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C. B. GREENSTREET

2,166,468

BULLET DEFLECTING ATTACHMENT FOR FIREARMS

Filed Jan. 24, 1938

Fig. 1.

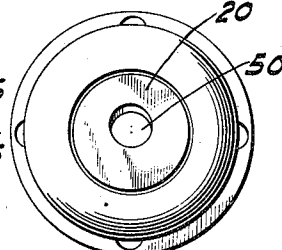
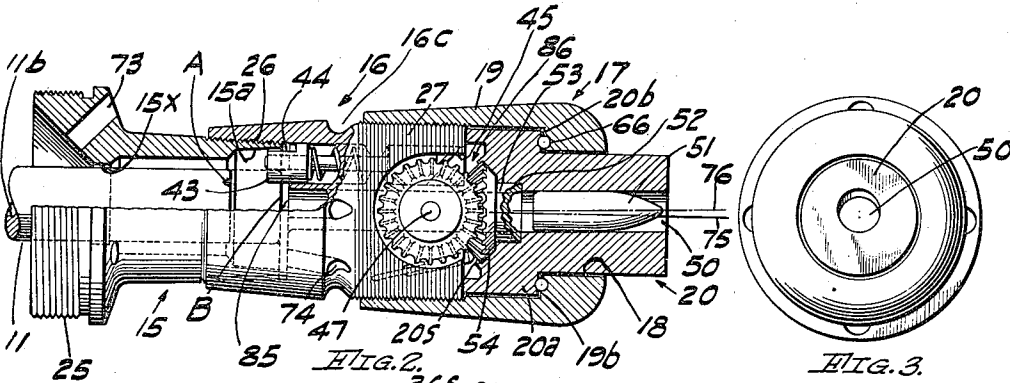
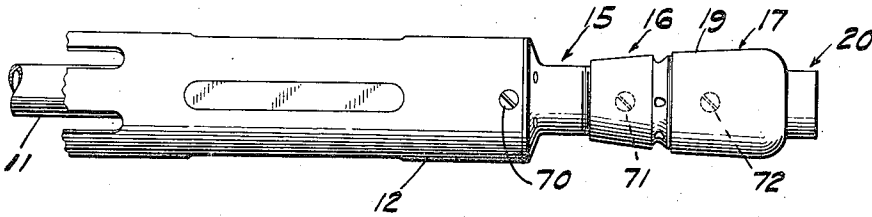


Fig. 3.

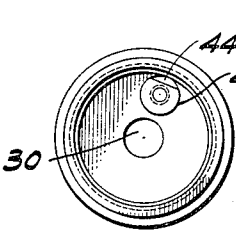


Fig. 5.

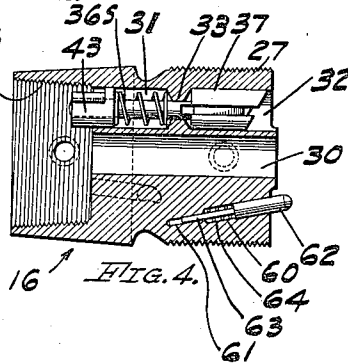


Fig. 4.

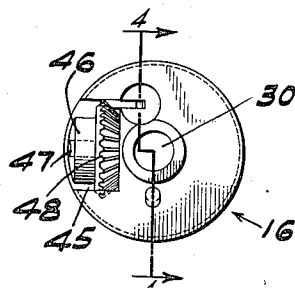


Fig. 6.

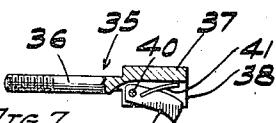


Fig. 7.

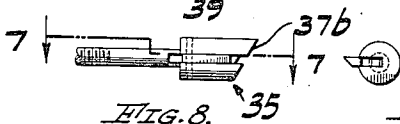


Fig. 8.

Fig. 9.

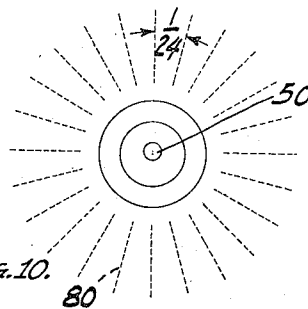


Fig. 10.

