V. U. D. PIERCE.

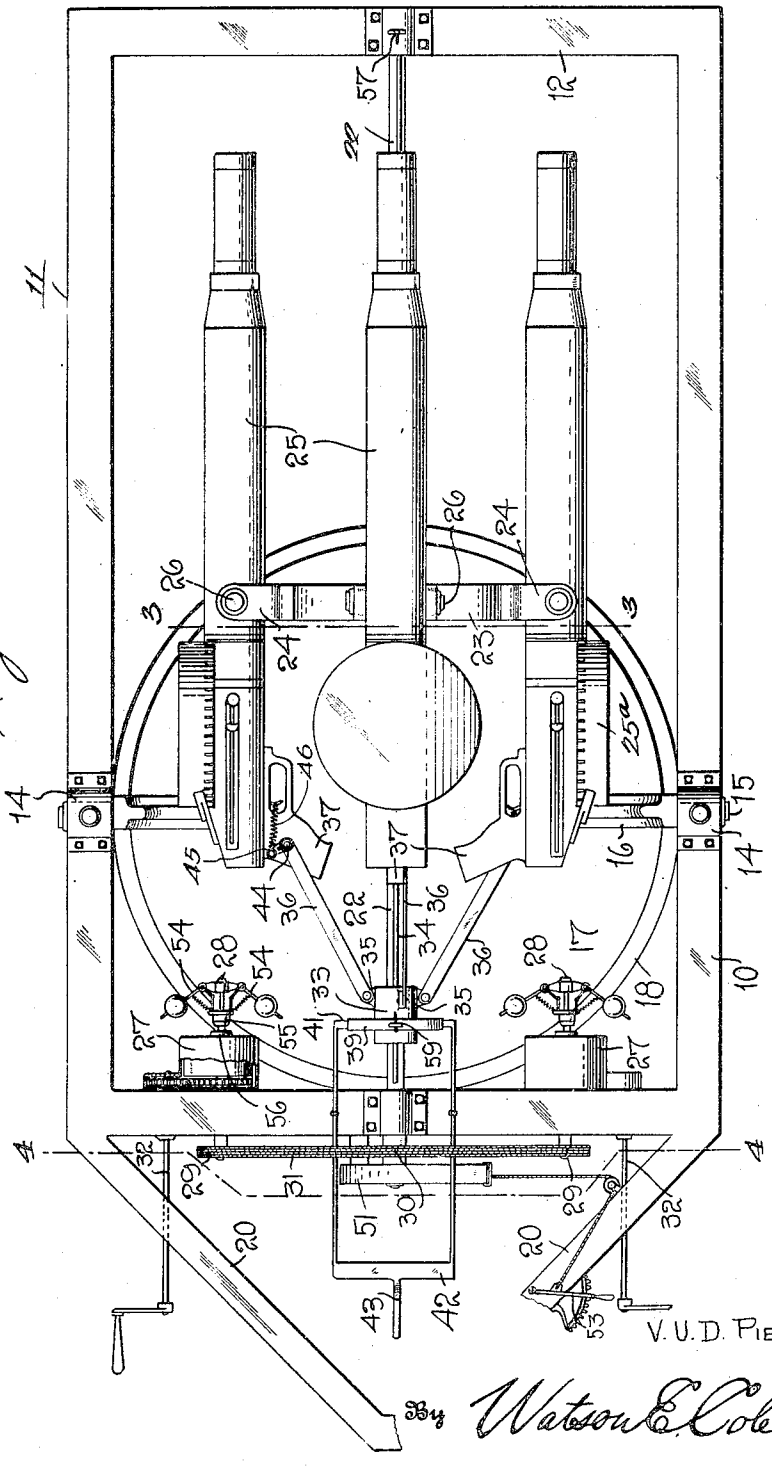
RAPID FIRE GUN.

APPLICATION FILED APR. 3, 1917.

1,353,267. Patented Sept. 21, 1920.

4 SHEETS—SHEET 1.

Fig. 1



Inventor

V. U. D. PIERCE

By Watson E. Coleman

Attorney

V. U. D. PIERCE.

RAPID FIRE GUN.

APPLICATION FILED APR. 3, 1917.

1,353,267. Patented Sept. 21, 1920.

