This invention relates to a firearm of the upward tilting breech type, particularly illustrated by the showing of a side by side double barrelled shotgun, although many of its features would be applicable to an over and under type of shotgun or to double rifles.

The conventional method of constructing this type of firearm utilizes two mismatched barrels with soft solder and then hammers and hand drawn files these members to the desired final shape and high degree of finish. The direct labor cost of such procedure is obviously extremely high and the end result not all that could be desired in terms of strength, and of symmetry of those sections subject to expansion and contraction as a function of the heat of firing, etc. The prior art arms of this class have also been characterized by single trigger mechanisms of such complexity as to virtually defy understanding and by confusing and complex systems of selective automatic ejection.

The prime object of this invention is the production of a firearm of this type of improved quality and one which utilizes in its manufacture an absolute minimum of hand operations.

Other objectives, largely achieved as an incident to clean production design, are ruggedness, dependability, and fool-proof operation.

It is contemplated that these objectives and others may be attained by the use of barrels which are finish turned to their final dimensions and united to each other only at the breech end. The barrels appear to be joined to each other and a sighting rib is provided by the interposition between the barrels of an appropriately shaped bar which may conveniently be of extruded aluminum. The fire control is greatly simplified through utilization of a member attached to and moving with the strikers to passively shift a laterally swingable tripper and transfer trigger control from one barrel to the other each time a shell is fired. The selective automatic ejectors employed, while conventional in some respects, are unusual in that they may be said to be gas actuated and are set to eject a pair of firearm units in turn of the chamber pressure as the shell is fired.

The exact nature of the invention as well as other objects and advantages thereof will more fully appear from consideration of the following specification referring to the attached drawings, in which:

Fig. 1 is a longitudinal sectional view of an assembled shotgun.

Fig. 2 is a side elevation of the barrel assembly.

Fig. 3 is a breech end elevation of the barrel assembly.

Fig. 4 is a transverse sectional view taken on the line 4-4 of Fig. 1.

Fig. 5 is a transverse sectional view taken on the line 5-5 of Fig. 1.

Fig. 6 is a partial longitudinal sectional view taken on the plane designated as 6-6 in Fig. 4.

Fig. 7 is a transverse sectional view taken on the line 7-7 of Fig. 1.

General description

Referring to the drawings by characters of reference, it may be seen that there is provided a frame 1 having a standing breech portion 2, a rearwardly extending tang portion 3, and a forwardly extending portion 4 providing a mounting for a hinge joint pin 5.

The firing mechanism is all housed within the tang portion 3 and the sides thereof are enclosed by forward extensions 6 of the buttstock 7 secured to the tang by the usual stock bolt. In the top strap 8 of the tang there are mounted the reliable safety control 9 and the top lever 10 which controls the breech locking bolt 11. A trigger guard 12 is mounted on the bottom strap 13 of the tang and a trigger 14 and selector 15 extend through the tang into the space within the guard. The major portion of the fire control mechanism, to be more fully described in a later section of this specification, is either mounted directly on or guided by the mounting block 16 which extends between the top and bottom straps of the tang.

As previously noted, the joint pin 5 is mounted in the forward extension 4 of the frame. Arcuate, forwardly facing surfaces 17 on the barrel lug 18 interengage with rearwardly facing surfaces on the joint pin to provide for the hinged barrel mounting typical of the upward tilting breech actions. A forwardly extending arm 19 on the barrel lug 18 extends beyond the joint pin and supports a joint adjusting screw 20 and a fore-end retaining plunger 21. A wooden fore-end 22 is provided with a metallic fore-end base 23 which is arranged to engage the arcuate forwardly facing end of the frame extension 4 in concentric relation to the joint pin 5. The fore-end base is maintained in tight engagement therewith by contact with the head of the joint adjusting screw 20 and the action of the fore-end retaining plunger 21 which releasably seats in a fore-end retaining button 24.

The barrel lug 18 is formed to define a pair of opposed arcuate barrel receiving recesses 25 that are engaged by opposed arcuate buttstock receiving recesses 26 of the buttstock 7.
within which the finish turned barrels 28 are received and secured as by a furnace brazing operation. The breech end of the barrel assembly is faced off to engage the standing breech 2 when the breech locking bolt 11 is engaged in the recess 27 in the barrel lug 10.