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BULLET DEFLECTING ATTACHMENT FOR FIREARMS

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Application January 24, 1938, Serial No. 186,647

23 Claims. (Cl. 42-1)

This invention relates to a muzzle attachment for firearms and more particularly to such an attachment when associated with a rapid fire gun.

5 Speaking more specifically the invention pertains to a muzzle attachment, for a firearm of the machine gun type, whereby an automatically controlled variation is effected in the direction of the courses of a succession of bullets being
10 fired from the gun, with the result that the firing is not concentrated upon too small an area, but the size of such area is enlarged to the desired extent and the firearm is thus rendered a more effective weapon.

15 Among other objects of the invention are, to provide a gun muzzle attachment which will render the guns mounted upon airplanes more efficient in aerial combat, and which will likewise add to the efficiency of guns mounted upon tanks
20 and those used in trench warfare; and to provide a gun muzzle attachment which will deliver successively fired bullets in circular cycles, the paths of the bullets of each cycle outlining a cone the apex of which is located at the muzzle of the
25 gun.

It is a further object of the invention to provide, as an article of manufacture, per se, a machine gun muzzle attachment which will vary the directions of the bullets fired from the gun and
30 will thereby render the gun a more efficient weapon.

A more specific object of the invention is to provide an improved mechanical means for utilizing the counterrecoil movements of the gun
35 barrel as a source of power whereby the courses of successive bullets fired from the gun are automatically varied in direction to the desired extent. With this last stated object in view the invention includes a superior step-by-step actuated
40 direction control means whereby the directions of the paths of a succession of bullets is varied through a cycle which is repeated over and over again throughout the period during which the firearm which is equipped with; or is constructed
45 according to the principles of the invention, remains in operation.

Other objects, advantages and features of invention will hereinafter appear.

Referring to the accompanying drawing, which
50 illustrates what is at present deemed to be a preferred embodiment of the invention,

Fig. 1 is a side elevation of the muzzle portion of an aircraft gun showing the invention applied thereto. In order to contract the view the gun
55 barrel and the jacket thereof are both shown

broken away at a little distance from the muzzle end of the gun.

Fig. 2 is a view partly in side elevation, and partly in longitudinal mid-section of the right hand portion of the structure shown in Fig. 1. 5 This view is on a larger scale than Fig. 1 and a greater portion of the firearm is broken away in order to further contract the view.

Fig. 3 is an elevation looking at the right hand end of the structure sectioned in Fig. 2. 10

Fig. 4 is a view separately showing, in approximately longitudinal mid-section, the coupling member located in the mid-length portion of Fig. 2, certain parts contained within said member being shown in side elevation. The plane of the sectioned portion of the view is indicated by the line 4-4 on Fig. 6. 15

Fig. 5 is an elevation of the coupling member of Fig. 4 looking at the left end thereof.

Fig. 6 is an elevation looking at the right hand end of the coupling member of Fig. 4. 20

Fig. 7 is a view partly in section and partly in side elevation showing separately a portion of the counterrecoil-actuated plunger. The sectioned portion of the view is on the plane indicated by the irregular line 7-7 in Fig. 8. 25

Fig. 8 is a bottom plan view of the structure sectioned in Fig. 7.

Fig. 9 is an end elevation of the aforesaid plunger viewing the same from right to left as seen in Fig. 8. 30

Fig. 10 is a view illustrating diagrammatically the cycle of step-by-step bullet deflection produced by the device.

Referring in detail to the drawing, in Figs. 1 35 and 2 are shown fragments of the muzzle portion of the barrel 11 of a machine gun, Fig. 1 showing also a fragment 12 of a conventional jacket for said barrel.

