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FIRE CONTROL MEANS FOR A RECOILING TWIN-GUN

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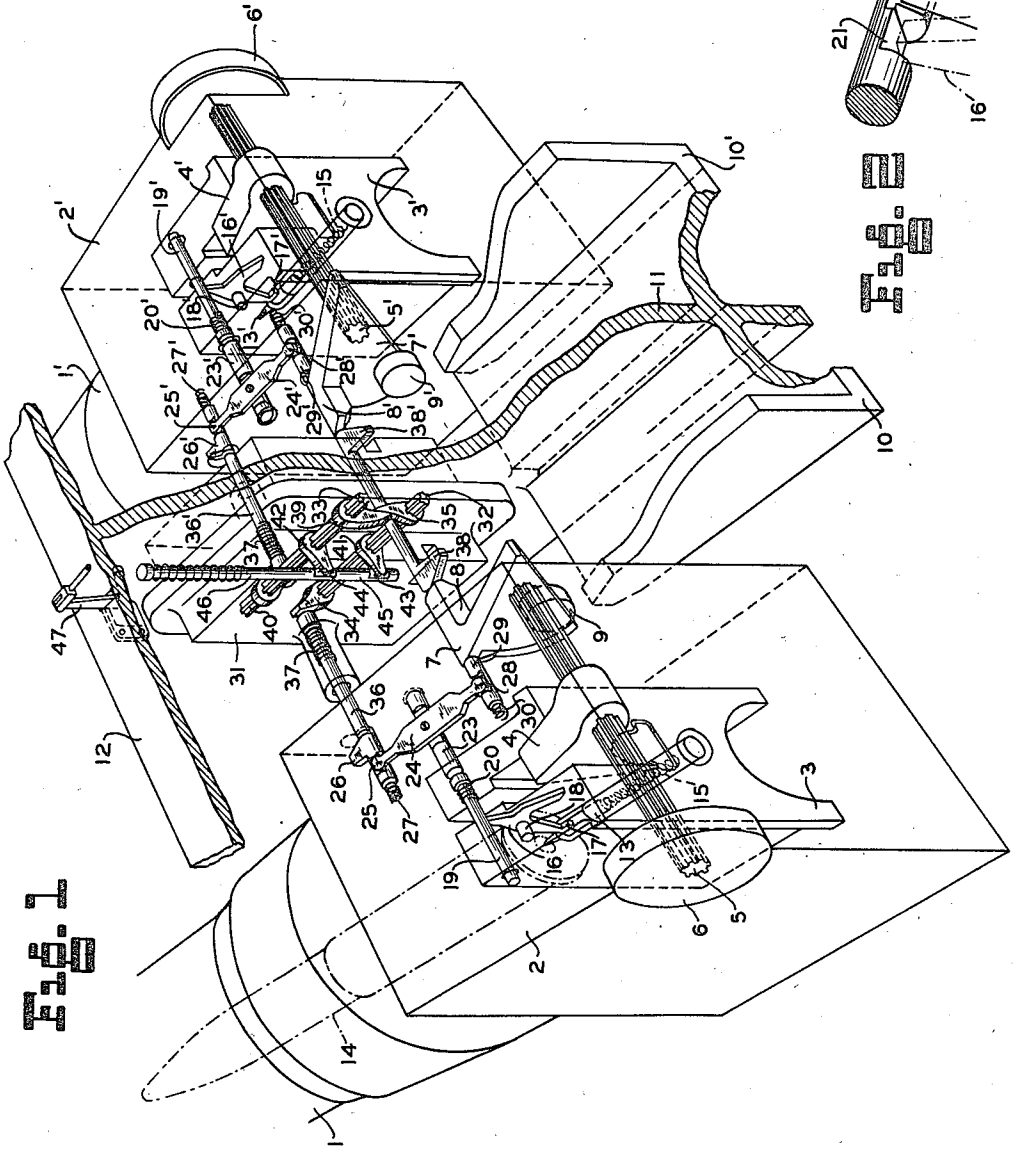

Fig. 1

Fig. 2

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FIRE CONTROL MEANS FOR A RECOILING TWIN-GUN

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The present invention relates to guns having twin barrels mounted for joint elevational and traversing movements, particularly to a twin-gun in which each barrel is individually recoiling and has a breech ring with associated breech block and a firing device.

