Oct. 18, 1949. W. L. FINLAY 2,484,988

MEANS FOR CONTROLLING SHOT PATTERNS

Filed April 3, 1945 2 Sheets-Sheet 1

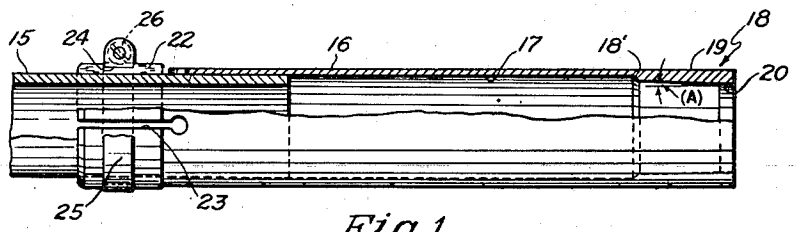


Fig. 1

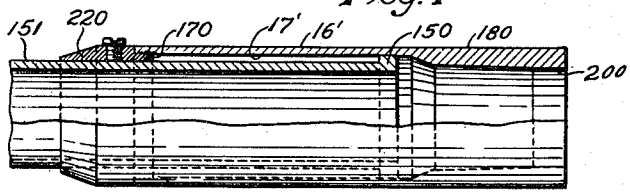


Fig. 2

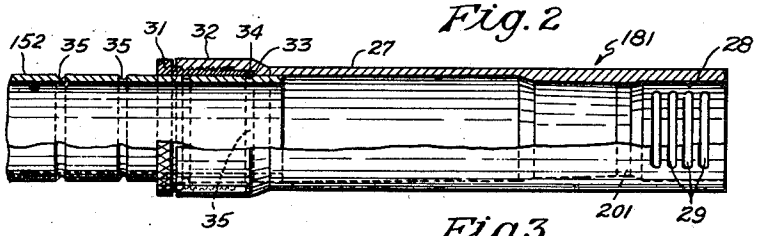


Fig. 3

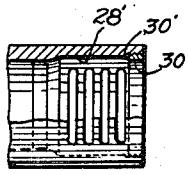


Fig. 3a

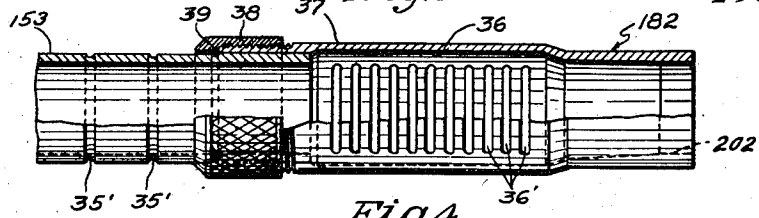


Fig. 4

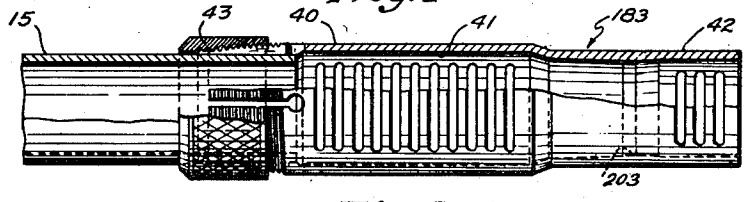


Fig. 5

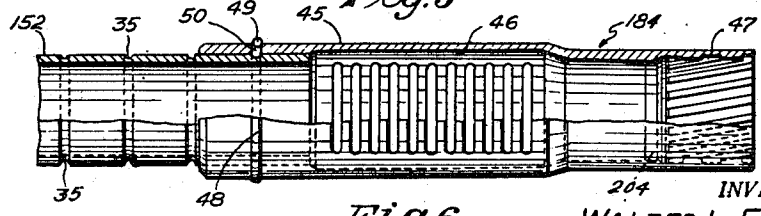


Fig. 6

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MEANS FOR CONTROLLING SHOT PATTERNS