4 SHEETS—SHEET 2.

Fig. 11

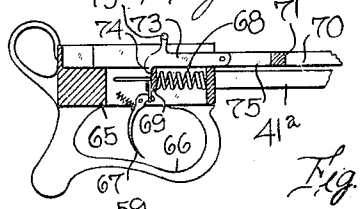


Fig. 13

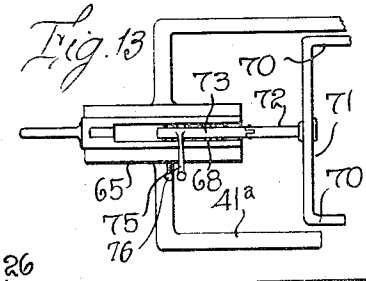


Fig. 2

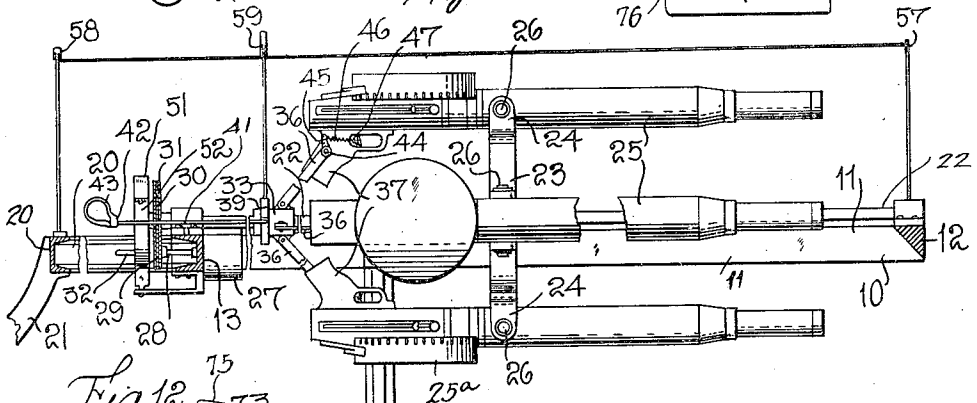


Fig. 12

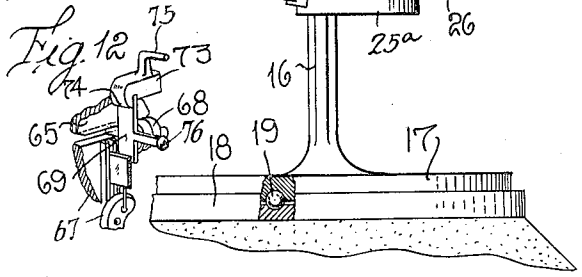


Fig. 8

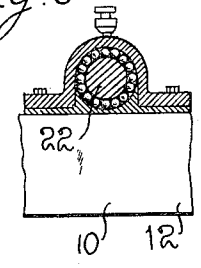
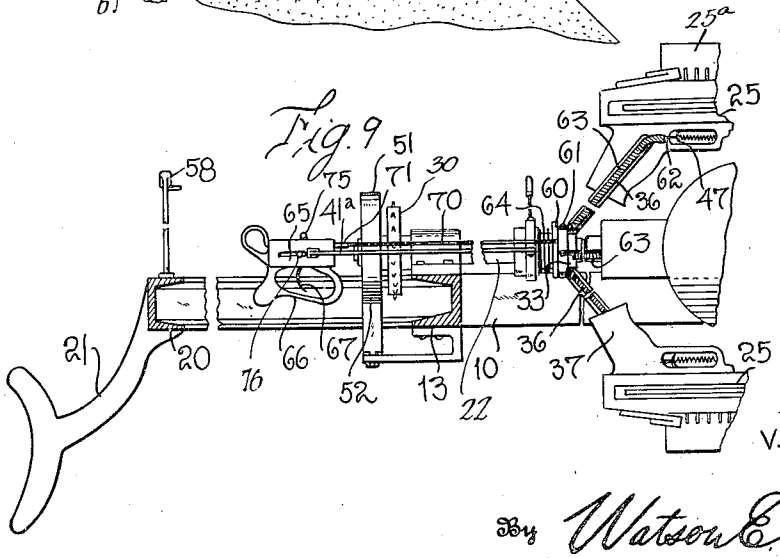


Fig. 9



Inventor

V. U. D. PIERCE

By Watson E. Coleman

Attorney

V. U. D. PIERCE.

RAPID FIRE GUN.

APPLICATION FILED APR. 3, 1917.

1,353,267. **Patented Sept. 21, 1920.**

4 SHEETS—SHEET 3.

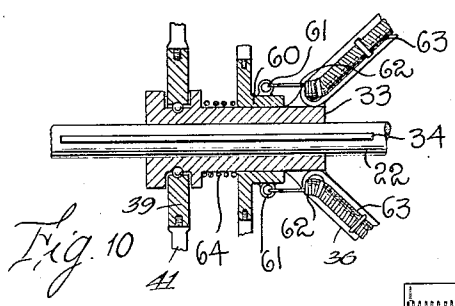


Fig. 10

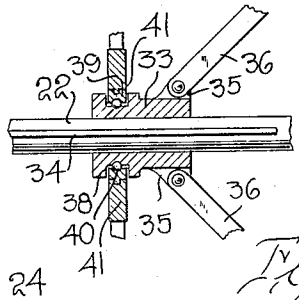


Fig. 7

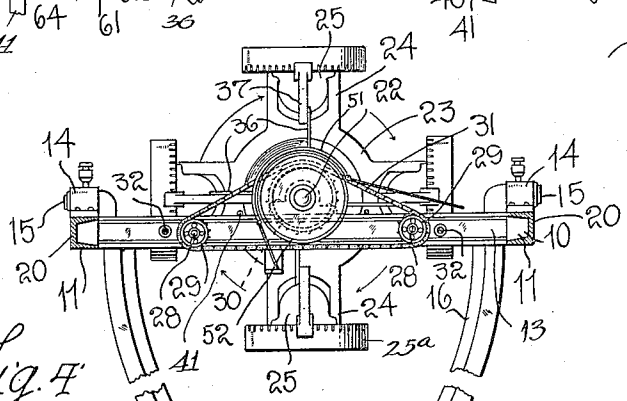


Fig. 4

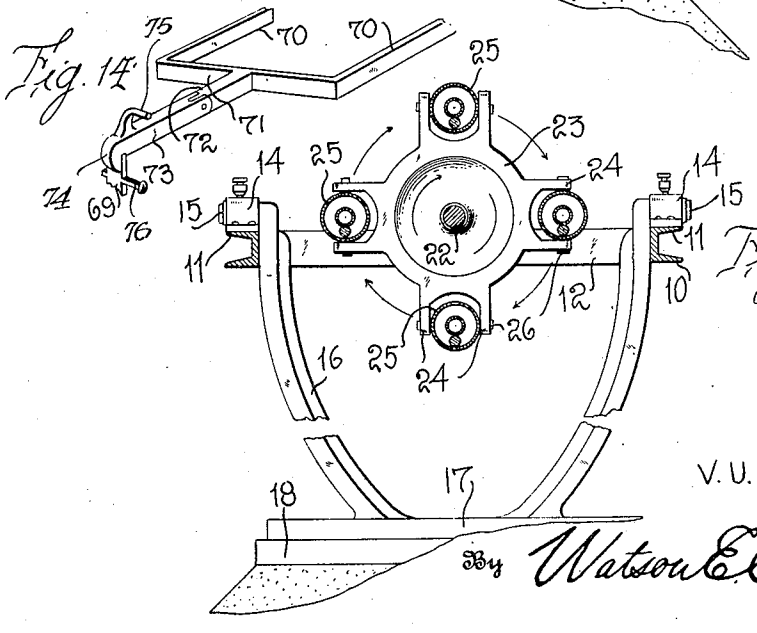


Fig. 14

Fig. 3

Inventor

V. U. D. PIERCE

By Watson E. Coleman

Attorney

V. U. D. PIERCE.

RAPID FIRE GUN.

APPLICATION FILED APR. 3, 1917.

