrier and having a movable connection with said hammer, means for locking and unlocking said breech block, and means interconnected with said breech block and operated during the locking and unlocking movement of said breech block for moving said support with said pin and hammer into and out of operative position.

5. In a breech loading gun, the combination with a breech block, of a firing pin arranged to fire the gun electrically, a support for said pin, a hammer arranged to strike the pin and fire the gun percussively, a hammer shaft to which said hammer is splined, lugs on the support engaging the hammer whereby it will move with the support, means to lock and unlock said breech block, and means interconnected with said breech block and operated during the locking and unlocking movement of said breech block for moving said support with said pin and hammer into and out of operative position.

6. In a breech loading gun, the combination with a breech block, of a firing pin arranged to fire the gun electrically, a support for said firing pin, a hammer arranged to strike said pin and fire the gun percussively, means for locking and unlocking said breech block, means interconnected with said breech block and operated during the locking and unlocking movement of said breech block for moving said support with said pin into and out of operative position, and an insulating base with which said pin engages while in inoperative position.

7. In a breech loading gun, the combination with a breech block, of mechanism arranged to fire the gun percussively including a firing pin and a hammer, a support for one of said members, means for locking and unlocking said breech block, means interconnected with said breech block and operated during the locking and unlocking movement of said breech block for moving said support into and out of operative position, and means operated by the locking movement of said breech block for cocking the hammer.

8. In a breech loading gun, the combination with a breech block, of mechanism arranged to fire the gun percussively including a firing pin and a hammer, a support for one of said members, means for locking and unlocking said breech block, means interconnected with said breech block and operated during the locking and unlocking movement of said breech block for moving said support into and out of operative position, means operated by the locking movement of said breech block for cocking the hammer, and a safety device arranged to prevent release of the hammer until the breech block is wholly locked.

9. In a breech loading gun, the combination with a breech block, of mechanism arranged to fire the gun percussively including a firing pin and a hammer, a support for one of said members, means for locking and unlocking said breech block, means interconnected with said breech block and operated during the locking and unlocking movement of said breech block for moving said support into and out of operative position, means for cocking the hammer, and a safety device arranged to prevent release of the hammer until the breech block is wholly locked.

10. In a breech loading gun, the combination with a breech block, of mechanism arranged to fire the gun percussively including a firing pin and a hammer, a support for the firing pin, connections whereby the hammer is arranged to move with the sup-

port, means for locking and unlocking said breech block, means interconnected with said breech block and operated during the locking and unlocking movement of said breech block for moving said support with the pin and hammer into and out of operative position, means operated by the locking movement for cocking the hammer, and a safety device arranged to prevent release of the hammer until the breech block is wholly locked.

11. In a breech loading gun, the combination with a breech block, of a firing pin arranged to fire the gun electrically, a support for said firing pin, a hammer arranged to strike the pin and fire the gun percussively, means for cocking the hammer, means for locking and unlocking the breech block, means interconnected with said breech block and operated during the locking and unlocking movement of the breech block for moving said support into and out of operative position, and a safety device arranged to prevent release of the hammer until the breech block is wholly locked.

12. In a breech loading gun, the combination with a breech block and a carrier therefor, of mechanism arranged to fire the gun percussively including a firing pin and a hammer, a support for said hammer mounted on said carrier, cocking mechanism mounted directly on said carrier and having a loose connection with said hammer, means for locking and unlocking said breech block, and means interconnected with said breech block and operated during the locking and unlocking movements thereof for moving said support into and out of operative position.

13. In a breech loading gun, the combination with a breech block and a carrier therefor, of mechanism arranged to fire the gun percussively including a firing pin and a hammer, cocking mechanism mounted on said carrier, a hammer shaft on said carrier, a splined connection between said hammer and shaft, means for locking and unlocking said breech block, and means interconnected with said breech block and operated during the locking and unlocking movements thereof for moving said hammer into and out of operative position.