Filed April 3, 1945 2 Sheets-Sheet 2

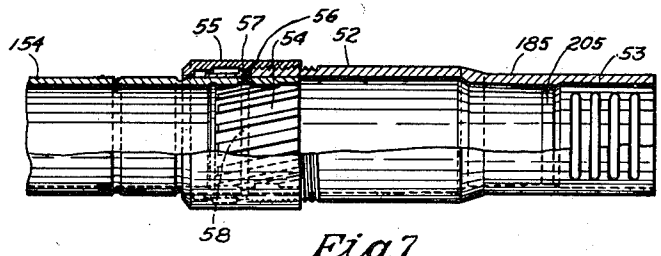


Fig. 7

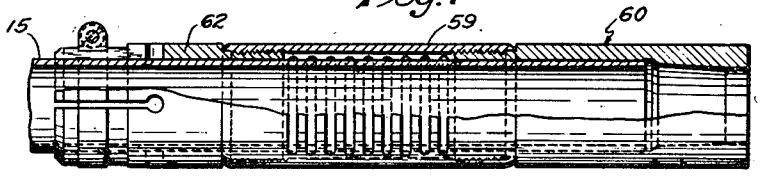


Fig. 8

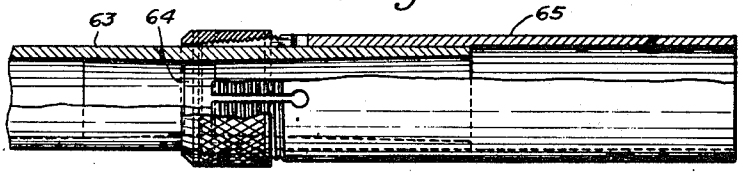


Fig. 9

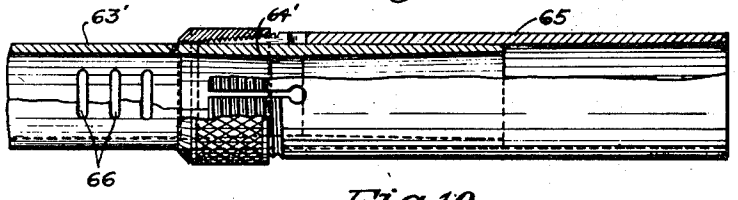


Fig. 10

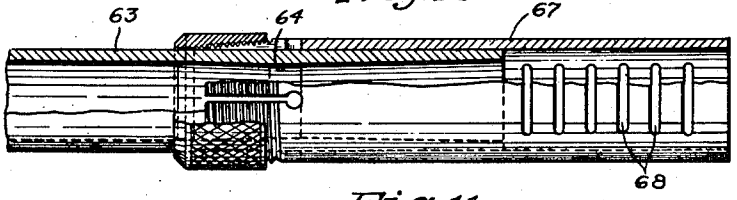


Fig. 11

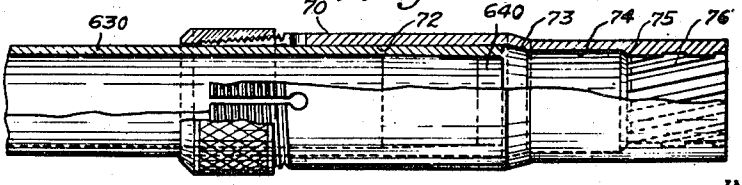


Fig. 12

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UNITED STATES PATENT OFFICE

2,484,988

MEANS FOR CONTROLLING SHOT PATTERNS

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Application April 3, 1945, Serial No. 586,303

7 Claims. (Cl. 42—79)

1

This invention relates to a pattern controlling device for shotguns and contemplates an efficient device adapted to be slidably mounted on a shotgun barrel to enable full control of patterns. Moreover, the pattern control device may embody features for reducing recoil and insuring uniform dispersion of the shot in a target area.

The "pattern" of a shot charge, as fired from a gun, is ordinarily measured as the percentage of the entire charge of pellets which falls within a thirty inch circle at a range of forty yards. Different densities of pattern are required for different types of shooting. For a rapidly moving target at close range, such as pheasant, grouse in timber, or "Skeet" targets, an open or widely spread pattern is desirable, for the reason that the conditions of shooting do not enable high accuracy of aim, and in hunting a great concentration of shot is too destructive to the target. On the other hand, handicap trap shooting and the shooting of ducks, geese, etc., requires a concentrated pattern, for the reason that the target is at a greater range, and a substantial concentration of shot at a long range is needed for effective results. While under extreme conditions patterns having a greater spread or a greater density may be desirable, the ordinary range of shotgun uses is satisfied by an "open," "cylinder" or "scattered" pattern, in which about 40% of the shot pellets fall within the standard thirty inch circle at forty yards; and a "full choke," "close" or "dense" pattern, in which about 70% of the shot pellets fall within the thirty inch circle at forty yards.