The space between the barrels is filled out and a sighting rib is provided by the use of a bar 28 conveniently of extruded aluminum having generally the cross-section of a conventional 1-beam. This beam is inserted between the barrel recesses to interfere with the top flange 29 and bottom flange 30 engaging the arculate exterior surfaces of the barrels. At the rear end of the bar the web 31 and bottom flange 30 are cut away and the upper flange 29 carried on above the barrel lug. Conveniently, a lug 32 may be received in a recess 33 in the barrel lug and the assembly maintained by the use of a barrel rib retaining screw 34.

**Fire control**

As previously pointed out, all of the fire control mechanism is housed between the rearwardly extending strips 10 and 13 of the tang of the frame and the components are largely mounted on or guided by the mounting block 16. These components include a pair of main spring plungers 35 and 36, each guided for reciprocation in the mounting block 16. Engaged between the main spring retaining caps 37 and a similar cap (not shown) on the right hand plunger, and appropriate shoulders on the plungers are the main springs 39 and 40, both acting to move their respective plungers in a forward direction. Forward of the mounting block 16 main spring plunger extensions 41 and 42 are secured to each main spring plunger. These plunger extensions are adapted to serve as strikers for driving the firing pins and each is provided with a depending arm respectively 43 and 44 providing a point of pivotal attachment for rearwardly extending sears 45 and 46. These sears extend rearwardly through guiding and clearance apertures 47 and 48 in the mounting block 16 and are engaged to swing downwardly relative to the plunger extension by a spring 49 on the left hand sear and a similar spring (not shown) for the right hand sear, both received in blind holes in said extensions. The rear face of the mounting block is provided with a hardened steel side plate 51 for engagement by the sears 45 and 46 to hold the respective main springs in a cocked position. In position to receive the impact of the main spring plunger extensions or strikers there are supported left hand firing pin 52 and a similar right hand pin (not shown) which pass through holes in the standing breech into position to impact upon the primer of a chambered shot shell. Firing pin retracting spring 55 engages the left hand pin and a similar spring (not shown) engages the right hand pin to normally urge the firing pins rearwardly a sufficient distance to prevent their protrusion from the face of the standing breech.

The sears are actuated to cause the desired release of one or the other of the main spring plungers or strikers by a trigger 14, swingly supported on the mounting block 16, which acts through a disconnecter or tripper 56 supported for lateral swinging movement from the block 16. The tripper has a depending arm on which there is mounted a roller 57 engaging the upper face of the trigger and connected through the spring 58 which forms its pivot axle in the trigger to a slot 59 in the shank of the selector 15. A coiled portion of the spring 58 closely surrounds the shank of the selector and engages an annular groove therein to act as a retainer for the trippler spring and for a coil spring 60 acting to urge a detent plate 61 into closer engagement with a detent 62 mounted in a blind hole in the bottom strap 13. Obviously rotation of the selector to one or the other of its extreme positions will apply a spring tension tending to shift the trippler to one or the other of its extreme positions. In either extreme position of the trigger, the pulling of the trigger acts through the roller 51 to produce a further rotation of the trigger 56, bringing one of the arms 63 or 64 of the trippler into lifting engagement with the rearwardly extending tail of the respective sear 45 or 46. As the sear is disengaged from the sear plate 51, the plunger extension or striker drives the associated firing pin into the shotshell primer opposite thereto. At the same time, the down-turned end 66 of the similar end (not shown) of the right hand spring applies the pressure of the associated sear spring to the trippler in opposition to the force of the trippler spring 58. The forces of these springs are so balanced that upon release of the trigger the sears move into their former swinging and shifts the trippler over center to a new position where a second actuation of the trigger will release the second sear and fire the second barrel.

An involuntary release of the trigger and an involuntary second pull during the interval in which the gun is subject to recoil is prevented by an anti-doubling inertia plunger 76 and its associated spring 76 acting to hold the inertia plunger in a normally rearward position. As the gun recoils the inertia plunger tends to maintain its original position, causing the tip of the inertia plunger to come beneath the block 14 of the trigger to prevent an involuntary release and inadvertent double firing.