By this invention an attachment is provided for 40 said barrel and jacket, said attachment comprising mounting means having three principal parts, namely a proximal or inner coupling member 15, a central coupling member 16 and a connector cap 17. Said cap 17 has thru its outer end portion a circular axial aperture 18. This cap completes the outer portion of the mounting structure and has rotatably fitted within its aperture 18 and the outer part of its flange portion 19 the bullet deflector 20 provided by the invention. 50

The aforesaid proximal coupling member 15 has an externally screw-threaded head 25 for screwing into the outer end of the gun barrel jacket 12, and the body portion of said member 15 tapers to a relatively thin annular lip 15a 55

which is also externally screw-threaded, and has screwed on to it the cavitated, internally screw-threaded portion 26 of the central coupling member 16. Thruout its opposite end portion said member 16 is, in turn, externally screw-threaded at 27 and over this part thereof is screwed the flange portion 19 of the connector cap 17, this cap as has already been stated, constituting a mounting means for the rotatable bullet deflecting member 20, the latter member forming an extension for the barrel of the gun.

Referring more particularly to Fig. 4, the central coupling member 16 has, thruout the length of its body portion, an axial bore 30, said bore, in the assembled condition of the device, alining with the bore of the gun barrel. Parallel to said bore 30 there is provided within said member 16 two alined cylindrical sockets or short bores 31, and 32, said bores being axially connected by an isthmus 33. Or these three bore portions may be regarded as a single bore or passage leading longitudinally thru the member 16 and having its mid-length portion diametrically contracted at 33.

Within the passage or bore thus afforded thru the central coupling member 16 is mounted the pawl-carrying plunger or driving member 35 separately shown in part in Figs. 7 and 8. Said driving member is operated by the counterrecoil movements of the gun barrel 11, and comprises a stem 36 one end of which carries, desirably as an integral part thereof, a head 37 of a cylindrical character to fit workably within the bore section 32. At 38 said head 37 is longitudinally slotted from end to end thus providing a guide way for a pawl 39 which is provided at its end nearest to the stem 36 with a pivot 40 and which is furnished with a spring 41 tending to swing its opposite end out to the position shown in Fig. 7. That end of said head 37 which is directed toward the outer end of the firearm is beveled at 37b in order to accommodate an annular angular shoulder 20s with which the inner portion of the bullet deflecting member 20 is provided.

In a spaced relation to the head 37 the stem 36 has screwed onto it a second head 43 which is of a sufficiently cylindrical character to fit workably within the bore section 31. The end portion of the driving member which carries the head 43 is the part which receives the impact from the counterrecoil of the gun barrel 11 whenever a shot is fired.

It is necessary to prevent rotary movements of the driving member 35 from taking place during the reciprocation thereof, in order that its pawl 39 may always be properly positioned to do its work. For this reason the head 43 is recessed, desirably by flattening, at 44, from its left end as viewed in Fig. 2 to a point not far from its opposite end. This flattened or cut away part of said head 43 is located so close to the inner periphery of the adjacent annular lip 15a of the proximal coupling member 15 that said lip prevents a turning movement of the driving member 35 from taking place. A coiled compression spring 36s around the stem 36 of the counterrecoil-operated driving member 35 restores said member to the normal position after each shot is fired.

As shown in Figs. 2 and 6, the central coupling member 16 has a recess 45 in one side, said recess being of a sufficient size to receive a bevel transmission gear 46 in such a manner that all parts of said gear will be within the periphery of said member 16. This gear is rotatably mounted upon a pin 47 fixed to said member 16 and pro-

jecting radially from its axis. Said gear being thus mounted its toothed portion 48 is brought into the proper relation to the pawl 39 of the driver member to cause said pawl to impart a step-by-step rotation to the gear each time a shot is fired, each advance step of the gear being equal to the space between any two adjacent teeth thereof.

The bullet deflecting member 20 is rotatably supported by the mounting means afforded by the members 15, 16 and 17. Said member 20 has thru it an axial bore 50 to receive the bullets (a bullet 51 being shown in said bore) and guide them along a deflected path during the final portion of their travel within the weapon. At its inner end said bore 50 has a diametrical enlargement 52 into which is tightly fitted the sleeve portion 53 of the beveled driven gear 54, this gear, in the assembled condition of the device, being in mesh with the transmission gear 46 which has already been described.