It is known that close or dense patterns are secured by introducing a constriction known as a "choke" in the path of a shot charge which, according to one theory, constricts the charge and at the same time retards the wad following the charge, thereby permitting the shot mass to emerge from the constriction in the form of an elongated dense mass without subsequent interference from the wad. On the other hand, open or scattered patterns appear to be effected chiefly by the driving of the wad into the shot mass as the latter moves through and emerges from a cylindrical bore, whereby the shot mass is shortened in a longitudinal direction and made to spread transversely on leaving the muzzle, the relatively light wad rapidly falling behind the heavy shot mass.

There are at the present time, devices designed to effect pattern control, as, for example, the device shown in the patent to White, No. 1,892,522, December 27, 1932, but this device and devices of

2

a similar nature are designed to vary the diameter of the constriction through which the shot charge is propelled a constriction variation of the order of 0.035 inch being provided for full control of patterns. Whereas adjustments for the extreme open and close patterns may be readily made, attempts to make the very small adjustments required for intermediate patterns such as 50% and 60% are generally frustrated by the mechanical limitations of these devices.

The present invention has its inception in the discovery that by varying the point in the path of a shot charge, following unimpeded travel of the charge, and hence radial expansion thereof, at which the charge is realigned, the proportion of the whole charge which is realigned will be varied and, as a consequence, will vary the pattern; and as a corollary, that by varying the point in the path of a shot charge, following restriction thereof, at which the charge is dispersed, the proportion of the whole charge which is dispersed will be varied, and, as a consequence, vary the pattern, that is to say, may effectively neutralize the effect of a full choke barrel.

Stated in another way, the invention comprises the discovery that a full range pattern control can be secured by varying the length of a tubular shot passage with which there is associated a constriction of less diameter or cross sectional area than the variable length passage. The arrangement may be such that the shot first traverses the relatively enlarged passage and then the constriction, or such that the shot first passes through the constriction and then through the variable length enlarged passage.

This discovery has been embodied in certain means, constructions and proportions by which pattern control can be effected over a full pattern range and by gradual increments so as to secure successive patterns of 40%, 50%, 60%, 70% and even a 75% or ultra-full choke pattern.

In the drawings:

Fig. 1 is a sectional side elevation of a form of the invention in which the pattern control device comprises a substantially cylindrical sleeve provided with a cylindrical bore and a shouldered constriction or choke at the forward end thereof. The sleeve is shown mounted on the muzzle end of a fragmentary barrel.

Fig. 2 is a sectional side elevation of a form of the invention in which a pattern control sleeve is mounted on a barrel for automatic operation.

Fig. 3 is a sectional side elevation of a sleeve having a substantially cylindrical bore, a choke adjacent the forward end thereof and a series of

recoil compensating vents in the sleeve in front of the choke.

Fig. 3*a* is a fragmentary sectional side elevation of the sleeve of Fig. 3 provided with a baffle ring at the front end of the sleeve.

Fig. 4 is a sectional side elevation of a form of the invention in which the sleeve is slightly larger in cross section than the sleeve of Fig. 3 and provided with recoil compensating vents rearwardly of the choke portion of the sleeve.

Fig. 5 is similar to Fig. 4, but includes additional recoil compensating vents in front of the choke.

Fig. 6 is similar to Fig. 4, but includes a rifled section in front of the choke.

Fig. 7 shows a sectional side elevation of a form of the invention in which a relatively short sleeve having recoil compensating slots is provided on a barrel, the muzzle of which has a rifled section.

Fig. 8 shows a sectional side elevation of a form of the invention in which the sleeve comprises a recoil compensator secured at its forward end to a choke member and at its rear end to an adapter slidable on the barrel.

Fig. 9 is a sectional side elevation of a form of the invention, wherein the pattern control device comprises a substantially cylindrical sleeve having a cylindrical bore and is adapted to be mounted on a barrel having a solid full choke.

Fig. 10 is a form of the invention identical to Fig. 9, but shown mounted on a barrel provided with recoil compensating vents.

Fig. 11 is a modification of the sleeve shown in Fig. 9, a series of recoil compensating vents being provided in the forward end of the sleeve.