When the strikers are again cocked the trippler 56 is again under the control of the trippler spring 58 and returns to the position plate 61 by the setting of the selector 15. Thus, it is possible to set the selector to fire either barrel first and at each reloading return without further attention to that setting, or the choice of barrels may be made and set at any time.

**Cocking and automatic safety**

Each time the action of the gun is opened to reload or for any other purpose, any fired barrel is cocked and the safety automatically moved to "Safe" position. These operations are performed by the cocking rod 67 which is mounted for reciprocation in the frame 1 and is guided therein by passing through aligned holes in the cocking rod guide bushing 68, the locking bolt 11, and by a centralizing pin 69 by the cocking rod by a tenoned joint and passing through a hole in the mounting block 16. A cocking rod retracting spring 70 surrounds the extension 59 and acts between the forward face of the block 16 and a flange 71 on the extension to normally urge the cocking rod to a forward position. A positive limit is placed on forward movement by a snap ring 72 engaged in a groove in the cocking rod shank and brought into engagement with the rear face of the cocking rod guide bushing 68 which passes through the front end of the frame and threadably engages a bore in the joint pin 5.

During rearward movement of the cocking rod the flange 71 engages the front face of the main
spring plunger extensions 41 and 42, moving them rearwardly into position for engagement of the sears 45 and 46 with the rear plate 51. At the same time, the tip of the cocking rod extension engages the safety control 9 and moves it rearwardly until the downward extension 73 of the safety is positioned over a block 74 on the trigger to prevent operation thereof.

The cocking rod is reciprocated each time the action of the gun is opened as a result of the engagement of the cam 71, formed in the fore-end base 23, with the forward end 70 of the cocking rod. This operation will be readily understood when it is recalled that the fore-end base is, for operating purposes, a unit with the barrel and turns with them about the axis of the joint pin each time the action is opened.

**Breech locking**

As previously mentioned in the general discussion, the action is locked in closed position by a breaching bolt 11 which engages a recess 27 in the barrel lug 18 and is under the control of the top lever 10.

A top lever cam 79 is fastened by a screw or other convenient means, not shown, to the shank of the top lever and carries a depending cam pin 80 which engages in a transverse slot 81 in the inner face of the top lever 11 to convert rotary motion of the top lever shank to reciprocation of the bolt. A spring and plunger, not shown, but of any convenient form, may engage an abutment on the top lever cam and thereby bias the bolt to a normally forward position.

To provide for a smoother closing movement of the action, a bolt stop 82 may be mounted in the frame and urged upwardly by a spring 83 to a position in front of the bolt 11. Thus, whenever the bolt is retracted and the action opened the bolt stop springs upward to retain the bolt in its rearmost position, escape of the bolt stop being prevented by engagement with the cocking rod 81. As the action is closed, the lower surface on the butt lug 18 to each side of the slot 84, which provides clearance for the cocking rod, will engage the upper surface of the bolt stop and depress it to its lower position. The depression of the bolt stop 82 releases the bolt 11 which then snaps out to engage the recess 27 in the barrel lug. To insure a tight locking action the tip of the bolt 11 and the recess 27 should inter-engage on matching tapers.

**Extraction and automatic ejection**

Extractor plungers 85 and 86 are mounted for reciprocation in parallel bores in the barrel lug 18 and are urged to a normally rearward position by a spring not shown on the left hand plunger and a similar spring 88 on the right hand plunger. Each plunger is provided with an extractor claw 85 or 86 which intersects the corresponding barrel chamber in position to engage beneath the rim of the head of a chambered shell. Rounded cam surfaces 81 and 82 on each extractor claw engage the standing breech as the action is closed and force the extractors back flush with the breech end of the barrel. As the gun is opened without firing, the extractor cams again ride out on the standing breech and the unfired shells are retracted by the springs about 3/4 of an inch to a position where they may be readily grasped for manual removal.

Automatic ejection is desirable to positively and completely eject any fired shells and is accomplished by setting a latch to hold the extractor spring tensioned when the shell is fired, and releasing this latch as a function of completion of the movement of the action to breech open position. The ejector latches 93 and 94 are each pivoted in the barrel lug 18 and the right hand latch 94 is provided with a hook 96 to engage a detent notch 98 in the extractor plunger 86. A spring-urged detent ball 100 engages holes in the latch to releasably secure the latch in either extractor holding or extractor releasing position. Similar arrangements (not shown) are provided for the left hand latch 93.

