AUTOMATIC SHOTGUN CHOKE OPERATED BY GASES OF EXPLOSION

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This invention relates to chokes for shotguns, and has particular reference to chokes of the automatic type.

The principal object of the present invention is the provision of a shotgun choke which is adjustable successively from a "no-choke" or full-cylinder setting through one or more modified choke settings to a "full choke" setting, thereby providing a mechanism whereby it is automatically advanced to the next successive setting each time the gun is fired. In firing at birds or other moving targets which normally travel farther away from the gunner if the target is not hit on the first shot, it is desirable that the diameter of the muzzle end of the barrel be slightly reduced or "choked" on successive shots, so that the shot pattern will be reduced, and hence remain effective at the greatest distances to the target. It is of course highly desirable that this adjustment be automatic and very rapid, since the gunner does not ordinarily have sufficient time in which to make adjustments manually.

Another object is the provision of a shotgun choke of the character described wherein the automatic choke-advancing mechanism is actuated by the pressure of the explosion gases which propel the shot through the barrel each time the gun is fired.

Other objects are simplicity and economy of construction, dependable efficiency of operation, ease of installation on pre-existing shotguns, and the provision of a selector whereby the choke-advancing mechanism may be set selectively for gas operation or manual operation, or may be locked against operation.

With these objects in view, as well as other objects which will appear in the course of the specification, reference will be had to the drawings, wherein:

Fig. 1 is a fragmentary side elevation view of a shotgun showing the barrel portion thereof with an automatic choke embodying the present invention attached thereto.

Fig. 2 is a longitudinal, vertical mid-sectional view of the choke and the adjacent portion of the barrel.

Fig. 3 is a sectional view on line III—III of Fig. 2.

Fig. 4 is a sectional view taken on line IV—IV of Fig. 2.

Fig. 5 is an enlarged sectional view taken on line V—V of Fig. 2.

Fig. 6 is a reduced fragmentary sectional view taken on line VI—VI of Fig. 5, with parts left in elevation.

Fig. 7 is an enlarged fragmentary sectional view taken on line VII—VII of Fig. 6.

Fig. 8 is an enlarged fragmentary sectional view taken on line VIII—VIII of Fig. 6.

Fig. 9 is an enlarged fragmentary view similar to Fig. 6, showing the latch released by gas pressure to permit advancement of the choke.

Fig. 10 is a view similar to Fig. 9, showing the choke locked against change.

Fig. 11 is a view similar to Fig. 10, showing the latch released manually.

Fig. 12 is an enlarged sectional view taken on line XII—XII of Fig. 1.

Fig. 13 is an enlarged sectional view taken on line XIII—XIII of Fig. 1, with parts left in elevation.

Like reference numerals apply to similar parts throughout the several views, and the numeral 2 applies to a shotgun, shown fragmentarily, including barrel 4 and forepiece 6. The choke 8 is mounted at the forward end of the barrel. The choke includes a tubular body member 10 forming a forward extension of the barrel, said body member being internally threaded at its rearward end to engage threads formed externally on the barrel, this threaded connection being indicated at 12. This threading of the end portion of the barrel is the only adaptation which need be performed on the usual shotgun to permit installation of the present choke, and this may be done easily. Many guns are of course already threaded for receiving standard chokes, muzzle brakes, and the like.

The inner diameter of body member 10 is the same as the bore of barrel 4, and forms an extension thereof.

The forward end portion of the body member is bevelled as at 14, and is longitudinally split to provide a plurality of prevailingly disposed tongues as shown, as is best shown in Figs. 2 and 3. An operating sleeve 18 surrounds the forward end portion of the body member, being freely rotatable thereon and threaded thereto just behind tongues 16, this threaded connection being indicated at 20. The sleeve is provided at its forward end with an internal bevelled shoulder 22 which is in engagement with the bevel 14 of the body member. Thus as the sleeve is turned in a counter-clockwise direction, facing forwardly, the threads 20, being right-handed, will move the sleeve rearwardly on the body member, whereby the bevelled shoulder 22 of the sleeve, in engagement with the bevelled ends 14 of the tongues 16, forces said tongues inwardly to a smaller diameter. This general type of choke operation is common and well understood in the art. The lead of threads 20 is such that the entire range of adjustment, from full cylinder diameter to full choke, is obtained with less than one full revolution of sleeve 18.