Fig. 12 is a sectional side elevation of a sleeve having an enlarged chamber portion and a rifled section.

In Figs. 1 to 8, the constriction is so located that the shot first traverses the passage which is of larger diameter than the constriction while, in the form shown in Figs. 9 to 12, the shot first passes through the constriction and then through the tube which is of larger diameter than the constriction.

Referring to the form of the pattern control device shown in Fig. 1, 15 indicates the muzzle end of a barrel which has been turned down externally so as to be of slightly less diameter than the outside diameter of the rest of the barrel. The barrel is provided yith a true cylindrical bore, the inside diameter of which is 0.730–0.735 inch corresponding to the bore diameter of a standard 12 gauge shotgun. Slidably mounted on the turned down portion of the barrel is a sleeve member 16 having a substantially cylindrical bore or chamber 17 which is preferably of a diameter such as to enable the shot and wads of a shot charge to expand transversely while passing therethrough. The chamber 17 is provided at its forward end with a constricting portion or choke indicated generally at 18 having a bevelled shoulder 18' and preferably of such diameter as to offer resistance to the passage of the wads and to realign the pellets of the expanded shot charge. To this end, the choke 18 comprises a slightly tapered bore 19 which blends at its forward end into a substantially cylindrical constriction 20, the diameter of which is less than the diameter of the chamber 17 but greater than the diameter of the muzzle bore.

Assuming the sleeve 16 is in its foremost position on the muzzle, as shown in Fig. 1, and a shot charge is being propelled through the barrel 15 under rapid acceleration and lateral confinement; when the charge and its accompanying wad or wads leave the muzzle, they are no longer confined and hence expand laterally into the chamber 17. Having traversed the chamber 17, the charge enters the choke 18 which condenses and realigns the shot mass. It is presumed that the wad, having expanded laterally in the chamber 18, is momentarily held up by the choke constriction and hence is made to lag behind the shot charge. In any event, the shot charge moves through the cylindrical constriction of the choke which constricts the shot so that the shot mass issues from the choke in a dense elongated column and without subsequent interference from the wad. The resulting pattern corresponds to an ultra-full choke pattern wherein not less than 75% of the pellets strike within a thirty inch circle at forty yards.

When the sleeve is in its rearmost position, the choke 18 is immediately adjacent the end of the muzzle. A shot charge and wad propelled from the end of the muzzle expand laterally but by properly dimensioning the choke constriction 20, the wad and shot charge are permitted to pass therethrough without detention or realignment to produce the so-called open or true cylindrical pattern.

Intermediate the two extreme positions of the sleeve are sleeve settings which provide patterns between 40% (open) and 75% (ultra-full choke). Thus, designating the open position as "O," then moving the sleeve forwardly substantially one and one-half inches will give a substantially 50% pattern; moving the sleeve forwardly two and one-half inches effects a substantially 60% pattern; moving the sleeve forwardly three and one-half inches effects a substantially 70% or full choke pattern and at four and one-half inches the ultra-full choke pattern is effected. It will be noted that each adjustment of the sleeve for effecting successive changes in patterns is relatively large being of the order of one inch which is quite within the mechanical limitations of the device, a feature which does not characterize the pattern control devices heretofore known and used.

The sleeve may be secured in any one of its positions of adjustment by suitable fastening means. In the embodiment shown in Fig. 1, a cylindrical boss 22 is formed integrally on the end of the sleeve, both the sleeve and boss being split longitudinally as at 23. A circumferential groove 24 is provided in the boss to receive clamping means such as a band 25 which is adapted to be tightened by a screw 26 so as to clamp the sleeve firmly to the barrel. It will be appreciated, however, that the fastening means shown is by way of illustration only and that other fastening means may be used as hereinafter disclosed.