The ejector latches are moved to extractor holding position as a function of the firing of the shell by actuator pistons 101 and 102 which are received in bores intersecting the chambers and provided with offset ends which pass through slots in the extractor shanks and overlie the ejector latches. The inner ends of the actuator pistons are arranged in position to contact the body paper of a chambered shell which upon firing applies a sufficient impulse to the actuator piston to trip the latch. Tests have proven that this action is quite consistent and reliable and that it does not tend to burst shell bodies or blank disks therewith, although there is a slight localized expansion. Because of this localized expansion, extraction is facilitated by a wide chamber surrounding the actuator piston bores.

As the action reaches a substantially completely open position, a latched extractor is tripped by the engagement of the associated ejector release rod 103 or 104 with an abutment 105 at the forward end of the frame. It will be noted that the release rods pass through the extractor springs and through the end of the extractor shank being provided with slightly enlarged portions such as 108 which will abut the end of the extractor shank at substantially the instant the release of the ejector latch is complete. In the event a shell tends to stick in the chamber and is not immediately ejected by the release of the extractor latch, the engagement of the shoulder of the release rod with the extractor shank will impart a primary extraction force sufficient to dislodge a tightly chambered shell.

**Miscellaneous**

To cushion the shock of abruptly opening the action, a barrel cushion 108 is secured over the abutment 105 in the frame and suitably apertured to permit passage of the shanks of the ejector release rods. As the action is opened completely, this cushion is compressed between the barrel lug and the abutment 105 to prevent noise and deformation of any parts. Preferably this cushion is formed of neoprene or other oil-proof resilient material suitably cemented or vulcanized in place.

The construction and assembly of the barrels and rib have been described in sufficient detail in the general discussion but it may be well to point out that this construction makes it possible for each barrel to be absolutely symmetrical with regard to the bore axis and virtually independent of the other barrel insofar as vibration characteristics and thermal expansion rates are concerned. These factors combine to insure consistent shooting at all times and this construction is also an important feature in cost reduction.

**We claim:**

1. In an upward tilting breech firearm having a frame provided with a spring-urged striker, a fire control mechanism for said striker, a standing breech, and a barrel hinge pin; a barrel as-
assembly: tilttable about said hinge pin; and a locking bolt reciprocably mounted in the standing breech for movement into engagement with the barrel assembly to lock the breech end of said barrel assembly in engagement with the standing breech; the combination comprising a cocking rod; a front bearing for said cocking rod mounted in said hinge pin; a rear bearing for said cocking rod formed by a bore passing through the locking bolt, said cocking rod being supported in said bearings with freedom for reciprocation; a fore-end mounted on said barrel assembly to tilt therewith about said hinge pin; a cam mounted in said fore-end and shaped to define a portion relatively remote from said hinge pin engaging the end of said cocking rod when the breech end of said barrel assembly engages the standing breech and movable with the barrel assembly as the same is tilted about said hinge pin to successively bring into engagement with the end of the cocking rod portions of the cam which are progressively less remote from the hinge pin; thereby converting tilting movement of said barrel assembly into reciprocation of the cocking rod; and flanged means mounted directly on the rear end of said cocking rod and directly engageable with the striker to move same to cocked position as said barrel assembly is tilted.

2. In the combination described in claim 1, a block in said frame bored to provide a bearing in alignment with said cocking rod bearings and rearwardly disposed relative thereto; a coaxial extension of said flanged means received in said bearing; spring means encircling said extension between said block and the flanged means urging said cocking rod forwardly; and a safety member movable from a forward position to a rearward position in which it blocks operation of the trigger, said safety member being disposed directly in the path of said coaxial extension and movable thereby to said rearward position as said cocking rod is reciprocated.

3. The combination defined in claim 1 for use in a double-barreled firearm having two spring-urged strikers, said cocking rod bearings being positioned in a plane passing substantially midway between the barrels and between the two said strikers, said flanged means mounted on the cocking rod being of such size and shape as to have substantially simultaneous direct engagement with both of said strikers as the cocking rod is reciprocated.

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