1,353,267. **Patented Sept. 21, 1920.**

4 SHEETS—SHEET 4.

Fig. 15

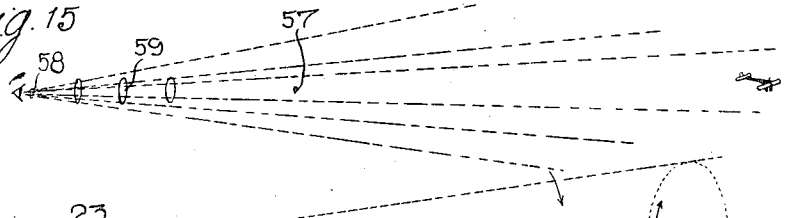


Fig. 16

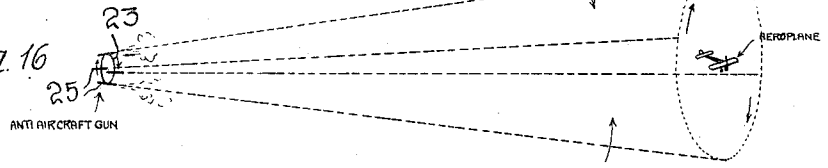


Fig. 17

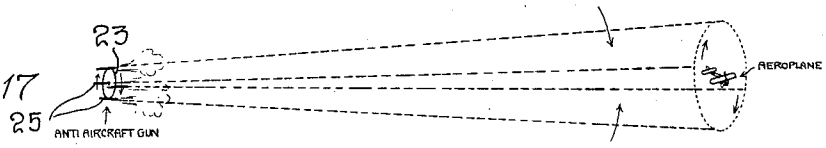


Fig. 18

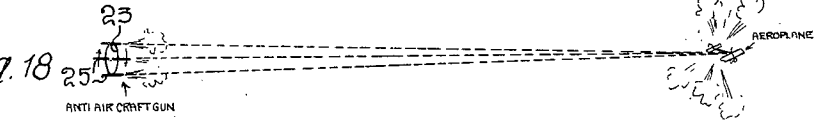


Fig. 19

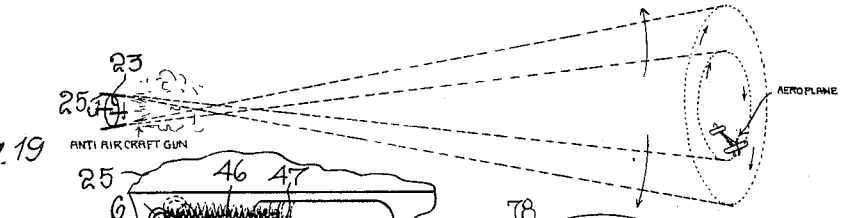


Fig. 5

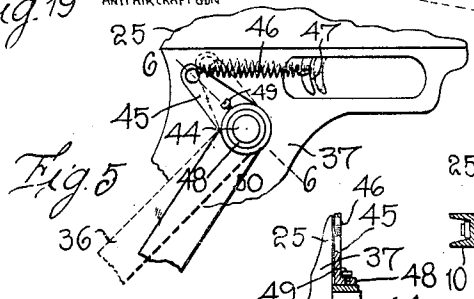


Fig. 6

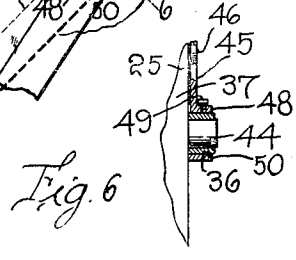
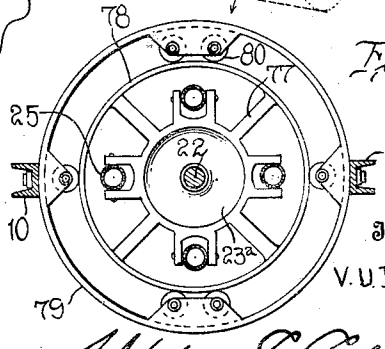


Fig. 20



Inventor

V. U. D. PIERCE

By Watson E. Coleman

Attorney

UNITED STATES PATENT OFFICE.

VINTON ULRIC DAHLGREN PIERCE, OF WASHINGTON, DISTRICT OF COLUMBIA.

RAPID-FIRE GUN.

1,353,267. Specification of Letters Patent. Patented Sept. 21, 1920.

Application filed April 3, 1917. Serial No. 159,411.

To all whom it may concern:

Be it known that I, VINTON U. D. PIERCE, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Rapid-Fire Guns, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to ordnance, and particularly to machine guns.

Generally speaking the object of the invention is to provide means whereby the projectiles from a single machine gun may be scattered over a relatively wide zone or, at the will of the operator, concentrated to what may be termed a focal point.

A further object of the invention is to provide a machine gun with a plurality of barrels, and provide means whereby the barrels may, at the will of the operator, be disposed either in a divergent, convergent, or parallel relation and in this connection to provide means whereby the barrels may be disposed initially in a divergent relation, then shifted slowly into a parallel relation, and then into such convergent relation that the projectiles from the barrels will cross each other at what may be termed the focal point, so as to provide beyond said focal point a zone wherein the projectiles will be traveling in divergent lines.

A further object is to provide a machine gun so constructed that a circular zone of fire, or circular "barrage" fire will be created through which zone projectiles will pass and provide means whereby this circular zone may be contracted in diameter until the projectiles will be directed toward a common point, and further to provide means, as before stated, whereby a circular zone of fire may be created beyond this focal point and gradually expanded.

A further object of the invention is to provide a construction which is particularly adapted for anti-aircraft guns and which, as before stated, is so constructed that a zone of fire may be created around the aircraft initially and then this zone contracted, until the projectiles are discharged in parallel lines directly at the target and whereby, if the target escapes this direct fire and moves laterally out of it, a further convergent movement of the guns composing the piece of ordnance will cause a second circular zone of fire to be formed, which will expand and again surround the aircraft with a barrage.

A further object of the invention is to provide a construction of this character employing a plurality of gun barrels mounted for rotation around a common central axis, the barrels being approximately parallel to the rotative axis and provide means, as the barrels are revolved, whereby the barrels may be rotated from a divergent into a parallel and a convergent relation, or from a convergent into a divergent relation to thereby accomplish the general objects previously stated.

A further object is to provide means whereby this radial shifting of the barrels from a divergent to a convergent relation may be accomplished at the will of the operator and to a degree, by him deemed necessary, and to provide means whereby the barrels may be initially discharged, the firing mechanism used with the several barrels being such, that after each gun barrel is initially discharged the gun barrels will continue to be discharged automatically until the trigger or firing mechanism of the gun barrel is released.

A further object of the invention is to provide a construction of this character in which a well known and extremely effective type of rapid fire gun may be used with practically no change in the machine gun itself.

Still another object is to provide means whereby the field seen through the sighting devices will be equal to the diameter of the circular zone of fire and whereby this field, which is seen through the sighting device, will be contracted in proportion as the zone of fire is contracted.

Other objects will appear in the course of the following description.

