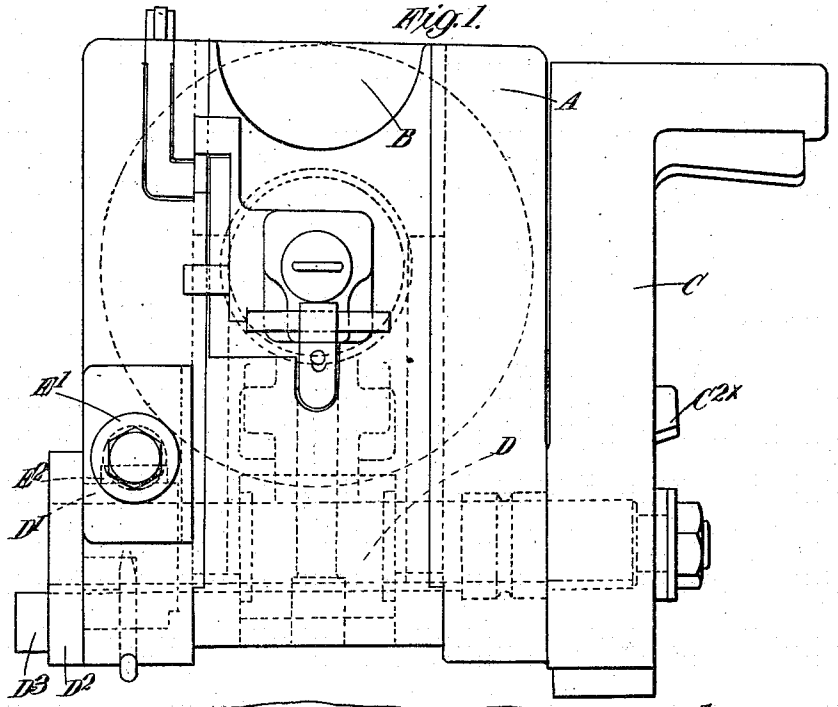
March 29, 1927. 1,622,861

A. T. DAWSON ET AL

ORDNANCE BREECH MECHANISM

Filed Aug. 25, 1926 3 Sheets-Sheet 1

Fig. 1.



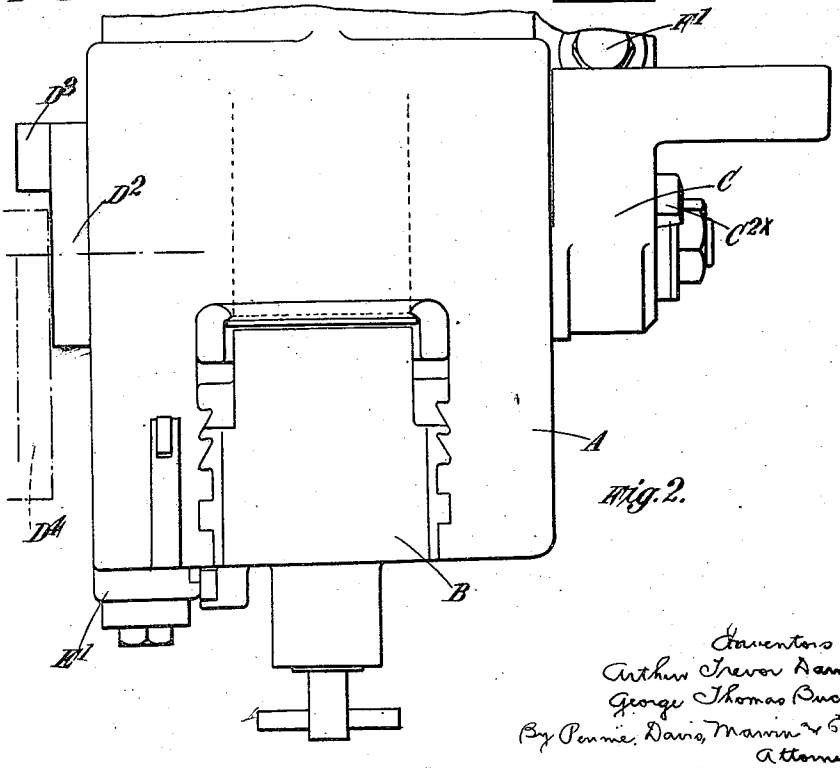


Fig. 2.

