H. HASTING.

AUTOMATIC ELECTRICALLY FIRED ORDNANCE.

APPLICATION FILED JUNE 10, 1918.

1,335,500.

Patented Mar. 30, 1920.

2 SHEETS—SHEET 1.

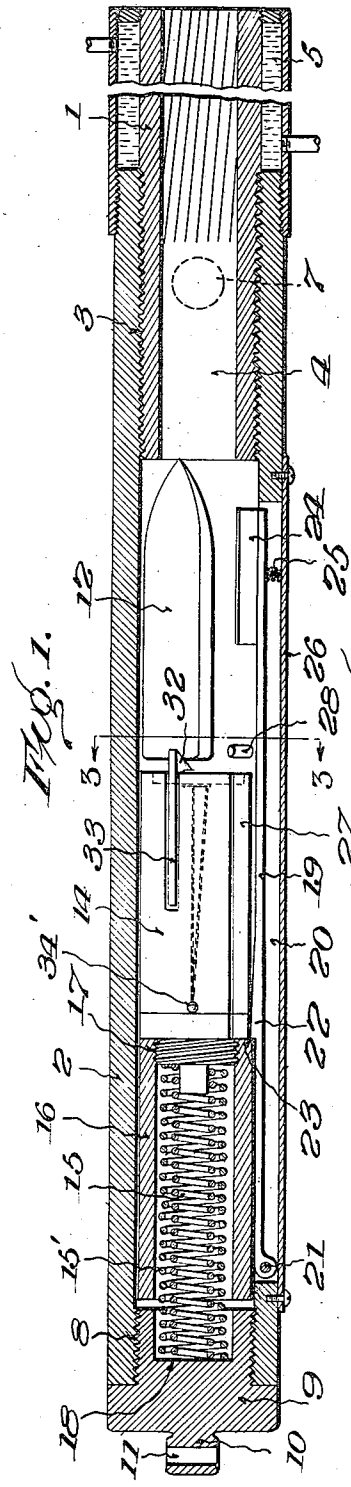


Fig. 1.

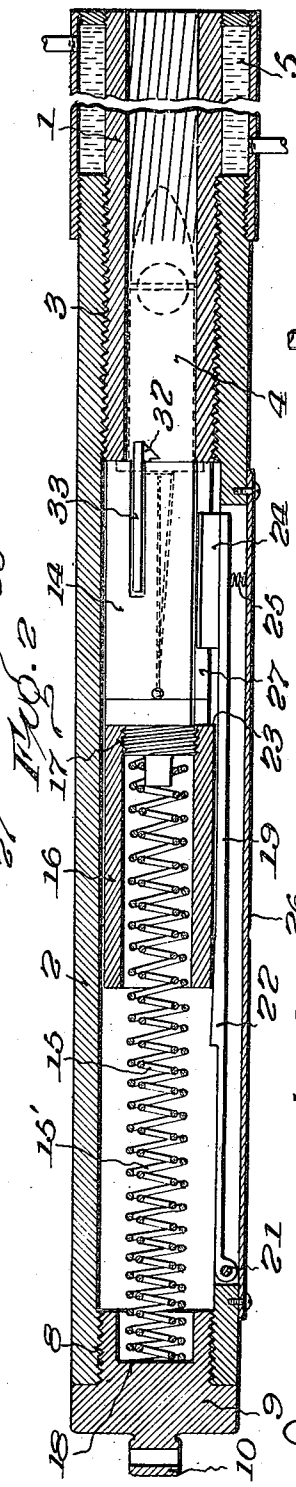


Fig. 2.

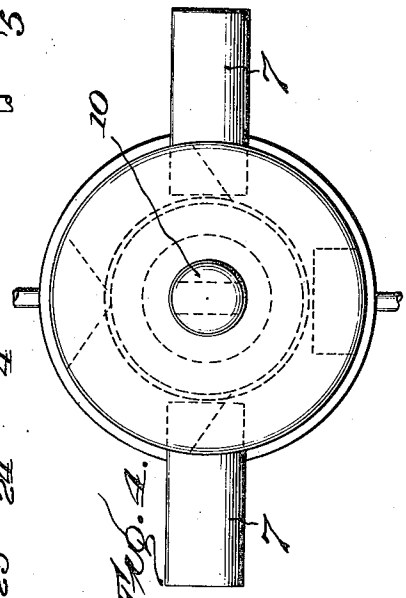


Fig. 4.