It has been found that in the construction of the pattern control sleeve certain critical dimensions and proportions must be observed in order to enable full pattern control. Thus, to obtain an ultra-full choke pattern substantially all pellets of the shot charge must be realigned before leaving the pattern control sleeve 16. The minimum distance, therefore, from the end of the muzzle to the choke portion 18 of the sleeve must be selected so that when the sleeve is in its fully extended position, all of the pellets of the shot charge will spread transversely into the chamber of the sleeve before reaching the constricting portions thereof. This minimum distance has been found to be substantially four and one-half

inches for the ultra-full choke pattern and three and one-half inches for the standard full choke pattern, the overall length of the chamber 17 and choke portion 18 being substantially five inches. The maximum length of the sleeve is governed by practical limitations such as convenience in operating and carrying, barrel length, and by the distance between the muzzle of the barrel and the fore-end of the gun. The minimum diameter of the chamber 17 is determined by the outside diameter of the reduced end 15 of the barrel to enable the sleeve to have a smooth sliding fit thereon and for the barrel of a standard 12 gauge shotgun having a wall thickness of 0.050 inch is substantially 0.830 inch. Its maximum diameter is determined primarily by considerations of appearance.

The choke 18 of the sleeve has characteristics of the more commonly known solid choke and is shown having a constriction angle (A) of substantially 0°, 51', 33'' for producing optimum full choke patterns. Permissible variations of the constriction angle lie between an upper limit of 1° and a lower limit of 0° 20'. The amount of constriction, that is to say, the difference in diameter between the exit and entrance ends of the tapered bore 19 is preferably substantially 0.040 inch. The length of the cylindrical constriction 20 is preferably 0.25 inch, although this may vary between 0 and 1 inch. The diameter of the cylindrical constriction 20 is determined by two factors, the first being that in the rearmost position of the sleeve, the constriction must be large enough to permit the shot charge to pass therethrough without interference. The minimum diameter, therefore, of the constriction must be greater than the bore diameter of the muzzle and for the sleeve shown in Fig. 1 is preferably 0.750 inch. The second requirement and one governing the maximum diameter of the constriction is that the constriction shall be smaller than the cylindrical chamber 17 in order to insure full choke patterns when the sleeve is fully extended. The maximum diameter of the constriction is determinable, therefore, by the distance from the muzzle of the constriction 20 when the sleeve is fully extended and has been found to be substantially 0.750 inch.

It will be understood, however, that these specific angles and dimensions are preferable for the simple pattern control choke shown in Fig. 1, and that these specifications may vary in some respects when the sleeve is used on other than a standard 12 gauge barrel or in conjunction with other elements such as a rifled bore and recoil compensator as described below.

In the arrangement shown in Fig. 2, the pattern control sleeve 16' is similar to that of Fig. 1 embodying a chamber 17', a choke portion 180 and cylindrical constriction 200 with the exception that the diameter of the chamber 17' is slightly greater to enable the sleeve to slide freely over an annular substantially square shoulder 150 shown as the end of the muzzle. Moreover, the rear end of the chamber 17' terminates in an annular shoulder 170 formed by the thimble 220 threaded on the end of the sleeve, the thimble normally having sliding engagement with the barrel 151.

This construction illustrates one embodiment of means for mounting the sleeve for automatic operation. In the field, the hunter almost invariably uses an open pattern on his first shot and a full choke pattern on his second shot. The construction shown in Fig. 2 enables the change from

open to full choke pattern to be made automatically on firing the first shot. Thus, with the sleeve in its rearmost position, as shown in Fig. 2, on recoil the barrel will move rearwardly relative to the freely mounted sleeve thereby "moving" the sleeve to its foremost position on the muzzle where it is stopped by engagement of the annular shoulders of the barrel and sleeve respectively. The gun is then ready to shoot a full choke pattern. The embodiment described above illustrates one feasible means for mounting a pattern control sleeve on a barrel for automatic operation and it will be understood that it may be used in conjunction with means for positively fastening the sleeve at predetermined points on the barrel; and on any one of the several types of sleeves hereinafter described.

Fig. 3 is a modification in which a recoil reducing means or compensator is provided in conjunction with a pattern control sleeve 27.

The compensator is shown in front of the choke portion 181 of the sleeve 27 and comprises an extension of the sleeve having the form of an enlarged chamber 28 provided with a plurality of lateral slots or vents 29.

The compensator must have throughout an internal diameter such that its walls are not engaged by the expanding shot charge as the latter traverses the compensator. The minimum diameter of the chamber 28 of the compensator shown in Fig. 3 is thus determined by the amount of expansion of the shot charge when the sleeve is in the open pattern position and has been found to be substantially 0.780 inch. Moreover, the maximum length of the compensator is determined in part also by the lateral expansion of the shot mass, it being essential to open patterns that the shot mass shall not be constricted or realigned before escaping from the compensator.