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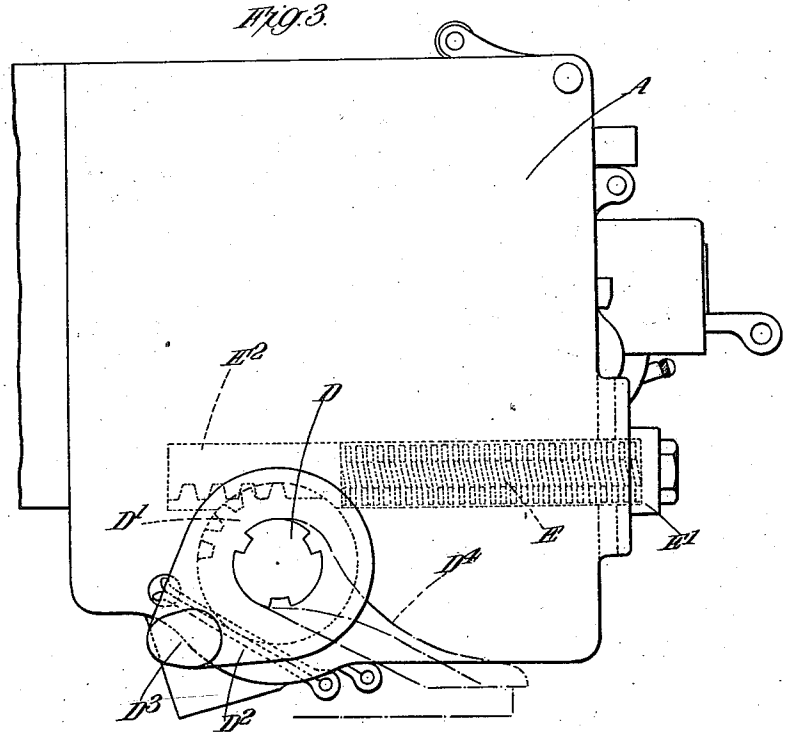
March 29, 1927. 1,622,861

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Filed Aug. 25, 1926 3 Sheets-Sheet 2

Fig. 3.



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March 29, 1927. 1,622,861

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Filed Aug. 25, 1926 3 Sheets-Sheet 3

Fig. 4.

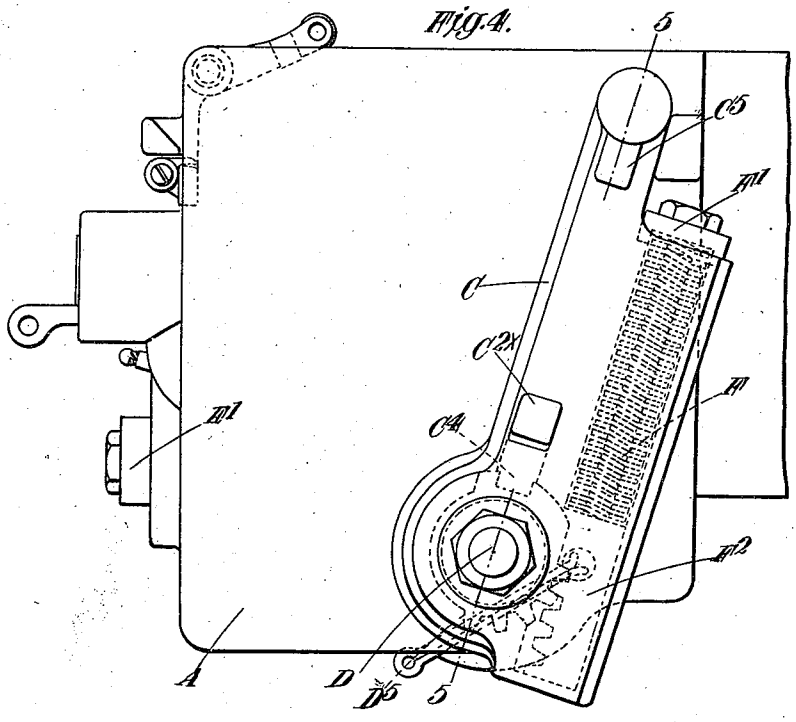
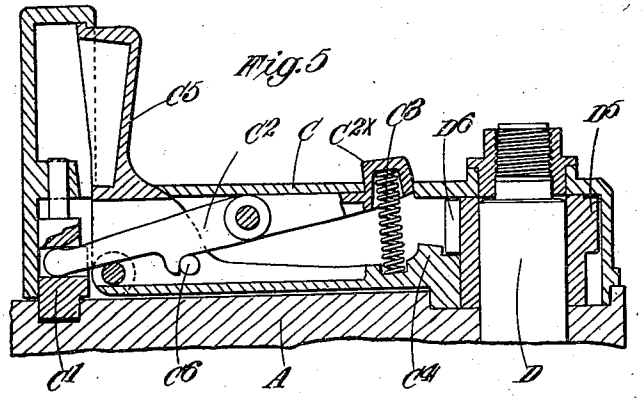


Fig. 5



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UNITED STATES PATENT OFFICE.