My invention is illustrated in the accompanying drawings, wherein:—

Figure 1 is a top plan view of my improved piece of ordnance;

Fig. 2 is a side elevation thereof;

Fig. 3 is a sectional view on the line 3—3 of Fig. 1;

Fig. 4 is a section on the line 4—4 of Fig. 1;

Fig. 5 is a fragmentary side elevation showing the trigger operating mechanism for each gun barrel;

Fig. 6 is a fragmentary sectional view through the same;

Fig. 7 is an enlarged fragmentary detailed sectional view through the sliding sleeve and its collar, the central shaft being shown in elevation;

Fig. 8 is a fragmentary sectional view through one of the ball bearings for the central shaft;

Fig. 9 is a fragmentary side elevation of a modified form of the construction illustrated in Figs. 1 and 2 to show a modified form of the trigger mechanism;

Fig. 10 is a sectional view of the modified form of sleeve and trigger connections;

Fig. 11 is a vertical sectional view of the trigger release mechanism shown in Fig. 9;

Fig. 12 is a fragmentary perspective view of the trigger release mechanism shown in Fig. 11;

Fig. 13 is a top plan view of the construction illustrated in Fig. 11;

Fig. 14 is a fragmentary perspective view of the trigger operating yoke and latch;

Fig. 15 is a diagrammatic view showing the action of the shiftable globe sight in decreasing the field of view as the barrels of the gun are converged;

Fig. 16 is a diagrammatic view showing the zone of fire created when the barrels are in divergent relation;

Fig. 17 is a like view to Fig. 16, but showing the barrels in a less divergent relation and approaching a parallel relation;

Fig. 18 is a like view to Figs. 16 and 17, but showing the barrels in a convergent relation;

Fig. 19 is a like view to Figs. 16, 17 and 18, but showing the barrels so convergently disposed that the paths of the projectiles intersect at a focal point and diverge to form a circular zone of fire around the target.

Fig. 20 is a sectional view on the same plane of section as Fig. 3 but showing a modified manner of supporting the forward end of the shaft 22.

Referring to Figs. 1, 2 and 3, it will be seen that this piece of ordnance comprises a rectangular frame, designated 10, and illustrated as formed of the side bars 11 and the cross bars 12 and 13. These may be made of any suitable or desired cross section and of any suitable strength. The cross bar 12, as illustrated in Fig. 2, is relatively sharp on its inner edge and has a downwardly inclined lower surface for a reason which will be later evident. The side bars 11 are provided with the bearings 14 and in these bearings are disposed trunnions 15 of a supporting member 16, which extends downward and is attached to a base 17, which is rotatably mounted upon any suitable foundation 18, anti-friction balls 19 being illustrated as supporting the base so that the base and piece of ordnance may be easily shifted. I wish it understood that the base 17 and the foundation 18 are purely illustrative and that I in no way wish to be limited to the construction illustrated as the manner of mounting the frame 10 will depend entirely upon whether the piece is to be used as a field gun, a ship's gun, or is to be permanently mounted. The frame 10 might be mounted on any suitable carriage or other support and the only necessary requirement is that the frame 10 shall be mounted so that it may be rotated in a vertical plane or a horizontal plane, and thus the elevation and direction of the gun barrels mounted upon the frame be changed. It will be seen that, as illustrated, the frame is mounted for angular movement in a vertical plane and for rotative movement in a horizontal plane.

I have illustrated angularly disposed convergent members or beams 20 as forming the rear end of the frame and converging rearward and supporting a shoulder piece 21 against which the gunner may dispose his shoulder so as to hold the mechanism steady. I, of course, do not wish to be limited to this. Rotatably mounted on the cross bars 12 and 13 is a shaft 22. Preferably the bearings for this shaft are ball bearings, as illustrated in Fig. 7, so that the shaft may rotate with the least possible friction. Mounted upon the shaft is a disk, wheel, or other member of like character, designated 23, this disk rotating with the shaft. The disk is provided at a plurality of points around its circumference with outwardly projecting pairs of ears 24 and pivotally mounted between each pair of ears is a gun, illustrated as the "Lewis" rapid fire gun and having a barrel 25, a magazine and firing mechanism of such character that when the trigger of the gun is pulled back, the piece will be automatically discharged and the cartridges automatically fed to the gun barrel until the trigger is released again. While the Lewis gun illustrated is a complete gun in itself, yet in order to distinguish the separate guns from my gun as a whole, I will hereafter refer to these separate guns as gun barrels. These gun barrels 25 are mounted on trunnions 26, which extend into the ears 24. The internal mechanism of these guns is well known and as this internal mechanism is immaterial, from the standpoint of my invention, it is not believed necessary to describe it.

The shaft 22 is designed to be rotated at a certain predetermined rate of speed, which may be, and preferably will be, relatively low, by means of a motor or motors operatively connected to the shaft. I have illustrated two of these motors, which are designated 27, and I have illustrated these motors as being spring motors, though it is obvious that other forms of motors may be used. I have illustrated each of these mo-

tors as being provided with a shaft 28 extending rearward through the cross bar 13 of the frame and carrying upon it a relatively small sprocket wheel 29. The shaft 22 is provided at its rear end with a relatively large gear wheel 30, with which the shafts 28 are operatively engaged by means of the sprocket chain or chains 31. It will be obvious that I may provide other means or transmission mechanism for transmitting power from the motor shafts to the gun carrying shaft 22, without departing from the spirit of the invention. For the purpose of winding the springs of the spring motors, I provide the winding shafts 32, which may be of any suitable construction.

As before stated, it is one of the objects of this invention to provide means whereby the pivoted gun barrels 25 may be shifted from a divergent to a parallel relation and then into a convergent relation, and vice versa, and to this end I mount upon the shaft 22, the sleeve or sliding member 33 (see Fig. 1), this sleeve or sliding member 33 being splined upon the shaft 22 by means of a key 34, or otherwise caused to rotate with the shaft but be longitudinally slidable upon it, this sleeve 33 being provided with ears 35 to which links 36 are connected, one for each gun. These links, as illustrated particularly in Fig. 5, extend to and are pivoted upon the stocks 37, or other suitable portions of the barrels 25. The sleeve 33 is formed with a groove 38, and rotatably mounted in this groove is a collar 39, which is shown as resting upon anti-friction balls 40, disposed in the groove. This collar 39 does not move, but the sleeve 33 rotates within the collar. Nevertheless, when the collar 39 is shifted longitudinally, the sleeve 33 will be shifted longitudinally and it will be obvious that as the collar is shifted in one direction, the links 36 will cause the barrels 25 to gradually converge and as it is shifted in the opposite direction, it will be obvious that the barrels 25 will diverge. For the purpose of shifting the collar 39, I provide a yoke 41 having rearwardly extending parallel arms, which at their forward ends are operatively engaged with the collar, these arms extending out through suitable guides in the rear cross bar 13, extending beyond the sprocket chain 31, or through said sprocket chain, and being connected by a cross bar 42, this cross bar being provided with any suitable hand grip 43, whereby a gunner, standing with his shoulder against the shoulder rest 21, may shift the yoke 41 longitudinally and thus shift the guns into convergent or divergent relation.