It is generally believed that, in order to secure any appreciable reduction in recoil, the forward movement of the powder gas be positively retarded and the energy of its forward movement transmitted to the gun barrel which may be done by deflecting the gas through lateral ports or vents of a compensator. The wad following the shot charge may be instrumental in this respect especially if the movement of the wad is somewhat retarded. Another expedient is to provide a baffle ring in the end of the compensator.

In the present embodiment, the maximum inside diameter of the compensator chamber 28 is such that award having passed through the cylindrical constriction 201 of the choke 181 may, on expanding laterally, engage the walls of the chamber 28 and be retarded somewhat so as to deflect the powder gases laterally through the vents 29 and reduce the recoil force.

Figure 3*a* is a fragmentary view showing a compensator chamber 28' provided with a baffle ring 30 in the forward end thereof. The inside diameter of the ring 30 must be such that it will not interfere with the passage of the shot charge for any position of the sleeve and, in the embodiment shown in Fig. 3*a*, is not less than 0.780 inch which corresponds to the minimum diameter of the compensator chamber, shown in Fig. 3. The inner diameter of the chamber 28' is shown enlarged so that the rear face of the baffle ring 30 will provide a substantially planar surface 30' at right angles to the path of the powder gases. This surface 30' augments the deflection of the gases through the lateral vents of the compensator and insures successful recoil compensation.

The pattern control sleeve 27, shown in Figs. 3

and 3a, is adapted to be secured in selected positions on the muzzle of the barrel 152 by fastening means which, in this instance, comprises a flanged bushing 31 mounted on the barrel and threaded exteriorly to engage an interiorly threaded skirt 32 at the rear end of the sleeve. The skirt forms a substantially square interior shoulder 33 with the end of the sleeve 27. By turning the threaded bushing 31, the shoulder 33 is adapted to be drawn up firmly against the projecting rim of a snap ring 34 seated in an annular groove 35 in the barrel. A plurality of these grooves are shown at substantially equally spaced points on the muzzle end of the barrel corresponding to various settings of the sleeve for producing patterns ranging from open to full and ultra-full choke.

In Fig. 4 is shown a further modification of the sleeve in which the cylindrical chamber 36 of the sleeve 37 is enlarged and a plurality of lateral vents 36' provided therein to form a recoil compensator between the muzzle end of the barrel 153 and the choke portion 182 of the sleeve. In this embodiment, the diameter of the compensator chamber 36 is substantially 0.850 inch which permits the wad to pass freely therethrough. The latter, however, may be retarded by the constriction at the entrance end of the choke 182 and hence powder gas will be deflected by the wad through the lateral vents 36' to reduce recoil. The sleeve fastening means, in this instance, comprises an interiorly threaded thimble 38 adapted to engage the exteriorly threaded end of the sleeve 37 and by abutment with a snap ring 39 seated in one of a plurality of annular grooves 35' of the barrel to draw the end of the sleeve up against the ring.

In the manner described above, by moving the sleeve 37 longitudinally to predetermined points with respect to the muzzle, patterns varying from open to full and ultra-full choke may be secured.

The pattern control sleeve 40, shown in Fig. 5, embodies a recoil compensator chamber 41 at the rear of the choke portion 183 and a second recoil compensating chamber 42 in front of the cylindrical constriction 203 of the choke, this construction being the combination with the sleeve and compensator of Fig. 4 of the compensator shown on the sleeve in Fig. 3. The sleeve 40 is adapted to be secured at various points along the barrel 15 by a comparatively simple friction gripping means comprising an interiorly threaded thimble 43 threadedly engaged on the bevelled and threaded rear end of the sleeve 40, the latter being split longitudinally to enable the thimble to contract the rear end of the sleeve around the barrel.

The pattern control sleeve 45 shown in Fig. 6 embodies the choke portion 184 having a cylindrical constriction 204 and a recoil compensating chamber 46 rearwardly of the choke. In front of the choke is shown a rifled section 47, the purpose of which is two-fold, namely to increase dispersion of the shot charge and to provide a uniform pattern, that is to say, a pattern in which each unit area of the target is hit by substantially an equal number of pellets. The rifled section 47 has no effect on a fully choked shot charge, the diameter of the lands being substantially 0.760 inch or substantially 0.010 inch greater than the diameter of the choke constriction 204. When the sleeve is in its rearmost position, the expanding shot charge is adapted to engage the rifling which imparts a twist to the otherwise rectilinear motion of the pellets so that dispersion of the pellets is increased. At the same time, the individual pellets of the shot mass tend to be oriented in substantially equally spaced relationship to effect a uniform pattern.