Sleeve 18 is extended rearwardly from threads 20, and a plurality of longitudinally extending peripherally spaced slots 24 are formed in the extended portion thereof, said slot extending constituting a gear in which is meshed a gear pinion 26. Said pinion is fixed on a shaft 28 which extends parallel to and beneath body member 10, being supported rotatably in a bracket 30 fixed to the body member by screws 32. A helical torsion spring 34 is disposed about shaft 28 and is secured to the shaft as indicated at 36 (Fig. 2), and the opposite end of said spring being secured to bracket 30 as indicated at 38. Said springs exert continuous rotary torque on shaft 28, tending to turn said shaft and pinion in a clockwise direction, looking forwardly, whereby to turn sleeve 18 to increase the degree of choke. A pair of collars 40 are fixed on the shaft and engage bracket 30 to prevent longitudinal movement of the shaft. The gear formed in sleeve 18 by slots 24 must be of such length as to permit longitudinal movement of said sleeve a distance equal to the lead of threads 20. Pinion 26, and the associated parts are enclosed by a housing member 42 formed of sheet metal and including a lip 44 at its forward end in which sleeve 18 may rotate and move longitudinally, a slightly enlarged portion 46 just behind the lip which provides an annular channel to the rearward portion of sleeve 18 and extending rearwardly of said sleeve, and a downward enlargement 50 which extends from lip 44 rearwardly to the rearward end of body member 10. Portion 50 extends only around the bottom portion of body member 10, the edges thereof being secured to said body member by screws 52 (Figs. 1, 7, and 8).
The rotational movement of sleeve 18 is controlled by a latch mechanism including a flat leaf spring 54 disposed parallel to body member 19 but angularly offset from driving spring 34. Spring 54 is secured to the outer surface of body member 19 at its rearward end by rivets 56. The body portion of the spring is offset outwardly from the body member, and it terminates at its forward end just beyond sleeve 18. At this point block 58 is permanently secured to the free end of said spring, and normally rests against the surface of said body member. A hole 60 is formed through the wall of body member 10, communicating with the internal bore thereof, in such a position that the rearward thereof is normally covered and closed by block 58. It is apparent that each time the gun is fired, the high pressure explosion gases passing through barrel 4 and body member 10 will act outwardly through hole 60 and against block 58 to force the free end of spring 54 radially outwardly for a very short period of time.

Block 58 cooperates with a plurality of stop dogs or tongues 62, 64, and 66 formed integrally with sleeve 18 and projecting rearwardly therefrom to ride slidably on the inner surface of sleeve 18. Dogs 62 and 64 are identical, the forward face 68 of each, taken in the direction of rotation of the sleeve 18 by spring 34, being disposed radially of the body member, and the rearward face 70 of each being inclined gradually to the surface of the body member. Dogs 62 and 64 pass between the forward face 56 and the rearward face 74 thereof disposed radially to the body member, and this dog also extends radially to a radius greater than that of sleeve 18, for a purpose hereinafter appearing. The contours of these three dogs are best shown in Fig. 5. The block 58 of spring 54 is normally disposed in the circular path of said dogs.

In operation, the choke is set by turning sleeve 18 normally in a clockwise direction, facing forwardly. Dogs 62 and 64 pass under block 58, the inclined rearward surface thereof camming said block outwardly. The rearward surface 74 of dog 66 is radial, however, and cannot pass block 58, and this dog therefore serves as an end stop limiting the winding of the sleeve. When this stop is reached, the sleeve is released, and is turned in a counterclockwise direction by spring 34 and pinion 26 until the forward face of dog 63 engages the block. The choke is then set for automatic operation. In this position sleeve 18 is set to allow expansive movement of tongues 16 to the full diameter of body 10 and barrel 4. When the first shot is thereafter fired, block 58 is forced outwardly by the gases of explosion acting through hole 60, as described and shown in Fig. 9. Dog 62 is thus freed to pass under block 58, and sleeve 18 is turned in a counterclockwise direction by spring 34. The movement of the sleeve is arrested when the forward face of dog 64 strikes block 58, which is of course returned to its normal position by spring 54 with great rapidity. The sleeve has then contracted tongues 16 to a modified choke position, and the gun is then ready for the second shot. On the second shot, dog 64 is released in the same manner as dog 62, and the sleeve is again rotated by spring 34 till arrested by the engagement of dog 66 with block 58. The sleeve has then contracted tongues 16 to a full-choke position, and the gun is then ready for the third shot.