With the type of gun such as I have illustrated and referred to, namely, the "Lewis" gun, and with many other guns of this character, an initial pull upon the trigger causes the firing of the gun and the discharge is continued automatically until the trigger is released, each gun being provided with a magazine 25^a within which the cartridges are disposed, there being means, of course, to feed the cartridges to the gun automatically. In Fig. 5, I have illustrated one means whereby I secure the initial firing of the gun barrels, and the continued pressure upon the trigger, while the barrels 25 are being shifted from a divergent toward a parallel and convergent relation. When the sleeve 33 is in its rearmost position, the guns will, of course, be in a divergent relation, that is the relation illustrated in Fig. 17. Under these circumstances, it will be seen that the links 36 will be in the position shown in full lines in Fig. 5 and at an acute angle to the axis of the corresponding barrel 25. The ends of the links are shown as pivoted upon a stud 44 extending outward from the side wall of the stock, or other suitable projecting portion of the mount, and operatively mounted upon this stud 44 and operatively connected to the link 36 is an arm 45, which constitutes the short arm of a bell crank lever of which the link 36 is the long arm. The extremity of this arm 45 is connected by means of a spring 46 to the trigger 47 of the gun. This spring 46, when the link 36 is in the full line position shown in Fig. 5, will be relatively slack and will exert no pressure upon the trigger 47, but as the arm 36 swings from the full line position to a position toward a right angle with the axis of the barrel, the spring 46 will have its tension gradually increased until at a certain point the tension on the spring will be so great as to cause a retraction of the trigger 47 and the firing of the barrel. Once the trigger has been retracted, the firing mechanism will keep on functioning automatically, as before described, so long as there are cartridges for it. Preferably the arm 45 is made adjustable with relation to the link 36 so that the point at which the trigger 47 will be retracted may be controlled. To this end I have illustrated in Fig. 5 the link 36 as being formed with a sleeve 50 and the arm 45 as being formed with a sleeve 48 surrounding the sleeve of the link, there being a set screw 49 extending through the sleeve 48 and engaging the sleeve 50 of the link 36. I do not wish to be limited to this construction, however, as I have merely shown it for illustrative purposes and it is obvious that it may be changed in many ways and various means may be provided for quickly adjusting the arm 45, in relation to the link 36, so that the guns will commence firing when they are in a predetermined relative position and not before.

In order to provide means for regulating the speed at which the shaft 22 revolves, I may provide an ordinary band brake 51 en-

gaging over a brake drum 52, the brake band being operatively connected to a lever 53, mounted upon the beam 20, or in any other suitable position. I, of course, do not wish to be limited to this specific manner of controlling the speed of the shaft, as other means may be provided. For the purpose of steadying the rotation of the gun barrels and of the shaft 22, I may provide any suitable governing mechanism, which will operatively control the rotation of the shaft 22. I have illustrated this governing mechanism as being applied to the shafts of the spring motors, though I do not wish to be limited to this and I have illustrated the governing mechanism as comprising the pivoted governor arms 54, weighted at their extremities, these arms being urged inward by springs, as is usual, and urged outward by centrifugal force and these arms being connected to a sliding keyed friction member 55 adapted to engage a fixed friction member 56. It will be obvious that when the speed of the motor increases beyond a predetermined point, the governor arms will move outward, the member 55 will move inward and into frictional engagement with the corresponding member 56, thus frictionally braking the motor shaft and reducing the speed of rotation. As I have said before, I do not wish to be limited to this construction and I only show it for illustrative purposes.

It is obviously necessary to provide some means for sighting the gun and to this end I mount upon the forward cross bar of the frame 10, and preferably upon the bearing for the shaft 22, the bead sight 57 as shown in Fig. 2. At the opposite extremity of the frame, namely at the point of convergence of the beams 20, I mount the peep sight 58, and upon the collar 39, I mount the globe sight 59. It will be obvious from Fig. 15 that an observer looking through the peep sight 58 will see through the globe sight 59 with the bead sight disposed in line with the center of the globe sight and it will be further obvious that looking in this manner through the peep sight and the globe sight, a certain area or field will be included within the globe sight and that the nearer the globe sight is to the peep sight, that is to the observer's eye, the greater the area will be, while the farther away the globe sight is from the observer's eye, the less the field or area will be for the same distance and it will be further seen that as the globe sight, which is mounted upon the collar 39, is shifted along the shaft 22 to cause the shifting of the barrels from a divergent toward a parallel relation or convergent relation, the field seen through the globe sight will be correspondingly decreased and that the globe sight may be so proportioned as to its diameter that this field will correspond to the base of the conical figure described by the projectiles in their flight growing less and less as the barrels are brought from a divergent to a parallel position. This is indicated diagrammatically in Fig. 17.

While I have illustrated and heretofore described one form of trigger actuating mechanism operating automatically as the guns are brought from a divergent toward a convergent relation, it is obvious that I may provide trigger mechanism which is not actuated automatically, but which is controlled entirely by the gunner, so that the guns may be fired at any time desired and without regard to their moving to a specific angle with relation to each other. Such a modified form of trigger mechanism is illustrated in Figs. 9, 10, 11, 12 and 13. The mechanism, as far as regards the mounting of the barrels themselves, the operation of the shaft upon which the barrels are mounted and the manner in which the barrels are caused to diverge or converge, is precisely the same as heretofore described, and hence the same reference numerals have been used for the parts in these figures. It will be seen from Fig. 10 that the sleeve 33, which is mounted upon the shaft 22, is in the modified form of my device, longer than in the construction illustrated in Fig. 7. This sleeve carries upon it the rotatable collar 39, as heretofore described. Upon the rotatable sleeve 33, however, is mounted a second collar 60, which may also be mounted on ball bearings, so as to permit the sleeve 33 to rotate with the least possible friction, and this collar carries the eyes 61, to which are attached cables or wires 62. These cables or wires should be, of course, relatively strong and these cables 62, as illustrated in Fig. 9, extend to the triggers 47. Preferably the links 36 carry upon them the flexible tubes 63, which are attached to the links in any suitable manner and extend to the pivotal connections of the links. A coiled expansion spring 64 is mounted around the sleeve 33 and bears against the collar 60 and against the flanges or shoulders with which the collar 39 engages. This spring 64 is relatively weak. As illustrated in Figs. 9, 11 and 13, the sleeve 33 is connected by rods 41^a to a body 65 having a hand grip 66 and a trigger 67. Mounted within the body 65 is a heavy coiled spring 68 and longitudinally movable within the body is a detent 69, with which the trigger 67 coacts. The trigger is so arranged that when it is pulled, it will release the detent 69 and permit the coil spring 68 to urge the detent rearward. Extending rearward from the collar 60 are rods 70 which are connected to form a yoke by means of a cross bar 71, as illustrated in Fig. 14, and from this cross bar of the yoke extends an arm 72 having a pivoted end section 73, formed at its ex-