Twin guns of the general type above referred to, particularly when designed for large calibre projectiles are generally serviced by first ramming and preparing for firing one of the barrels and then ramming and readying the other barrel. According to the desired fire distribution, the two barrels are fired singly or jointly by separate and simultaneous operation respectively of the trigger mechanisms of the two barrels.

Modern development in the ordnance field has made obsolete a manual ramming of the cartridges and gravitates toward a fully automatic operation of twin-guns. Difficulties have been encountered in the design of a mechanism assuring a simultaneous firing of two projectiles whether manually or automatically effected. In practice, it is quite difficult for the personnel in charge of an automatic fire control device to ascertain whether the two barrels of a twin-gun are actually ready for firing. The man in charge of the firing may believe that both barrels are ready or the fire control device may receive indications to this effect whereas in fact only one barrel is ready so that only one barrel will be discharged.

As a result, there is a strong demand in the ordnance field for a reliable control mechanism which assures a simultaneous discharge of the barrels of a twin-gun whenever required.

Accordingly, the principal object of the present invention is to provide a novel and improved control mechanism assuring a simultaneous firing of the two barrels of a twin-gun.

Another object of the invention is to provide a control mechanism for selectively firing either one or both barrels of a twin-gun.

Still another object of the invention is to provide a control mechanism for a twin-gun in which for the purpose of assuring a simultaeous discharge of both barrels, the means of each barrel for moving the breech ring and the breech block thereof into the ready position are interlocked and coacting with each other so that neither barrel can be fired until the breech ring and the breech block of both barrels have reached positions in which the barrels are ready for firing.

Other objects, features and advantages of the invention will be pointed out hereinafter and set forth in the appended claims forming part of the application.

In the accompanying drawing, a now preferred embodiment of the invention is shown by way of illustration and not by way of limitation.

In the drawing:

Fig. 1 is an isometric fragmentary view of a twin-gun equipped with a control mechanism according to the invention, and

Fig. 2 is a detail view of Fig. 1 on an enlarged scale.

Referring now to the figures in detail, there are shown

part of the two barrels 1 and 1' of a twin-gun. Each barrel has at its rear end a breech ring 2 and 2' respectively including a breech block 3 and 3' respectively. The breech blocks are movable in the direction perpendicular to the axis of the barrels. Each breech block 3 and 3' is operatively coupled with a lever 4 and 4' respectively seated on a splined shaft 5 and 5' respectively. Each of these shafts is pivotally supported in a manner not shown by the respective breech ring. The left end of shaft 5 and the right end of shaft 5' are secured to spring loaded drums 6 and 6' respectively and the right end of shaft 5 and the left end of shaft 5' are fastened to a segment 7 and 7' respectively both disposed outside the respective breech block 3 and 3' respectively. Each of the segments 7 and 7' is formed with a finger 8 and 8' respectively laterally extending therefrom. Each segment is further formed with a laterally extending cylindrical guide member 9 and 9' respectively coacting with a cam surface 10 and 10' on a wall portion 11 of a housing 12 for the breech rings 2 and 2'.