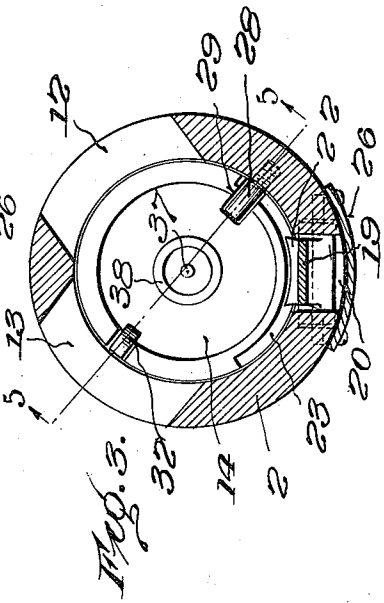


Fig. 3.

Inventor

Homer Hasting,

by Owen B. Martin,

Attorney

H. HASTING.

AUTOMATIC ELECTRICALLY FIRED ORDNANCE.

APPLICATION FILED JUNE 10, 1918.

1,335,500. Patented Mar. 30, 1920.

2 SHEETS—SHEET 2.

Fig. 5

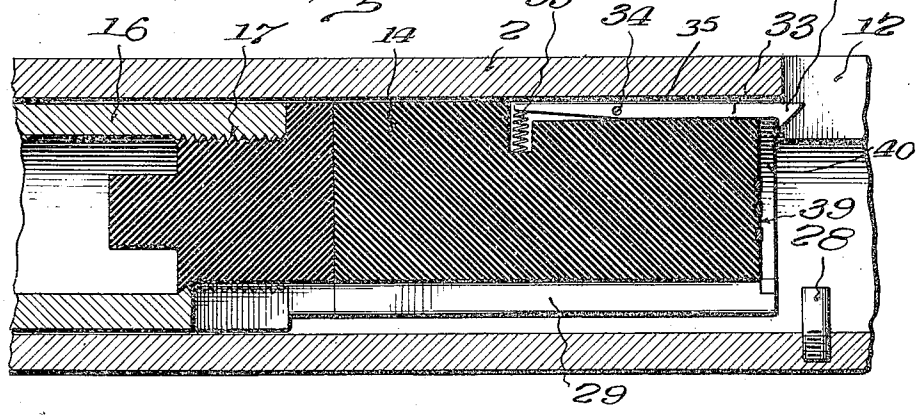


Fig. 6.