tremity with a detent tooth 74 adapted to be engaged by the detent 69. This arm is preferably provided with a finger piece, 75, whereby the arm 73 may be raised and thrown rearward. Now when it is desired to fire the gun, the arm or latch 73 is in engagement with the detent 69. When the trigger is pulled, this detent 69 is released so that it may be shifted rearward by the strong spring 68 and this pulls the yoke 71 rearward drawing rearward on the rods 70 and thus drawing rearward on the cables 62 and causing the triggers 47 to be actuated. The spring 64 is, of course, not powerful enough to resist the action of the spring 68 to any appreciable extent and is simply for the purpose of shifting the collar 60 forward upon the sleeve 33. When it is desired to stop firing the pivoted section or latch 73 is released by simply pulling up upon the thumb piece 75, releasing the latch 73 from its engagement with the detent 69. A finger piece 76 is attached to the detent 69 and projects out through the side of the body 65, whereby the spring 68 may be again compressed and engaged with the trigger 67.

The object of forming the cross bar 12 with a thin edge on its inside face and with its lower face downwardly and forwardly inclined is to cause any projectiles which may strike this cross piece to be deflected downward. In tractor aeroplanes, where the aeroplane is driven by a tractor propeller disposed at the forward end of the aeroplane, it is common to discharge a rapid fire gun through the propeller, and unless the gun is timed with the rotations of the propeller, a few bullets or projectiles will strike the propeller, but it has been found in practice that this is a matter of no moment as the bullets will be deflected downward and will not injure the blades of the propeller.

The practical operation of this piece of ordnance will be obvious from Figs. 16 to 19 which show diagrammatically the manner in which the target is enveloped or surrounded in a zone of projectiles and the manner in which this zone is gradually contracted. This gun is particularly applicable as an anti-aircraft gun, though, of course, it is also adapted to be used under other circumstances and in considering the advantages of this gun, reference will be particularly made to its use as an anti-aircraft gun for the reason that this use perhaps illustrates better than any other the advantages of the gun. It is a well known fact, which has been amply proven in actual practice, that it is extremely difficult to get the range of an aircraft, even a large aircraft such as a Zeppelin, and particularly where the aircraft is advancing or retreating. The movement of the craft is actually rapid, but at the ordinary distance from the observer, the movement seems relatively slow and the position of the aircraft is extremely deceiving, even to the most experienced gunners. The least deflection of a gun may cause its projectiles to pass harmlessly by the target and even where a large number of guns are used, they will all be turned directly upon the aircraft and hence there will be no means of surrounding the aircraft within an annular zone of projectiles, and it is practically impossible to so coördinate a number of guns as to cause a circular zone of projectiles around the aircraft.

With my construction, however, the gun is initially set with its various barrels in divergent relation to each other, the observer sighting, however, at the target itself. The gun is rotated and when it reaches the proper speed, the operator shifts the sleeve on the central shaft, gradually causing the barrels to move toward a parallel position and, as a consequence, contracting the zone of fire. The target is, therefore, surrounded by an annular zone of projectiles. There would be no annular zone if it were not that the barrels rotate around a central axis. If the barrels were simply divergent but stationary, the projectiles, assuming that there were four barrels, would merely be directed toward the corners of a square figure and there would be ample space between these four lines of projectiles for the aviator to escape. By rotating the barrels, however, around the central axis, the projectiles are caused to travel in an infinity of diverging paths, so that if the aircraft attempts to escape from within this circular zone, it is almost certain to be struck, because of the relative rapidity of movement of the barrels and the shower of projectiles discharged therefrom.

As the barrels are brought toward a parallel position, the zone of fire contracts and it becomes more and more dangerous to the aviator. He cannot move laterally and escape the zone. He must pass through the zone of fire in order to escape. Eventually the zone of fire is contracted so that all of the projectiles will be placed approximately on the target itself. Now if the aircraft manages to move laterally out of this relatively small zone of direct fire, the gunner may do one of two things. He may either again cause the divergence of the barrels, or he can cause the barrels to converge still more so that the focus, as it may be termed, of the projectiles, will be shortened, thus causing the paths of the projectiles to intersect and then extend outward in divergent relation so that the aircraft is again surrounded by an annular zone of projectiles. Such a situation is illustrated in Fig. 19 and it will be obvious that the greater the convergence of the barrels, the greater will be the diameter of this zone. Having

again surrounded the aircraft with this annular zone of fire, the barrels may be caused to shift toward a parallel relation to again bring a direct fire upon the aircraft. It will thus be seen that, assuming the range to have been secured, there will be very little chance for an aircraft to escape uninjured and that because of the fact that the aim at first was simply general in its character so as to surround the aircraft with the annular zone, there will be no chance for the aircraft, by moving laterally, to escape the projectiles and thus require that a new sight be taken. As the aircraft is surrounded by projectiles, there will be very little object in moving laterally into the actual path of the projectiles and the only possible way of escape is for the aviator to turn and retreat. Inasmuch as he must make a relatively wide turn, and as the area of fire is being contracted, it is obvious that this turning movement on the part of the aviator prior to retreating will be attended with great danger.

It is relatively easy for any experienced gunner to place his projectiles approximately close to the target, but in ordinary guns, this mere approximation is of relatively no value, unless a hit is made, as only the hits count. With my construction, however, the aircraft is hemmed in and is obliged to stay within the circle of fire and cannot escape therefrom, without great danger. Of course the globe sight, as previously stated, is so arranged that as the barrels are brought from their divergent position to contract the area of fire, the area of sky seen through the globe sight is proportionately contracted so that the gunner is fully informed as to the relative size of the circle surrounding the aircraft.