In each of the breech blocks 3 and 3' a firing pin 13 and 13' is slidably mounted. Each firing pin is arranged to strike a cartridge rammed into the respective barrel, a cartridge 14 rammed into barrel 1 being shown. The firing pins 13 and 13' are actuated by a spring 15 and 15' operatively connected with a trigger device (not shown). As will be noted, only those parts of the firing means that are essential for the understanding of the invention are shown. The firing pins are further controlled by pawls 16 and 16' respectively which for this purpose engage an abutment nose 17 and 17' provided on the firing pins 13 and 13'. Each pawl is pivotally supported on a pin 18 and 18' respectively extending from the breech blocks. Each pawl 17 has in addition to the arm coacting with the firing pin an arm coacting with a rod 19 and 19' respectively. These rods are slideably supported in recesses provided in the breech blocks 3 and 3' at a right angle to the axis of barrels 1 and 1'. Rod 19 is biased by a spring 20 towards the left and rod 19' is biased by a spring 20' towards the right. Each of the rods is formed with a stepped recess. As can best be seen on Fig. 2, the two slots thus formed are designated by 21 and 22. The said slots may take various configurations. It is merely essential that slot 22 prevents a passage of pawl 16 and 16' respectively through the slot and beyond rod 19 and 19' respectively, while slot 21 permits such passage of the respective pawl.

Each of the breech rings 2 and 2' also supports a rod 23 and 23' respectively which are mounted axially displaceable and are situated in alignment with the respective rod 19 and 19' when the respective breech block 3 and 3' is closed thereby forming an extension of rods 19 and 19'. Each of the rods 23 and 23' supports thereon a two-arm lever 24 and 24' respectively, pivotally secured to the respective rod 23 and 23' by any suitable means such as a screw or pin. One arm 25 and 25' respectively of each lever engages a recess in a member 26 and 26'. The rod shaped portions of these members are slideably mounted in bores in the breech rings 2 and 2' respectively. Each of the members 26 and 26' coacts with a spring 27 and 27' respectively which are loaded to force the respective member out of its bore in the breech ring in which it is supported. The second arm 28 and 28' respectively of each two-arm lever engages a recess in a rod 29 and 29' respectively which are also mounted axially slideably in a hole extending into the breech ring 2 and 2' respectively. Springs 30 and 30' respectively coact with rods 29 and 29' and exert a pressure upon the said rods urging the same out of their respective holes. The outer end of each rod 29 and 29' respectively is in engagement with a guide path provided on the respective segment 7 and 7'.

The control means further comprise a support structure 31, fixedly secured to wall 11 of housing 12 and rotatably supporting two shafts 32 and 33. Shaft 32 supports two arms or fingers 34 and 35 secured against rotation relative to shaft 32 which for this purpose is shown as a splined shaft. Finger 34 coacts with a bar 36 slideably supported by structure 31. Bar 36 is situated in axial alignment with member 26 when breech ring 2 is in its forward position. Bar 36 coacts with a spring 37 which urges bar 36 towards the right. Finger 35 coacts with the rod shaped portion of a member 38' also supported by structure 31. The right hand end of member 38' is coacting with finger 8' of segment 7'. Shaft 33 supports two arms or fingers 39 and 40. Finger 39 coacts with the rod shaped portion of a member 38 which in turn is engageable with finger 8 of segment 7 and finger 40 engages an axially slideable bar 36' which is situated in alignment with member 26' when breech ring 2' occupies its forward position. Bar 36' coacts with a spring 37' which urges the bar toward a position separated from member 26'. Shafts 32 and 33 each further support an arm or finger 41 and 42 respectively. These fingers engage recesses 43 and 44 respectively in an axially slideable rod 45. A spring 46 urges rod 45 in an upward direction. The upper end of rod 45 coacts with an actuation member 47. This member, which may be manually operable, has an arm forcing rod 45 downwardly upon actuation of member 47.