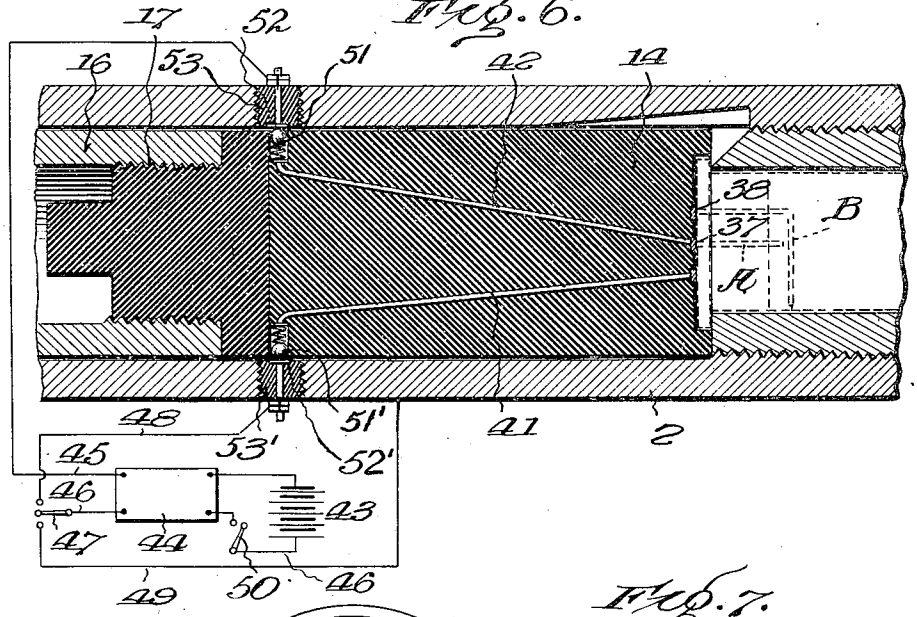
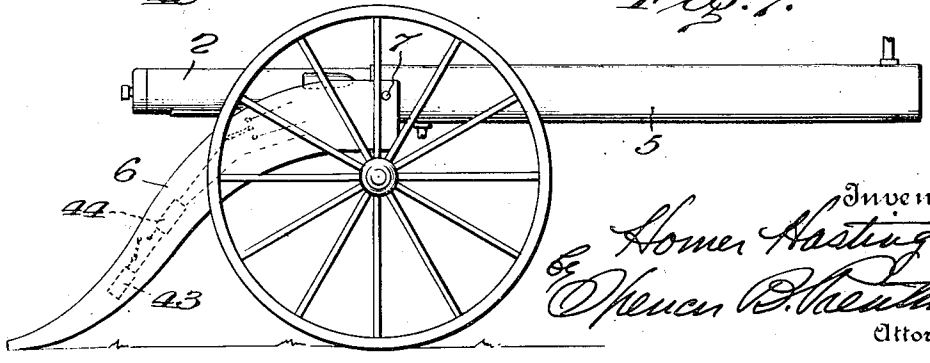


Fig. 7.



Inventor

Homer Hasting,

by Spencer B. Newton,

Attorney

UNITED STATES PATENT OFFICE.

HOMER HASTING, OF DETROIT, MICHIGAN.

AUTOMATIC ELECTRICALLY-FIRED ORDNANCE.

1,335,500. Specification of Letters Patent. Patented Mar. 30, 1920.

Application filed June 10, 1918. Serial No. 239,182.

To all whom it may concern:

Be it known that I, HOMER HASTING, a citizen of the United States, residing at Detroit, in the county of Wayne and State of Michigan, have invented new and useful Improvements in Automatic Electrically-Fired Ordnance, of which the following is a specification.

The invention relates to automatic ordnance in general and pertains particularly to rapid fire ordnance in which a large number of shots may be fired automatically in quick succession.

The principal object of the invention is to provide that type of electrically fired guns or cannon in which the feeding of the cartridge into the breech actuates the loading and firing mechanism, and in which the force of the recoil is utilized as a medium to return the loading mechanism to its cocked position and to eject the empty cartridge shells subsequent to each firing action and previous to the delivery of the next cartridge to the breech.

A further object of the invention is to provide a combined loading and electrical firing mechanism which is simple and positive in its action and which can be automatically or manually operated as desired.

Another object of the invention is to provide automatic rapid fire ordnance wherein the operating parts are reduced to a minimum and constructed with a view of reducing the costs of manufacture, and at the same time retain those features by which safety, durability and ease of assembly and installation are secured.

Another object of the invention is to provide automatic electrically fired ordnance in which the firing device absolutely eliminates all danger of short circuits or premature firing of the cartridge.

Further features of the invention and structural details will be described in the following specification and claim, and illustrated in the accompanying drawings, in which:

Figure 1 represents a longitudinal vertical section of a water cooled gun barrel with my improvements attached, the loading mechanism being shown in elevation and in cocked position subsequent to the firing of a cartridge.

Fig. 2 represents a similar section showing the parts in the position they occupy at the instant of firing.

Fig. 3 represents an enlarged section taken on the line 3—3 of Fig. 1.

Fig. 4 represents an enlarged end view of Fig. 1.

Fig. 5 represents an enlarged fragmentary section taken on the line 5—5 of Fig. 3.

Fig. 6 represents an enlarged fragmentary transverse section of Fig. 2.

Fig. 7 illustrates a means for mounting the cannon.