14. In a breech loading gun, the combination with a breech block and a carrier therefor, of mechanism arranged to fire the gun percussively including a firing pin and a hammer, a support for said hammer mounted on said carrier, cocking mechanism mounted on said carrier and having a loose connection with said hammer, means for locking and unlocking said breech block, means interconnected with said breech block and operated during the locking and unlocking movements thereof for moving said support into and out of operative position, and means operated by the locking movement of said breech block for cocking the hammer.

15. In a breech loading gun, the combination with a breech block and a movable carrier therefor, of mechanism arranged to fire the gun percussively including a firing pin and a hammer, a trigger for the hammer, means for locking and unlocking the breech block, a safety device including a finger, and a cam on the rear face of said breech block engaging the finger and arranged to hold the safety device in position to prevent release of the hammer when the breech block is partially or wholly unlocked.

16. In a breech loading gun, the combination with a breech block, of mechanism arranged to fire the gun percussively including a firing pin and a hammer, means for locking and unlocking said breech block, a trigger for said hammer, a trigger shaft, a finger on said shaft, and means on the breech block engaging the finger to lock said shaft and trigger against release movement when said breech block is partially or wholly unlocked.

17. In a breech loading gun, the combination with a breech block, of mechanism arranged to fire the gun percussively including a firing pin and a hammer, means for locking and unlocking the breech block, means on the breech block for cocking the hammer during the locking movement thereof, and an automatic safety device controlled by the breech block and arranged to prevent release of the hammer when said breech block is partially or wholly unlocked.

18. In a breech loading gun, the combination with a breech block, of mechanism arranged to fire the gun percussively including a firing pin and a hammer, means for locking and unlocking the breech block, means on the breech block for cocking the hammer during the locking movement thereof, a trigger for said hammer, a safety device including a finger, and means on the breech block engaging the finger arranged to hold the safety device in position to prevent release movement of the trigger when said breech block is partially or wholly unlocked

19. In a breech loading gun, the combination with a breech block, of mechanism arranged to fire the gun percussively including a firing pin and a hammer, a pivoted cocking lever, a movable toe on the cocking lever engaging the hammer, a trigger shaft on which said cocking lever is loosely pivoted, and a trigger on said shaft arranged to retract the toe and release the hammer.

20. In a breech loading gun, the combination with a breech block, of mechanism arranged to fire the gun percussively including a firing pin and a hammer, a trigger shaft, a cocking lever provided with spaced ears loosely engaging the shaft, a movable

toe on the cocking lever engaging the hammer, and a trigger on said shaft between the ears arranged to retract the toe and release the hammer.

21. In a breech loading gun, the combination with a breech block, of mechanism arranged to fire the gun percussively including a firing pin and a hammer, a pivoted cocking lever, a movable toe on the cocking lever engaging the hammer, a trigger shaft on which said cocking lever is loosely pivoted, a trigger on said shaft arranged to retract the toe and release the hammer, a finger connected to the trigger, and means on the breech block engaging the finger arranged to prevent releasing movement of the trigger when the breech block is partially or wholly unlocked.

22. In a breech loading gun, the combination with a breech block, of mechanism arranged to fire the gun percussively including a firing pin and a hammer, means for cocking the hammer, a trigger shaft, a cocking lever provided with spaced ears loosely engaging the shaft, a movable toe on the cocking lever engaging the hammer, a trigger rigidly connected to said shaft and mounted between the ears, a finger rigidly connected to the shaft, and a cam on the breech block engaging the finger and arranged to prevent releasing movement of the trigger when the breech block is partially or wholly unlocked.

23. In a breech loading gun, the combination with a breech block, of mechanism arranged to fire the gun percussively including a firing pin and a hammer, a hammer shaft, a hammer spring on said shaft, and an adjustable collar on said shaft for adjusting the tension of said spring.

24. In a breech loading gun, the combination with a breech block, of mechanism arranged to fire the gun percussively including a firing pin and a hammer, a hammer shaft, a support therefor, fixed and loose collars on said shaft having coöperating ratchet teeth, and a hammer spring on said shaft connected at one end to said support and at the other end to said loose collar whereby the tension of said spring may be adjusted by rotating said loose collar.

In testimony whereof I affix my signature in presence of two witnesses.

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