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ORDNANCE BREECH MECHANISM.

Application filed August 25, 1926, Serial No. 131,490, and in Great Britain September 16, 1925.

This invention relates to breech mechanism of the vertically sliding block type for semi-automatic guns convertible at will into quick-firing guns, such breech mechanism having a spring which is energized during the automatic opening of the breech in semi-automatic operation and serves to close the breech when the gun has been re-loaded. For hand actuation of the breech mechanism (i. e. during quick-firing operation) the aforesaid spring is, in one known form of such breech mechanism, left in action so that the operator has to compress the spring during the opening of the breech by the operation of the breech actuating hand lever, which operation is rendered difficult owing to the strength of the spring, whilst in another known form of breech mechanism the spring is disengaged for hand actuation in which case it is correspondingly difficult to close the breech owing to the weight of the vertically sliding breech block.

According to the present invention in order to avoid the above-mentioned difficulties we provide two springs one of which is in action during both the semi-automatic and the quick-firing operations and which is of such strength as to balance or approximately balance the weight of the breech block, and the second spring is in action together with the former spring during semi-automatic operation only, this second spring being disconnected during quick-firing operation. Thus during semi-automatic operation there are two springs in action (which springs combined serve the purpose of the single spring heretofore employed) and during quick-firing operation there is only one spring in action which serves to balance or approximately balance the weight of the breech block so that the latter can be operated easily by hand. In order to differentiate these springs we will hereinafter refer to the spring that is in action during both the semi-automatic and the quick-firing operations as the balancing spring and the spring that is in operation together with the balancing spring during semi-automatic operation as the main closing spring. The said balancing spring may be arranged longitudinally at the side of the gun opposite to that where the breech actuating hand lever is situated and may be compressed by a rack member operated by a pinion on the breech actuating crank shaft which is arranged transversely at the lower part of the breech ring and is operated automatically on the run-out movement of the gun to open the breech during semi-automatic operation, and the main closing spring may be carried by the breech actuating hand-lever which, during semi-automatic operation, is connected to the gun and disconnected from the breech actuating crank shaft and which during quick-firing operation is disconnected from the gun and connected to the said crank shaft, the connecting and disconnecting being effected by spring-controlled catches operated simultaneously when the operator grasps the handle of the breech actuating hand-lever; the said main closing spring in the former or semi-automatic condition is compressed by a rack member operated by a pinion on the crank shaft as is well understood and moves with the breech actuating hand-lever in the other or quick-firing condition and is therefore not energized during this operation.

In order that the said invention may be clearly understood and readily carried into effect, the same will now be described more fully with reference to the accompanying drawings in which:—

Figure 1 is a rear elevation of the breech end of a gun provided with our improvements,

Figure 2 is a plan of Figure 1,

Figure 3 is a side elevation of Figure 1 as viewed from the left of the latter figure,

Figure 4 is a side elevation of Figure 1 as viewed from the right of the latter figure, and

Figure 5 is a section taken approximately on the line 5, 5 of Figure 4.

A is the breech ring of the gun, B is the vertically sliding breech block, C is the breech actuating hand-lever arranged at the right-hand side of the gun with the handle uppermost, D is the transverse breech actuating crank shaft which passes through the lower part of the breech ring and to the right-hand end of which the hand-lever C can be connected in the manner hereinafter described, this shaft operating the breech block B in any known or desired manner. E is the aforesaid balancing spring arranged

longitudinally in a recess in the left-hand side of the breech ring A and F is the aforesaid main closing spring carried by the breech actuating hand-lever C.

The balancing spring E is retained in position in its recess by a cap E^1 and is operated upon by a rack member E^2 which engages with a part pinion D^1 attached to the breech actuating crank shaft D near the left-hand end thereof; consequently this balancing spring is compressed during the opening of the breech whether this opening is effected by the hand-lever C during quick firing operation, or whether it is effected automatically on the run-out movement of the gun during semi-automatic operation. Attached to the breech actuating crank shaft D contiguous to the part pinion D^1 is a crank D^2 provided with a lateral pin or projection D^3 for co-operating with a curved or inclined operating surface on a pawl D^4 pivoted to a bracket on the cradle as is described in the specification of our patent application filed concurrently herewith. The said crank and pawl could however be replaced by the usual cam and pawl. In either case the breech actuating crank shaft D is operated to open the breech automatically during the run-out movement of the gun and in so doing the balancing spring E is compressed as is also the main closing spring F as will now be described.