What has been above stated with regard to the use of this gun as an anti-aircraft gun, is equally true of its use as a gun for other purposes and it is obvious that by its means, either a diffused or a concentrated fire may be maintained and it will be seen that this fire is in the nature of a barrage surrounding the target with a danger zone, which is gradually contracted until the gun is aimed directly on the target.

It is likewise to be understood that while I have illustrated a particular embodiment of my invention with certain details of construction, the particular embodiment described is purely illustrative and the details may be modified in many ways, without departing from the principle of the invention and that the principle of the invention may be applied in various ways.

Thus, in Fig. 20 I have shown a different manner of supporting the forward end of the shaft 22, which will do away with the cross bar 12 and thus eliminate any danger of the projectiles striking anything and being deflected or split or caused to rebound toward the gunner. In this construction the rotatable member 23^a is mounted on the shaft 22 in the manner heretofore described for member 23 to rotate therewith and this rotatable member is provided with a plurality of spokes 77 engaged with an annular rim 78. Surrounding the rim 78 and concentric thereto is a fixed annulus 79 which carries a plurality of anti-friction wheels or anti-friction elements designated 80, which bear upon and have rotative engagement with the rim 78. The rim 78 may be grooved to receive the wheels or the wheels may be grooved to receive the rim, in an obvious manner. The annulus 79 is rigidly attached to the side bars 10 of the supporting frame, previously described. It will now be seen that the anti-friction elements 80 support the series of rotatable guns through the action of the rim 78 and that thus there is no object or element which extends across the line of fire of the guns. Here again it will be understood that Fig. 20 is merely illustrative of a method of mounting the guns, so that nothing will be disposed in the line of fire and that the construction illustrated in Fig. 20 may be modified in many ways.

Having described my invention, what I claim is:—

1. A machine gun comprising a plurality of barrels extending in the same direction, means for rotating the barrels around a central axis extending longitudinally of the barrels, and manually controlled means for shifting the barrels from a parallel relation into or out of a divergent or convergent relation while the barrels are being rotated.

2. A machine gun comprising a plurality of longitudinally extending barrels, means for rotating the barrels around a central, longitudinally extending axis, manually controlled means for shifting the barrels into or out of parallel relation, and means for automatically feeding a plurality of projectiles into each barrel as the barrels are being rotated and discharging each of said barrels a plurality of times while they are being rotated.

3. A machine gun comprising a plurality of barrels extending in the same direction, means for rotating the barrels around a central, longitudinal axis, means associated with each barrel for automatically causing a constant feed of projectiles into the barrel and the constant discharge of said projectiles, and manually controlled means for shifting the barrels into or out of parallel relation while they are being rotated and discharged.

4. A machine gun comprising a plurality of barrels extending in the same direction, means for rotating the barrels around a common central, longitudinal axis, means for automatically feeding a plurality of pro-

jectiles into each barrel as each barrel is making a complete rotation around the common axis and discharging each of said barrels a plurality of times while it is being rotated through a complete circle, and manually operable means for initially actuating said projectile feeding and discharging mechanism.

5. A machine gun comprising a plurality of barrels extending in the same direction, means for rotating the barrels around a central, longitudinal axis approximately parallel to the barrels, means associated with each barrel for automatically feeding projectiles into the barrel and causing the constant discharge of said projectiles while the barrels are being rotated, and manually controlled means for shifting the barrels into or out of a parallel relation while they are being rotated, said shifting means being operatively connected to the projectile feeding and discharging mechanism to cause the initial actuation of said feeding and discharging mechanism upon the initial movement of the shifting means.

6. In a gun, a plurality of barrels disposed at equal distances from an axis extending longitudinally of the barrels, means for simultaneously shifting the barrels into or out of parallel relation, and simultaneously and continuously shifting each of said barrels in a plane approximately at right angles to the plane of said first named movement.

7. In a gun, a plurality of barrels extending in the same direction and mounted for rotation around an axis substantially parallel to the barrels, said barrels being mounted for movement into a convergent or a divergent relation, means for rotating said barrels around the axis, and manually operable means for shifting the barrels into or out of a divergent or convergent relation.

8. In a gun, a plurality of barrels extending in the same general direction and mounted for rotation around an axis extending substantially parallel to the barrels, motor operated means for rotating the barrels around said axis, said barrels being mounted for movement into a convergent or divergent relation, and manually operable means for adjustably shifting the barrels into or out of a convergent or divergent relation.

9. A machine gun comprising a plurality of barrels mounted for movement into or out of parallel relation, means associated with each barrel for automatically causing the constant feed of projectiles into the barrel and a constant discharge of said projectiles, manually operable means for shifting the barrels into or out of said divergent or convergent relation, said manually operable means being operatively connected to the projectile feeding and discharging means to initially actuate said feeding and discharging means upon a predetermined movement of said shifting means.

10. In a gun, a plurality of barrels extending in the same general direction and mounted for rotation around a common axis extending substantially parallel to the barrels, power operated means for rotating said barrels, manually operable means for shifting the barrels into or out of a parallel relation, means for automatically discharging the barrels, while the barrels are being rotated around said axis, and manually shifted, and manually controlled means for initially actuating said automatically operated means.

11. In a gun, a plurality of barrels mounted for movement into or out of parallel relation, a support upon which said barrels are mounted for unitary angular movement in vertical planes and unitary angular movement in a horizontal plane, automatically actuated projectile feeding and discharging mechanism associated with each barrel, said mechanism requiring initial actuation, and manually operable means for simultaneously shifting all of the barrels into or out of said parallel relation and for unitarily shifting the barrels in horizontal and vertical planes, and single means for initially actuating the feeding and discharging mechanisms of all of said barrels.

12. A gun comprising a plurality of barrels mounted for movement into or out of a parallel relation, a support upon which said barrels are mounted for unitary angular movement in vertical planes and unitary angular movement in a horizontal plane, manually operable means for simultaneously shifting all of the barrels into or out of parallel relations and unitarily shifting the barrels in horizontal and vertical planes, a magazine associated with each barrel, mechanism for automatically feeding projectiles from the magazines into the several barrels and discharging projectiles therefrom while the barrels are being shifted, said mechanism requiring initial actuation, and a single manually operable means for initially actuating said feeding and projectile discharging mechanisms.