The means shown for fastening the sleeve 45 at selected positions on the barrel 152 comprises a snap ring 48 having an end portion 49 adapted to seat in any one of a plurality of annular grooves 35 in the barrel. One end of the snap ring is bent inwardly to form a finger 49 adapted normally to extend through a transverse slot 50 in the sleeve 45 to releasably lock the sleeve to the barrel.

The pattern control sleeve, shown in Fig. 7, comprises a cylindrical sleeve portion 52, choke portion 185 and compensator 53, such as shown in Fig. 3. The sleeve portion 52 is, however, relatively short. This construction is adapted for use on a barrel, the muzzle of which has been provided with a rifled section. The rifled section 54 shown in Fig. 7 has a land diameter of substantially 0.725 inch and a groove diameter of substantially 0.735 inch and is formed in a cylindrical bore having the standard inside diameter of 0.730 inch. As pointed out above, one of the effects of rifling is to increase the dispersion of the pellets and by this expedient it is possible to procure expansion of the whole shot charge in a sleeve of relatively short length. The realignment of the pellets in passing through the constriction 205 of the choke 185 effects a full choke pattern when the sleeve is in its foremost position.

When the sleeve is in its rear position, the rifling 54 assists in effecting an open pattern having uniform pellet dispersion.

The fastening means shown on the sleeve 52 is a modification of the fastening means, shown in Fig. 6, comprising an interiorly threaded thimble 55 adapted to engage the exteriorly threaded end of the sleeve 52. The latter is provided with a slot 56 through which projects a cam finger 57 formed on one end of a snap ring 58. The finger is adapted to be held down or to be released by turning the thimble 55 for respectively unlocking and locking the sleeve to the barrel.

Although the compensator and choke portions of the sleeve have been described as integral parts of the sleeve, the latter may comprise separable elements as shown in Fig. 8. In this instance, a recoil compensator 59 is shown threadedly secured at its forward end to a choke portion 60 and at its rear end to an annular adapter 62 slidable on the barrel. By making the parts separable, worn elements may be replaced and elements having slightly varying dimensions may be interchanged to produce different effects. It will be noted that with this modification the compensator does not become operative until the sleeve has been moved forwardly to modified and full choke positions where the long range loads with their accompanying heavier recoil are ordinarily used. This has the desirable effect of equalizing recoil for the various loads, which is of some assistance in obtaining uniform action with recoil-operated automatic shotguns.

As pointed out above, the devices, shown in Figs. 9, 10, 11 and 12 are embodiments of the concept that by varying the point in the path of the shot charge following restriction thereof, at which the charge is dispersed, the proportion of the whole charge which is dispersed will be varied and, as a consequence, vary the pattern.

Referring to Fig. 9, the barrel 63 is provided with a standard solid full choke 64, the bore diameter of the barrel being substantially 0.730 inch for a standard 12 gauge shotgun and the full choke diameter being substantially 0.700 inch. In the embodiment shown in Fig. 9, the barrel muzzle extends beyond the full choke and its bore is enlarged by means of a substantially 1° taper, the diameter of the bore at the outer end of the muzzle being substantially 0.750 inch.

Mounted on the reduced end of the barrel is a cylindrical sleeve 65 having a substantially smooth cylindrical bore, the diameter of which is such as to insure a smooth sliding fit on the barrel muzzle and in the present embodiment is substantially 0.800 inch.

When the shot charge emerges from the full choke 64 of the barrel, the shot mass is aligned in an elongated column and passes out of the muzzle end of the barrel without interference. If the sleeve 65 is in its rearmost position, the shot mass also emerges from the end of the sleeve without interference from the wad and a full choke pattern will be obtained.

On the other hand, it is reasoned that when the sleeve 65 is moved forwardly, its relatively long cylindrical bore constitutes in effect a constriction, and hence the wad is enabled to overtake and to spread the shot charge as it issues from the end of the sleeve thereby forming a relatively open pattern. In the foremost position of the sleeve 65, a 40% pattern will be produced completely neutralizing the effect of the full choke barrel bore.