The said main closing spring F is carried in a recess in the breech actuating hand-lever C and is held in place by a cap F^1. This spring acts upon a rack member F^2 meshing with a part pinion D^5 attached to the right-hand end of the breech actuating crank shaft D. In the semi-automatic condition of the parts the breech actuating hand-lever C is connected to the breech ring of the gun by means of a plunger C^1 (Figure 5) operated by one arm of a lever C^2 the other arm of which is operated upon by a spring C^3 interposed between this arm and a catch C^4 forming part of a hand grip C^5 which in the semi-automatic condition of the parts occupies the position shown in Figure 5 in which the catch C^4 is out of engagement with a notch D^6 in the part pinion D^5. Under these conditions, which are those occurring during semi-automatic operation, the spring F is compressed as well as the spring E during the opening of the breech and both these springs are therefore operative in closing the breech. For quick-firing operation the hand grip C^5 is operated in grasping the handle of the breech actuating hand-lever C and this causes the catch C^4 to engage with the aforesaid notch D^6 of the part pinion D^5 and at the same time a pin C^6 on a portion of the hand grip C^5 rocks the aforesaid lever C^2 in order to release the plunger C^1 from engagement with its notch in the breech ring, these movements of the catch C^4 and the lever C^2 compressing the spring C^3. In this condition of the parts, the hand-lever C is connected to the breech actuating crank shaft D and in opening the breech by hand the aforesaid balancing spring E is alone compressed seeing that the main closing spring F merely moves with the breech actuating hand-lever C without its being compressed by this movement. Consequently during the quick-firing operation the weight of the breech block is balanced or approximately balanced by the spring E and the raising of the breech block to the closed position is therefore facilitated. It will, of course, be understood that during the quick-firing operation the aforesaid pawl B^4 appertaining to the semi-automatic gear would be placed in the inoperative position. As the effective weight of the breech block tending to move it to the open position is at the maximum when the gun is firing horizontally and is zero when the gun is firing vertically, we preferably arranged the balancing spring E to be of such strength as to balance the effective weight of the breech block at an angle of elevation intermediate between the two extremes for anti-aircraft guns.

The lever C^2 is provided with a projection $C^{2\times}$ which extends through the side of the hand-lever C as shown. This projection is for the purpose of liberating the plunger C^1 from the gun in the event of the breech mechanism failing to close automatically. Under these circumstances the catch C^4 is unable to rise and actuate the lever C^2 as the head of the catch is under the toothed portion of the part pinion D^5. When the plunger C^1 is raised by pressing on the projection $C^{2\times}$ the hand-lever C can be moved until the catch C^4 reaches the position for engaging with the notch D^6 whereupon the breech mechanism can be closed by means of the said hand-lever.

What we claim and desire to secure by Letters Patent of the United States is:—

1. In ordnance breech mechanism of the vertically sliding block type for semi-automatic guns convertible at will into quick-firing guns, the combination of two springs one of which is in action during both the semi-automatic and the quick-firing operations and which is of such a strength as to approximately balance the weight of the breech block, and the second spring is in action together with the former spring during the semi-automatic operation only.

2. In ordnance breech mechanism of the vertically sliding block type for semi-automatic guns convertible at will into quick-firing guns, the combination with the transversely arranged crank shaft for operating the breech mechanism by hand, and the hand-lever at one end of said crank shaft, of a spring arranged at the side of the gun

opposite to that where said hand-lever is situated, said spring being of such strength as to approximately balance the weight of the breech block, means for energizing said spring from said crank-shaft during the opening of the breech mechanism during both the semi-automatic and the quick-firing operation, a second spring carried by said hand-lever, and means for energizing said second spring during the semi-automatic operation only.

3. In ordnance breech mechanism of the vertically sliding block type for semi-automatic guns convertible at will into quick-firing guns, the combination with the transversely arranged crank shaft for operating the breech mechanism by hand, and the hand-lever at one end of said crank-shaft, of a spring arranged at the side of the gun opposite to that where said hand-lever is situated, said spring being of such strength as to approximately balance the weight of the breech block, means for energizing said spring from said crank-shaft during the opening of the breech mechanism during both the semi-automatic and the quick-firing operations, a second spring carried by said hand-lever, means for connecting said hand-lever to the gun and disconnecting it from the crank-shaft during semi-automatic operation, a breech mechanism closing spring carried by said hand-lever, and means for energizing said spring from the crank-shaft during semi-automatic firing when the hand-lever is connected to the gun.

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