A device is provided to prevent over-rotation of the two gears which have been described when the transmission gear is acted upon by the pawl 39 of the driving member. For this purpose a guide bore 60 is formed in the central coupling member 16, said bore having a diametrically reduced axial extension 61. A retarding pin 62 fits slidably within and partly projects from the outer portion of the bore 60, said pin having a diametrically reduced inner extension or finger 63 which extends into the bore portion 61 with a working fit. Around said finger 63 is a coiled compression spring 64 which tends to maintain the retarding pin 62 in the projecting position shown in Fig. 4. Said pin 62 has a rounded outer end which, as viewed in Fig. 2, is positioned in such a way as always to enter the space between the two lowest teeth of the gear 54 during each of the intervals that said gear remains stationary. Owing to the rounded character of the projecting end portion of the pin 62, when the movement of the gears caused by the counterrecoil of the gun barrel occurs each time a shot is fired, said pin 62 recedes to allow an additional tooth of the gear 54 to be forced thereover, but the spring 64 causes said pin 62 to offer enough opposition to the advance of the gear 54 to insure that it will be advanced only one additional tooth at a time.

Internally of the aperture 18 of the cap 17 the bullet deflecting member 20 is furnished with a diametrically enlarged portion 20a, and in order to reduce rotational friction of said member 20 within its mounting means, the annular face of the shoulder 20b of said member has formed therealong a groove which registers with a like groove along the opposing shoulder 19b of the cap, these two grooves cooperating to form a raceway for the balls 66 of the ball bearing thus produced.

Referring to certain details of construction, the type of muzzle attachment 15 shown in the drawing is provided with an annular internal bearing shoulder 15x to steady the outer portion of the barrel 11 and form a guide therefor during its recoil and counterrecoil movements.

As to other details of construction, a set screw 70 is provided near the outer end of the gun barrel jacket 12, the inner end of said screw engaging the head 25 of the proximal coupling member 15 to safeguard against the unscrewing thereof. Another set screw 71 is used to safeguard against relative movement between said member 15 and the central coupling member 16, 75

while a third set screw 72 securely holds the cap 17 in place upon said member 16.

Air cooling passages 73 are provided in the front side of the head of the coupling member 15, and also air passages 74 leading from a groove 16c around the coupling member 16, all these air passages opening out in a forward manner.

In Fig. 2 the full line 75 indicates the produced axis of the bore 11b of the machine gun barrel 11, and the broken line 76 indicates the produced axis of the bore 50 of the bullet-deflecting member 20. These two lines intersect at the inner end of the bore 50, hence it will be seen that each bullet will squarely enter said inner end of the bore 50 and its deflection will begin at that point. The bullet-deflecting action of the member 20 is due to the fact that, altho the inner end of its bore 50 occupies the cross-sectional center of said member, the outer end of said bore is slightly eccentric in relation to the outer end of said member, the amount of this eccentricity being indicated by the space between the lines 75 and 76 at the outer end of said bore 50.

Except as to its bore 50 the member 20 is concentrically formed and, being concentrically mounted in relation to the parts which rotatably support it, the result is that said member uniformly deflects the bullets in all of its rotational positions. Its step-by-step rotation and bullet deflecting property are diagrammatically represented in Fig. 10 where each of the radially extending broken lines 80 represents the path taken by a bullet. The lines 80 are twenty-four in number and are equally spaced apart because the pawl-actuated gear wheel 46 has twenty-four teeth and the driven gear 54 in mesh therewith has the same number of teeth, altho a twenty-four step movement for each rotation of the bullet deflecting member 20 is considered desirable, yet it is evident that the number of steps for each rotation may be made greater or less, if desired, by using gears having a greater or less number of teeth. The amount of angular deflection of each bullet will depend upon the eccentricity of the outer end of the bore 50 of the bullet deflecting member.