The choke neutralizing sleeve, shown in Fig. 10, is identical to the sleeve shown in Fig. 9, but is shown used in conjunction with a full choke barrel 63' having recoil compensating slots or vents 66.

The sleeve 67, shown in Fig. 11, is similar to the sleeve of Fig. 9 but is provided with a plurality of gas vents 68 in its forward end to form a recoil compensator.

In Fig. 12 is shown a sleeve 70 for a solid full choke barrel 630, the choke 640 being at the muzzle end thereof. The sleeve 70 comprises a cylindrical bore portion 72, the inside diameter of which is slightly larger than the outside diameter of the reduced end of the muzzle. A beveled shoulder 73 at the forward end of the cylindrical bore 72 blends the latter into a cylindrical constriction 74 having an inside diameter of substantially 0.800 inch. The forward end of this constriction is blended by means of a bevelled shoulder 75 into a rifled portion 76, the inside diameter of the lands being substantially 0.710 inch.

When the sleeve 70 is in its rearmost position on the barrel, a shot charge fully choked will pass without interference through both the cylindrical constriction 74 and the rifled section 76. The bevelled shoulder 73 and rifled section 76 provide means for positively retarding the movement of the wad, and hence insure ultra-full choke patterns.

When the sleeve 70 is moved forwardly, the full choked shot charge is opened up by the interference of the wad as described above and is further dispersed by the rifled section 76 to form an open uniform pattern.

The choked neutralizing sleeves shown in Figs. 9, 10, 11 and 12, are provided with the type of fastening means shown and described with respect to Fig. 5 for securing the sleeves at selected positions on the barrel, but it will be understood that any one of the fastening means described above in connection with the pattern control sleeves may be used. For practical reasons, the choke neutralizing sleeves would not normally be mounted for automatic operation.

What is claimed is:

1. In a firearm, the combination with a barrel; of a pattern control device comprising a sleeve slidably mounted on said barrel, said sleeve being constructed and arranged to form a shot passage of variable length and uniform diameter having associated therewith an orifice of less diameter than the diameter of said passage; and means associated with said sleeve and said barrel to enable said sleeve to move automatically to vary the effective length thereof on discharge of said firearm.

2. The combination with a barrel; of a pattern control device comprising a sleeve slidably mounted on said barrel and arranged to form a shot passage of variable length; recoil compensating vents in said passage; and a constriction at the forward end of said passage.

3. The combination with a barrel; of a pattern control device comprising a sleeve slidably mounted on said barrel and arranged to form a shot passage of variable length; recoil compensating vents in said passage; a constriction at the forward end of said passage; and a rifled section associated with said sleeve.

4. The combination with a firearm barrel of a pattern control device comprising a choke and adjustable means constructed and arranged to support said choke in coaxial relation to the barrel at any desired position of adjustment forward of the muzzle thereof within a range of from zero to several inches.

5. The combination with a firearm barrel of a pattern control device comprising a support member slidably mounted on said barrel and extending beyond the muzzle thereof and a shot constricting choke supported on said member in coaxial relation to said barrel, the slidable mounting of said support member providing for positioning the choke at any desired position of adjustment from the muzzle with'n a range of from zero to several inches.

6. The combination with a firearm barrel of a pattern control device comprising a sleeve adjustably mounted on said barrel, said sleeve being constructed and arranged to provide a support extending forwardly from said barrel in coaxial relation thereto, and a shot constricting choke having a minimum diameter not substantially less than the diameter of said barrel supported by said sleeve in coaxial relation to the barrel, the adjustable mounting of said sleeve providing for selectively positioning the choke at any desired position of adjustment from the muzzle of the barrel through a range of several inches.

7. The combination with a firearm barrel of a pattern control device comprising a sleeve movably mounted on said barrel, said sleeve being constructed and arranged to define a shot passage of variable length extending forwardly from said barrel in coaxial relation thereto, said shot passage being of greater diameter than the inside diameter of said barrel and having a constriction unitarily associated with the forward end thereof, said constriction being of less diameter than the diameter of said shot passage but not of less diameter than the inside diameter of said barrel, whereby the movement of said sleeve provides for selectively positioning the constriction at any de-

sired position of adjustment from the muzzle of the barrel within a range of from zero to several inches.

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