On the third and any subsequent shot, dog 66 is not released by the outward movement of block 58, since said dog is extended radially a distance greater than the maximum possible outward movement of said block. The outward movement of said block is limited by the engagement of the free end of spring 54 with the inner surface of portion 50 of housing 42, as indicated in Figs. 9 and 11. A permit 108 is provided in the housing adjacent spring 54 to permit the escape of gases therefrom. It is obvious that more settings of the choke could be provided by the use of a greater number of intermediate dogs similar to dog 64, and that the degree of choke at each setting could be varied by varying the angular spacing of the dogs. The free end portion of spring 54 is braced against lateral movement caused by the pounding of the dogs against block 58 by a U-shaped bracket 78 having its central portion secured to body 10 by screw 50 and having its parallel arms extending outwardly along the opposite longitudinal edges of said spring.

The choke-advancing mechanism may be operated manually, or locked against operation, by means including a selector member 82 which is disposed intermediate the ends of spring 54, said member comprising a block having its inner edge disposed slidably against body 10 and its outer edge disposed slidably against the inner surface of housing 42, whereby it may be shifted longitudinally of the spring. It extends through a longitudinally elongated slot 84 formed in spring 54, and is provided at its forward end with a forwardly projecting tongue 86 disposed adjacent the inner surface of housing 42. At its rearward end, it is provided with a rearwardly and inwardly inclined cam surface 88. Said selector has forward, intermediate, and rearward positions. When in its intermediate position, as shown in Fig. 6, it does not in any way affect the movement of spring 54, and permits automatic operation of the choke, as previously described and as illustrated in Fig. 9. When the selector is shifted to its forward position as shown in Fig. 10, tongue 86 thereof projects between the spring at the forward end of slot 84 and housing 42, thereby substantially preventing spring against outward movement and preventing block 58 from moving outwardly far enough to release dogs 62 or 64. The choke may thus be set at any desired setting and will maintain this setting regardless of firing of the gun. When the selector is moved to its rearward position, as shown in Fig. 11, cam surface 88 thereof engages the spring at the rearward end of slot 84 and cams said spring outwardly as shown, thereby forcing block 58 outwardly to release dogs 62 or dog 64.

Selector 82 is normally moveable to and secureable in any of its three positions as described above by means best shown in Figs. 1, 12 and 13, and including a wire 90 the forward end of which is welded or otherwise fixed to the rearward end of selector member 82, as indicated at 92. Said wire extends rearwardly through a flexible conduit 94 the forward end of which is secured in the rearward wall of housing 42, and which extends rearwardly beneath barrel 4. Said conduit is removably attached to the barrel at spaced points therealong by any suitable means such as spring clips 96. Just forwardly of forepart 6 of the gun is cam surface 100 which is the vertical median plane of barrel 4 and extending downward therefrom, is removably attached to the barrel as by spring clip 100. Said plate carries a horizontal transverse shaft 102 for axial oscillation. Adjacent one face of said plate, a handle bar 104 is diametrically fixed in the shaft. At the opposite face of the plate, a compression spring 106, is disposed about the shaft, bearing at one end against the plate and at its opposite end against a washer 108 secured on the shaft by pin 110, whereby bar 104 is urged yieldingly against plate 98. The rearward end of wire 90 is attached to the upwardly extended end of bar 104. The downwardly extended end of the bar forms a handle the oscillatory movement of which pushes or pulls wire 90 to move selector 82 to any of the three positions described. As shown, the central position of handle 104, as shown in Fig. 11, is its intermediate position, providing for automatic choke operation. Rearward movement of handle 104 moves the selector to its forward or locking position, as shown in Fig. 10, and forward movement of the handle moves the selector to its rearward or automatic release position as shown in Fig. 11. Handle 104 is releasable in any one of its three positions by a pair of dimples 112 formed in plate 98 adjacent handle 104. Said handle is permitted to move outwardly to snap over said dimples by the action of spring 106.

While I have shown and described a specific embodi-
ment of my invention, it is apparent that many minor changes of structure and operation could be made without departing from the spirit of the invention as defined by the scope of the appended claims.