The proximal coupling member 15 may be formed by remodeling the conventional muzzle attachment now in use. The remodeling consists of exteriorly screw threading the outer end portion of said muzzle attachment so as to provide for screwing thereonto the central coupling member 16; also in diametrically enlarging the adjacent end portion of the bore of said muzzle member so as to form the lip 15a and thus provide the desired amount of space for the flattened portion 44 of the head 43, it being necessary for this flattened part normally to project into the muzzle attachment, as shown in Fig. 2.

The coupling member 16, cap 17 and bullet deflecting member 20, together with the parts contained within them, may be assembled at the factory and be sold as an article of manufacture applicable to machine guns now in use after the muzzle attachment of the gun to which the article is to be applied has been modified in the manner above stated.

Considering the firearm as a whole, after the same has been equipped with the attachment provided by this invention, adjacent to the muzzle of the weapon the bore thereof has an inner gap 85 within the left end portion of the middle coupling member 16 (as viewed in Fig. 2) and have a second more outwardly located but less pronounced gap 86 just outside of the right hand

end of said member 16. But the gear 54 may be formed as an integral part of the bullet deflecting member 20 and, whether or not this integral construction is adopted, the toothed face of said gear where the bore passes therethru may be brought close up to the adjacent end of the bore section 30 so that a virtually continuous bore results at this point. The bore 30 of said member 16 is properly aligned with the bore sections 11b and 50 at opposite sides thereof and hence the bullets, aided by their forwardly character, readily pass across said gaps. The bore 50 is slightly larger than the bore 11b of the gun barrel and is not rifled, but it is considered within the province of the invention to so rifle it, if desired. Likewise the bore 30 is slightly larger than the bore of the gun barrel and is not rifled.

In Fig. 1 the line A indicates the position of the outer end of the gun barrel 11 at the limit of its recoil movement and the line B indicates the position thereof after the counterrecoil has taken place. Hence, in this view the distance which the head 43 of the driving member 35 extends to the left of the line B equals the distance that said driving member will be forced to the right by each counterrecoil movement of the barrel 11. The head 43 is screwed onto the stem 36 the required amount for properly regulating the action of the pawl 39 of the driving member upon the teeth of the transmission gear 46.

In the operation of a machine gun equipped with this invention, each counterrecoil movement of the conventional gun barrel 11 will cause the upper portion of the front end of said barrel (as viewed in Fig. 2) to strike against the lower portion of the head 43 of the reciprocatory driving member 35, thus moving said member forwardly against the opposition of its spring 36s. As said driving member approaches the limit of this movement its pawl 39 will act upon the gear 46 and slightly rotate said gear together with the gear 54 with which it is in mesh. The result will be that the bullet deflecting member 20 will be advanced rotationally a single step, or one twenty-fourth of a revolution in the illustrated embodiment of the invention. During this operation overrotation of the gear 53 and of the bullet deflecting member to which it is secured will be prevented by the retarding plunger 62, and immediately after this action has taken place the spring 36s of the driving member 35 will restore said member to its normal position ready to impart another partial rotation to the bullet deflecting member. Each advance movement of the bullet deflecting member takes place between shots, hence the passage of the bullets thru said member does not interfere with this operation.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the subject matter claimed.

What is claimed is:

1. A firearm having an extension connected with its muzzle portion, said extension having a bore which guides the bullets fired from said firearm during the final portion of their movement within the firearm, and means forming a part of said muzzle portion to impart a series of movements to said extension and thereby vary the directional relation of the bore of said extension to the remaining portion of the bore of said firearm.

2. A firearm having an extension connected with its muzzle portion, said extension having a bore which guides the bullets fired from said firearm during the final portion of their movement within the firearm, and means actuated by the counterrecoil movements of said firearm to impart a series of movements to said extension and thereby vary the directional relation of the bore of said extension to the remaining portion of the bore of said firearm.

3. A firearm provided with a muzzle portion having a bore which constitutes a deflected continuation of the major portion of the bore of the firearm, and mechanical means forming a part of said muzzle portion to impart a step-by-step circumferential variation of the position of said muzzle portion of said firearm in relation to the remaining portion of said firearm.