The fire control mechanism, as hereinbefore described, operates as follows:

Let it be assumed that a cartridge has been rammed into each of the barrels and that the barrels are in the act of recoiling. As a result the guide members or heads 9 and 9' follow the cam surfaces 10 and 10' respectively and the breech blocks 3 and 3' are moved into the open position. Let it further be assumed that the two breech rings are stopped when reaching their rearmost positions (actually such stoppage of the movements of the breech rings does not occur but it will facilitate the understanding of the operations to assume that the breech blocks remain temporarily stationary). When now the breech ring 2 begins its forward movement, the breech block 3 will begin to close and rod 29 will follow its guide path on segment 7. This guide path displaces rod 29 toward the left so that when the breech block 3 is completely closed, rod 29 has moved toward the left relative to the position that it occupied when the breech block was in its open position. Hence, arm 28 of lever 24 which engages rod 29 will also be forced to the left and the other arm 25 of lever 24 will now occupy a corresponding position towards the right. The pivotal movement of lever 24 will also effect a movement of rod 19 toward the left. As a result, the arm of pawl 16 coacting with rod 19 will be seated partly in retaining slot 22 thereby preventing a clockwise movement of pawl 16. If the breech block 3 would have been fully opened the arm 28 of lever 24 would have been forced into a position so far to the right that the respective arm of pawl 16 is fully seated in slot 22. In order to cause the respective arm of pawl 16 to move into the slot 21—in which position the pawl is released as previously explained—rod 19 must be pushed still further to the left. For this purpose, it is necessary to displace member 26 against the action of spring 27. As previously explained bar 36 is urged away from member 26 by spring 37. Hence, it is necessary to exert upon member 36 a force by which the required additional movement is imparted to rod 19 through member 26 and lever 24.

There are two possibilities of moving bar 36 for the purpose aforesaid. One way is an actuation of member 47 which effects a downward movement of bar 45. Such a downward movement of bar 45 causes a rotation of shaft 32 by the agency of finger 41 engaging recess 43 of shaft 45. This rotational movement of shaft 32 is transmitted by finger 34 to bar 36 and causes the required movement of the rod 19 toward the left through the agency of lever 24. The second way of causing the required movement of rod 19 towards the left is movement of the second breech ring 2' into its forward position whereby its breech block 3' is closed. Closing of breech block 3' causes finger 8' associated with breech block 3' to move downwardly to displace rod 38' toward the left resulting in a rotation of shaft 32 so that rod 19 is moved towards the left through the agency of finger 34, bar 36, member 26 and lever 24 as previously described.

If, however, breech block 3' would have been in the open position, finger 8' associated therewith could not have acted upon rod 38'. Then the required left hand movement of rod 19 could have been effected only by actuation of member 47.

When breech block 3 is closed the segment 7 associated with this breech block functions in the same manner as just described for the segment 7', that is, finger 8 of segment 7 will actuate member 26' through shaft 33 and fingers 39 and 40. As a result rod 19' is moved by lever 24' into a position in which pawl 16' is released. If, however, for any reason finger 8 should fail to coact with member 38, member 26' can be displaced for the purpose of moving rod 19' into the released position by actuating the member 47 which will effect a rotation of shaft 33 as previously explained for shaft 32.

As will now be apparent, the fire control mechanism according to the invention assures that selectively either both projectiles are fired simultaneously or a projectile is discharged only from a single barrel of the gun.

While the invention has been described in detail with respect to a certain now preferred example and embodiment of the invention it will be understood by those skilled in the art after understanding the invention, that various changes and modifications may be made without departing from the spirit and scope of the invention and it is intended, therefore, to cover all such changes and modifications in the appended claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. In a twin-gun each barrel of which is individually recoiling and equipped with a breech ring movable between a forward and a rear position, a breech block movable transversely to the axis of the respective barrel between an open position and a closed position, a firing means, a control means coacting with the breech ring of each barrel and controlling the firing of said barrels, each of said control means being operatively coupled with the breech block of the respective breech ring, and also with the other breech block, each of the said control means including retaining means controlled to block an operation of the firing means of the respective barrel upon either breech ring being in a position other than the said forward position and either breech block being open and to release the firing means for operation thereof upon both breech rings being in the forward position and both breech blocks being closed, each of said retaining means comprising a movable member retaining the retaining means in one position and releasing the same in another position, a movable control lever actuating said member to move the same from said one position into said other position, and means actuating said lever for the purpose aforesaid under the control of the movement of the respective breech ring and breech block, and an independent actuating mechanism operatively coupled with the retaining means of both the control means for individually releasing the said retaining means by actuation of the independent actuating mechanism thereby permitting firing of the respective barrel by actuation of the firing means thereof, the actuating mechanism being operable for releasing the firing means of a barrel when the breech ring of the said barrel is in the forward position and the breech block thereof is closed.