What I claim as new and desire to protect by Letters Patent is:

1. A shotgun choke comprising a tubular body member adapted to be secured to the barrel of a shotgun to form an extension thereof and having a contractile section, a sleeve disposed concentrically about said body member and operable as it is turned on said body member in one direction to restrict said contractile section to reduce the diameter thereof, a plurality of rearwardly extending, angularly spaced stop dogs carried by said sleeve, resilient means carried by the body member and continuously urging said sleeve rotatably to contract said contractile section, a latch member carried for substantially radial movement by said body member to the rear of said sleeve, said body member having an opening formed therethrough communicating with the interior thereof, and means urging said latch member yieldingly against said body member to cover said opening and into the path of said stop dogs, said latch member being movable outwardly by the pressure of the gases of explosion, passing outwardly through said opening on successive firings of the gun to allow one of said stop dogs to pass.

2. The structure as set forth in claim 1 having means limiting the outward movement of said latch member, and wherein one of said stop dogs is extended radially to a distance such that it cannot pass said latch member even in its extreme outward position.

3. The structure as set forth in claim 1 wherein the rearward faces of all of said dogs but one, considering the rearward face as the one opposite to the leading edge when said sleeve is being turned by said sleeve rotating means, being inclined rearwardly to form a cam, whereby said sleeve may be turned rearwardly to reset the same, said cams urging said latch member outwardly to permit said dogs to pass thereunder.

4. The structure as set forth in claim 1 having means for limiting the outward movement of said latch member, one of said stop dogs being extended radially to such a distance that it cannot pass said latch member even when the latter is at the outer limit of its movement, and the rearward face of each of the remaining stop dogs being inclined inwardly to form a cam surface.

5. The structure as set forth in claim 1 having a selector member carried by said body member, and manually movable from a first position wherein it does not restrict the movement of said latch member to a second position wherein it engages said latch member to lock the latter against outward movement.

6. The structure as set forth in claim 1 having a selector member carried by said body member, said selector member having a cam formed on a portion thereof, said selector member being manually movable from one position, wherein it does not affect the movement of said latch member, to another position, said cam being operable during movement to said other position to engage and move said latch member outwardly regardless of any gas pressure through said opening.

7. The structure as set forth in claim 1 having a selector member carried by said body member, and having a cam formed on a portion thereof, said selector member being selectively movable from a first position wherein it does not affect or restrain the movement of said latch member, either to a second position wherein it engages said latch member to lock the latter against outward movement, or to a third position in which the latch lock is inoperative, said cam being operable during movement to said third position to engage and move said latch member outwardly.

8. The structure as set forth in claim 1 wherein said latch member comprises a leaf spring extending longitudinally of said body member and attached thereto at its rearward end, and a block attached to the free end of said spring and normally urged by said spring against said body member to cover said opening, said spring having a slot formed longitudinally therein, and having a selector member carried for longitudinal sliding movement by said body member and extending radially through said slot, said selector member having a forward projection at its forward end and a rearwardly and inwardly inclined cam surface at its rearward end, said selector member having a central position wherein it does not affect the movement of said spring, a forward position wherein said tongue overlaps the outer surface of said spring at the forward end of said slot to lock said spring against outward movement, and a rearward position, said cam surface being operable during movement to said rearward position to engage said spring at the rearward end of said slot to force said spring outwardly, and manually operable means for moving said selector member to any of its three positions.

9. In a shotgun choke, a body member adapted to be attached to a shotgun barrel to form an extension thereof, and having a contractile section adapted to be restricted to reduce the diameter of said extension, said body member having an opening formed therein communicating with the interior thereof, an adjusting member carried movably by said body member and operable as it moves to restrict said contractile section, means carried by said body member and continuously urging said adjusting member in a direction to restrict said contractile section, a plurality of spaced apart stop dogs attached to said adjusting member and movable therewith, a latch member normally disposed in a position covering the opening in said body member and in the path of movement of said stop dogs, and means securing said latch member to said body member and holding said latch member yieldingly in its normal position, said latch member being momentarily movable out of the path of said stop dogs by the gases of explosion passing outwardly through said opening at each successive firing of the gun.

References Cited in the file of this patent

UNITED STATES PATENTS

2,134,238 Sedberry Oct. 25, 1938