4. In a firearm having a mounting means secured to its muzzle portion, a muzzle extension member having thru it a bore which forms a deflected terminal portion for the main bore of said firearm, said extension member being supported by said mounting means in a rotatable relation to the firearm as a whole, and means forming a part of said muzzle portion to mechanically rotate said extension member during the operation of the firearm.

5. In a firearm having a mounting means secured to its muzzle portion, a muzzle extension member having thru it a bore which forms a deflected terminal portion for the main bore of said firearm, said extension member being supported by said mounting means in a rotatable relation to the firearm as a whole, and means operable by the counterrecoil of the firearm to mechanically rotate said extension member.

6. A firearm having axially secured to its muzzle portion a mounting means of a generally cylindrical character, said mounting means having an internal annular shoulder which is directed toward the body portion of the firearm, a barrel extension member rotatably mounted within said mounting means and having a bearing portion which cooperates with said shoulder of said mounting means, said barrel extension member having a bore positioned to deflect the courses of the bullets as they leave the firearm, and means to mechanically rotate said barrel extension member in relation to the firearm as a whole.

7. A firearm having a mounting means attached to it, a bullet deflecting member rotatably supported by said mounting means in an axial relation to the barrel of said firearm, and means operated by the counterrecoil of the firearm to impart a step-by-step rotation to said member, said member deflecting the bullets by means of a bore therein having its inner end in axial alignment with the bore of the firearm and its outer end eccentric to the bore of said firearm.

8. The subject matter of claim 7 and, said counterrecoil operated means including a gear wheel secured to said bullet deflecting member.

9. The subject matter of claim 7 and, said counterrecoil operated means including two intermeshing bevel gear wheels one of which is fixed to said bullet deflecting member in a position for the bullets to pass thru it and the other of which is rotatably supported by said mounting means.

10. A firearm having a mounting means attached to it, a bullet deflecting member rotatably supported by said mounting means, said member having a bullet deflecting bore, one end por-

tion of which is located in alignment with the bore of the gun and in the axis of rotation of said member, a driven bevel gear fixed to said member at said end portion of its bore, said gear having thru it an opening thru which the bullets pass as they are fired, a transmission bevel gear rotatably supported by said mounting means in mesh with said driven bevel gear, and an actuating means supported by said mounting means in a position to impart a step-by-step rotation to said transmission gear, said actuating means being operated by the counterrecoil movements of said firearm.

11. As an article of manufacture a bullet deflecting device attachable to a firearm, said device having a rotatable portion provided with a bore which, when the device is attached to the firearm forms a deflected continuation of the bore of the firearm, said device having also means operable by the counterrecoil of the firearm to rotate in a step-by-step manner its said rotatable portion.

12. As an article of manufacture a bullet deflecting device attachable to a firearm, said device having a rotatable portion provided with a bore which, when the device is attached to the firearm forms a deflected continuation of the bore of the firearm, said device including a driven bevel gear wheel fixed to said rotatable portion in an axial manner in relation to its axis of rotation, a driving bevel gear having an axis of rotation radial to the axis of rotation of said driven gear and in mesh with the latter gear, and a counterrecoil operated member mounted to reciprocate longitudinally of the firearm, the latter member being operatively related to said transmission gear to impart a step-by-step rotation thereto.

13. In a structure of the kind described, the combination, with the barrel and barrel jacket of a machine gun; of a mounting means attached to said jacket adjacent to the muzzle of said barrel, a driving means carried by said mounting means, said driving means being positioned to be acted upon by the barrel of said gun during its counterrecoil, a plurality of intermeshing gears supported by said mounting means, a pawl, carried by said driving means and positioned to act upon one of said gears and impart a step-by-step rotation thereto, and a rotatable bullet deflecting means having fixed to it another of said gears to rotate therewith and be thereby caused to change the direction of bullet deflection each time a shot is fired from said gun.