Referring in detail to the drawings, 1 represents the barrel of a cannon provided with a hollow cylindrical extension or chamber 2 suitably attached as by means of screw threads 3 to the breech end 4 of the barrel. The extension 2 projects over the breech end 4 of the barrel 1 for a considerable distance, thus forming a double wall around the breech 4 where the explosions and consequently the greatest strain occurs. For cooling the barrel 1, a water jacket 5 is preferably provided although other means may be used if desired. In Fig. 7 I have shown the cannon mounted on a gun carriage 6 by means of the usual trunnions 7 merely for purposes of illustration, but it is to be understood that the cannon may be suitably mounted on ships, aeroplanes, or wherever it is desired.

The chamber or cylindrical extension 2 is provided inside at its rear or butt end with screw-threads 8 to receive a plug 9. A small projector 10 is formed integral with the plug 9 and is provided with an opening 11 for the reception of a suitable tool or rod, thus providing an easy and convenient means for tightening or unscrewing the plug 9 from the chamber 2. A feed opening 12 and an ejector opening 13 through which the cartridges are respectively fed and the empty shells ejected, are cut in opposite sides of the chamber 2 at approximately right angles to each other.

Within the chamber 2 is slidably carried a solid plunger or breech bolt 14 preferably of insulating material, such as fiber. The breech bolt 14 is adapted to be pushed forward by means of the coiled compression springs 15—15′ and into engagement with the breech 4. A tubular casing 16, suitably fastened to the rear end of the breech bolt 14 by means of screw threads 17, and a

cylindrical recess 18 in the center of the plug 9, hold the ends of the coil springs 15—15′ in axial alinement and also serve to prevent the coiled springs from buckling when suddenly compressed. The breech bolt 14 is adapted to be pushed back from engagement with the breech 4 by the recoil occurring from the firing of the cartridge.

In order to insure the proper and successful operation of the breech bolt 14, a control device has been provided which consists of a locking lever 19 pivotally mounted in slot 20 and 21 near the rear end of chamber 2 and extending forwardly into proximity to the breech 4. This lever is provided with a detent 22 positioned to engage notch 33 on the breech bolt structure when the latter is in its rearward position. The forward end of the lever 19 carries a pan or receptacle 24 formed to correspond to the shape of the cartridge to receive a cartridge fed through opening 12 in the chamber and to hold said cartridge in position to be inserted in the breech 4. The weight of the loaded cartridge is sufficient to depress the lever 19 to release the breech bolt, and a spring 25 between the pan 24 and the slot closure plate 26, is provided to hold said lever normally in its raised position. The bottom of the breech bolt 14 is cut away at 27 to allow for sliding movement thereof over the pan 24.

Extending into the chamber 2 diametrically opposite the ejector opening 13 and near the rear end thereof is an ejector pin 28. A longitudinal slot 29 cut into the outer surface of the breech bolt 14 permits the breech bolt to reciprocate over the ejector pin 28. Any suitable guiding means, such as a key and key-way, may be used to guide the breech bolt 14 over the ejector pin 28. Diametrically opposite the ejector pin 28 is an extractor hook 32 carried at the forward end of a lever 33 pivotally mounted at 34 in a slot 35 in the outer surface of the breech bolt 14. A spring member 36 bears upwardly against the rear end of the lever 33 and tends to hold the extractor hook 32 in working position (see Fig. 5).

For electrically detonating the cartridges, there are provided the sliding ball contacts 51—51′ carried by the breech bolt 14 on opposite sides thereof. The ball contacts 51—51′ are adapted to be moved by the breech bolt 14 into and out of engagement with the stationary contacts 52—52′ carried by and insulated from the chamber 2 by means of insulating bushings 53—53′. The forward end of the breech bolt 14 carries a centrally located electrode 37 and a circular electrode 38 concentric therewith. These electrodes 37—38 project slightly beyond the surface 39 of a recess 40 in the forward end of the breech bolt 14 and are adapted to engage respectively with the electrodes A and B of the cartridge. A wire 42 is carried within a channel in the breech bolt 14 and connects the ball contact 51 with the electrode 37, while a wire 41 similarly mounted in the breech bolt connects the ball contact 51′ with the electrode 38. Electrodes 37 and 38 are so spaced with respect to each other as to avoid or reduce to a minimum the possibility of short circuit across these terminals. The firing circuits and apparatus will be clearly understood from the following description of operation, and also by reference to my Patent, No. 1,263,763, granted April 23rd, 1918.