2. A twin-gun according to claim 1, wherein the said

retaining means of each control means comprise an axially displaceable member retaining said retaining means in one axial position and releasing the same in another axial position, a pivotally mounted two-arm lever, one arm of said lever actuating said member for axial displacement thereof in response to a pivotal movement of the said lever, and means for pivoting said lever for the purpose aforesaid controlled by the movement of the respective breech ring and breech block.

3. A twin-gun according to claim 2 in combination with spring means coacting with said axially displaceable member and spring means coacting with the said pivotal lever, the said two spring means biasing the said member and the said lever toward a position in which the same retain the retaining means.

4. A twin-gun according to claim 1, wherein the said retaining means of each control means comprise an axially displaceable first member formed with at least one recess, a movable control member operatively coupled with said firing means and controlling the release of the same for operation, the said control member releasing the firing means in a pre-determined position of the control member relative to the first member, the said first member and the said control member being disposed in a spatial relationship such that in one axial position of the first member the same arrest a release movement of the control member and in a second axial position permits passage of said control member through said recess and into a position releasing the firing means for operation, a pivotally mounted two-arm lever, one arm of said lever engaging said axially displaceable first member for displacement of the same into the release position in response to a pivotal movement of said lever, and means for pivoting said lever controlled by the movement of respective breech ring and breech block.

5. A twin-gun according to claim 1, wherein the said retaining means of each control means comprise an axially displaceable member retaining said retaining means in one axial position and releasing the same in another axial position, and a pivotally mounted two-arm lever, one arm of said lever engaging said member for axial displacement thereof in response to a pivotal movement of the said lever, the other arm of said lever being operatively coupled with the respective breech block for pivoting of said lever by the movement of said breech block.

6. A twin-gun according to claim 5, wherein the said operative coupling between the said other lever arm and said breech block comprises a first member movable in unison with the breech block and having thereon a guiding surface and a second movable member engaging said guiding surface and said other lever arm for imparting a pivotal movement to said lever, the said guiding surface being of a configuration such as to effect pivoting of the two-arm lever upon a movement of the said first movable member in unison with the respective breech block.

7. A twin-gun according to claim 6, wherein the said first movable member is in the form of a segment, and wherein coupling means couple the said member with said actuating mechanism for moving the said axially displaceable member into its axial position releasing the firing means for operation.

8. A twin-gun according to claim 7, wherein the said coupling means include the said two-arm lever, one arm of said lever coacting with the said axially displaceable member and the other arm with the said second movable member controlled by the movement of the respective breech block.

9. A twin-gun according to claim 8, wherein the said actuating mechanism comprises two rotatable rod members, each of said rod members having thereon two laterally extending arms coacting with said two-arm levers.

10. A twin-gun according to claim 9, wherein one arm of each rod member is in operative engagement with the arm of the respective two-arm lever coacting with the axially displaceable member associated with the breech ring of one barrel and the other arm of each rod member is in operative engagement with said second member associated with the breech ring and the breech block of the other barrel for effecting a movement of the said axially displaceable member so as to release the respective retaining means in response to an actuation of the said movable actuating mechanism.

11. A twin-gun according to claim 10, wherein each of the said rod members has thereon a third arm, each of the said third arms being in operative engagement with the respective axially displaceable member.

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