14. In a structure of the kind described, the combination, with the barrel and barrel jacket of a machine gun; of a mounting means attached to said jacket adjacent to the muzzle of said barrel, a driving means consisting of a plunger carried by said mounting means and positioned to reciprocate longitudinally in relation to the barrel of said gun, one end portion of said plunger being positioned to be acted upon by the outer end of said gun barrel during its counterrecoil, rotatable bullet deflecting means carried by said mounting means and arranged to deflect a succession of bullets thru different portions of a conical plane each time said bullet deflecting means completes its rotation, and means operatively connecting said bullet deflecting means with said plunger whereby the latter at each of its reciprocations imparts a fractional part of a rotation to said bullet deflecting means.

15. The subject matter of claim 14 and, said plunger having mounted upon one of its end por-

tions a pawl which is positioned to act upon the means which operatively connects it with said bullet deflecting means, the opposite end portion of said plunger having a laterally recessed portion into the recess of which enters an end portion of the barrel jacket of the gun to prevent rotational changes in the position of said plunger.

16. A machine gun construction comprising, in combination, a machine gun barrel, a bullet deflecting means capable of directional variation, means whereby said bullet deflecting means is connected with said barrel in a position to deflect the bullets after they leave the muzzle thereof, and means operable by the movement of said barrel during its recoil and counter-recoil to cause the aforesaid directional variation of said bullet deflecting means.

17. A machine gun construction comprising, in combination, a machine gun barrel, a bullet deflecting means capable of directional variation, means whereby said bullet deflecting means is connected with said barrel in a position to deflect the bullets after they leave the muzzle thereof, and means operable by the counterrecoil movement of said barrel to cause the aforesaid directional variation of said bullet deflecting means, said counterrecoil operable means including a part positioned to receive an impact from the counterrecoil movement of the barrel of the gun.

18. A firearm of the machine gun type having a mounting means secured to its muzzle portion, a bullet deflecting member having thru it, a bore which forms a deflected terminal portion for the main bore of said firearm, said bullet deflecting member being supported by said mounting means in a rotatable relation to the firearm as a whole, means forming a part of said muzzle portion to mechanically rotate said member in a step-by-step manner during the operation of the firearm, and means to releasably hold said member against rotation during the intervals of nonrotation thereof.

19. The combination, with a machine gun having a recoil barrel and provided with means to produce a counterrecoil movement of said barrel, said gun also having a jacket in which said barrel is slidably mounted; of means fastened to said jacket and operatively related to the muzzle

portion of said gun for deflecting a bullet fired therefrom from the trajectory imparted to it by said barrel, and means actuable by the counter-recoil movement of said barrel after each successive firing to vary the angle of deflection of said bullet deflecting means.

20. A firearm having an extension connected with its muzzle portion, said extension having a bore which guides the bullets fired from said firearm during the final portion of their movement within the firearm, and means including an actuator actuated by the counterrecoil movements of the firearm to impart a series of movements to said extension and thereby vary the directional relation of the bore of said extension to the remaining portion of the bore of said firearm.

21. A firearm having an extension connected with its muzzle portion, said extension having a bore which guides the bullets fired from said firearm during the final portion of their movement within the firearm, and means including an actuator operatively related to said extension and actuated by the counterrecoil movements of the said firearm to impart a series of movements to said extension and thereby vary the directional relation of the bore of said extension to the remaining portion of the bore of said firearm.

22. A firearm provided with a muzzle portion having a bore which constitutes a deflected continuation of the major portion of the bore of the firearm, and mechanical means including an actuator actuated by the counterrecoil of the barrel of firearm to impart a step-by-step circumferential variation of the position of said muzzle portion of said firearm in relation to the remaining portion of said firearm.

23. In a firearm having a mounting means secured to its muzzle portion, a muzzle extension member, having through it a bore which forms a deflected terminal portion for the main bore of said firearm, said extension member being supported by said mounting means in a rotatable relation to the firearm as a whole, and means including an actuator actuated by the counterrecoil of the barrel of said firearm to mechanically rotate said extension member during the operation of the firearm.

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