The operation of the automatic loading, firing and ejecting mechanism is as follows:

A cartridge is fed into the chamber 2 through the opening 12 by means of a chute or other suitable mechanism (not shown). The weight of the cartridge falling upon the pan 24 depresses the locking lever 19 into the slot 20. The detent 22 is thus released from the notch 23 and the breech bolt 14 is shot forward by means of the coil springs 15—15′ thereby forcing the cartridge into the breech 4. The closing of the breech 4 by the breech bolt 14 automatically closes an electric circuit, hereinafter fully described, thus detonating the cartridge. At the instant the breech 4 is closed, the extractor hook 32 engages the rim of the cartridge. Thus, when the cartridge is fired, the recoil forces back the breech bolt 14 which carries with it the empty shell. Just before the rearward position of the breech bolt is reached, the rim of the empty shell will strike the end of the ejector pin 28 which throws the empty shell through the ejector opening 13. When the end of the rearward movement of the breech bolt 14 is reached, by striking the plug 9, the detent is raised by the spring 25 to engage the notch 23, thus holding the breech bolt in cocked position until released by another cartridge.

The method of electrically discharging the cartridges will be readily understood. A battery is indicated diagrammatically at 43 to represent a suitable source of electricity. An induction coil is indicated at 44 and a wire 45 connects the coil with the stationary contact 52. The opposite side of the source of electricity is provided with a wire 46 leading to a switch 47. From this switch 47 a choice of circuits may be had by the wire 48 leading to the stationary contact 52′ or the wire 49 connected to the extension or chamber 2. A switch 50 is provided in the path of the wire 46 so as to control the application of electricity to the cartridge. When switch 47 is closed upon the contact of wire 48 (the switch 50 being closed) the following single spark circuit is completed (see Fig. 6). From one terminal of the spark circuit of induction coil 44, wire 45, stationary contact 52, ball contact 51, wire

42, electrode 37, electrode A of the cartridge, electrode B, circular electrode 38, wire 41, ball contact 51', stationary contact 52', wire 48, switch 47, wire 46 back to induction coil 44. When the switch 47 is closed upon the contact of wire 49 (the switch 50 being closed), the following spark circuit is completed. From one terminal of the spark circuit of induction coil 44, wire 45, stationary contact 52, ball contact 51, wire 42, electrode 37, electrode A, electrode B, chamber 2, wire 49, switch 47, back to induction coil 44.

From the foregoing, it will be obvious that the herein described mechanism provides for an automatic positive acting rapid fire gun or cannon in which the danger of jamming, quite frequent in machine guns or automatic ordnance, is positively eliminated. Danger of premature firing of the cartridge is absolutely prevented for the reason that the electrical circuit is maintained open by the breech bolt until the moment the breech is closed and the cartridge is in firing position. The breech bolt being made of insulating material prevents, to a minimum, all danger of cross circuits. The cannon will automatically fire with great rapidity and accuracy as fast as the cartridges can be fed into the chamber, or at the rate of approximately sixty shots a minute.

Changes in material, relative size, shape and location of parts may be made without departing from the scope of the invention.

What I claim is:

A recoil operated cannon comprising a barrel and breech therefor, a chamber in axial alinement therewith, a breech bolt slidably mounted in said chamber, a coil spring in said chamber adapted to be compressed by said breech bolt, a locking lever pivotally mounted in a slot in said chamber and extending in proximity to said breech below the same, a detent in said lever arranged to engage and hold said breech bolt against the compression of said coil spring and release said breech bolt when said lever is engaged by a cartridge, fixed electrodes carried by said chamber, and electrodes carried by said breech bolt and positioned to register with said first mentioned electrodes only when said breech bolt is in engagement with said breech.

In testimony whereof I have hereunto set my hand.

HOMER HASTING.