13. In a gun, a longitudinally extending support, a rotatable member mounted upon the support and supporting a plurality of barrels, the barrels being directed in approximately the same direction as the axis of rotation of said member, said barrels being mounted for movement into or out of parallel relation, motor operated means for rotating the member, manually controlled means for shifting the barrels into or out of parallel relation while the barrels are rotated around the member, and manually controlled means for causing the discharge of the barrels as they are rotated.

14. In a gun, a longitudinally extending

shaft, a member mounted for rotation with the shaft, a plurality of barrels mounted upon said member and rotatable therewith, said guns being shiftable into or out of parallel relation, motor operated means for rotating the shaft, manually operable means for shifting the guns into such relations while the guns are rotating with the shaft, and means for discharging the guns while they are rotating and being shifted.

15. In a gun, a longitudinally extending shaft, a member mounted upon the shaft to rotate therewith, a plurality of barrels mounted upon said members and extending approximately parallel to the shaft, motor operated means for rotating the shaft, manually operable means for shifting the barrels into or out of a parallel relation, manually controlled means for discharging the barrels while they are being rotated and shifted, and manually operable means for stopping the discharge of the barrels and checking the rotation of said shaft.

16. In a gun, a longitudinally extending shaft, a frame supporting the shaft, means supporting the frame for angular adjustment in horizontal and vertical planes, a member mounted upon the shaft for rotation therewith, a plurality of barrels pivotally mounted upon said member, said barrels extending in the same direction, manually operable means slidable along the shaft and operatively connected to the rear ends of the barrels, whereby the barrels may be oscillated upon their pivots into or out of a parallel relation to each other and the shaft, and manually controlled means for discharging said barrels.

17. In a gun, a longitudinally extending shaft, supporting means for the shaft whereby the shaft may be shifted in horizontal and vertical planes, motor operated means for rotating the shaft, a plurality of barrels mounted upon the shaft and pivotally supported for movement into or out of a parallel relation to the shaft and each other, a sleeve mounted on the shaft to rotate therewith, links connecting the sleeve with the rear ends of the barrels, a longitudinal movement of the sleeve causing a shifting of the barrels into said relative positions, a non-rotatable collar mounted on the sleeve but engaged with the sleeve for longitudinal movement, and manually operable means for shifting said collar longitudinally.

18. In a gun, a longitudinally extending shaft, supporting means for the shaft whereby the shaft may be shifted in horizontal and vertical planes, motor operated means for rotating the shaft, a plurality of barrels mounted upon the shaft and pivotally supported for movement into or out of parallel relation to the shaft and each other, a sleeve mounted on the shaft to rotate therewith, links connecting the sleeve with the rear ends of the barrels, a longitudinal movement of the sleeve causing a shifting of the barrels into said relative positions, a non-rotatable collar mounted on the sleeve but engaged with the sleeve for longitudinal movement, manually operable means for shifting said collar longitudinally, and means connected to said sleeve whereby the discharge of said barrels may be manually controlled.

19. A gun of the character described including a longitudinally extending shaft, a motor for rotating the shaft, gun barrels operatively supported upon the shaft for movement around the axis of the shaft, manually operable means for shifting the gun barrels into or out of parallel relation while the barrels are rotating, means for discharging projectiles from the barrels while they are rotating, manually operable means for controlling the discharge of said projectiles, and speed governing means controlling the rotation of the shaft and gun barrels.

20. In a gun, a supporting frame, a motor driven shaft mounted upon the frame, means supporting the frame for angular movement in vertical or horizontal planes, a plurality of gun barrels mounted upon the shaft for rotation with the shaft and around the axis thereof, said barrels being mounted for movement into or out of parallel relation to the shaft and each other, manually operable means for shifting the gun barrels into said last named relations, manually controlled means for discharging the barrels as they are being shifted and rotated, and sights operatively mounted upon the frame, comprising a peep sight at the rear end of the frame, a bead sight at the forward end of the frame, and an intermediate globe sight longitudinally shiftable toward or from the peep sight in correspondence with the divergence or convergence of the gun barrels.

21. In a gun, a frame supported for angular movement in a vertical and a horizontal plane, a motor driven shaft mounted upon the frame, a member mounted upon the shaft for rotation therewith, a plurality of gun barrels pivotally mounted upon said member and extending approximately parallel to the shaft but shiftable into or out of parallel relation to the shaft, a sleeve mounted upon the shaft for longitudinal movement thereon but rotary movement therewith, a collar loosely surrounding the sleeve but longitudinally shiftable therewith, links operatively connecting the sleeve to the rear ends of the gun barrels whereby the barrels may be shifted into said relation to each other by a longitudinal movement of the sleeve, and sights coacting with the gun comprising a rear peep sight, a forward bead sight, and an intermediate globe sight,

the globe sight being mounted upon the said collar and longitudinally shiftable therewith in consonance with the shifting of the gun barrels from a divergent to a convergent relation.

22. In a construction of the character described, a supporting frame mounted for rotation in a vertical and in a horizontal plane, a shaft mounted upon the frame, a member mounted upon the shaft to rotate therewith, a plurality of gun barrels extending approximately parallel to said shaft and pivotally mounted upon the member for movement into or out of parallel relation, a rim carried by said member and extending concentric to the shaft, and anti-friction bearings operatively supported upon the frame and with which said rim rotatably engages.

23. In a gun, a plurality of gun barrels mounted for rotation around a common axis, the barrels being all directed in approximately the same direction as the axis and manually controlled means for causing the barrels to deliver projectiles in paths defining cones of variable diameter.

24. In a gun, a plurality of simultaneously shiftable gun barrels, and manually operable means operatively connected to the barrels to cause the barrels to deliver projectiles in paths initially defining a cone, the apex of which is disposed toward the gun, then decreasing the diameter of said cone defined by said paths until the paths are parallel, and then causing the convergence of the paths so that said paths define a double cone having their apices coincident.

25. In a gun, a plurality of gun barrels extending in approximately the same direction but shiftable into angular relations to each other, a magazine for each gun barrel, mechanism automatically feeding projectiles from the magazine into the barrel, automatic firing mechanism for each gun barrel, and manually controlled means for shifting the gun barrels into or out of parallel relation and simultaneously actuating the firing mechanism and feeding mechanism.

26. In a gun, a plurality of barrels mounted for movement into parallel or angular relations, and means for rotating said gun barrels around an axis substantially parallel to the barrels.

27. In a gun, a plurality of barrels mounted for movement into parallel or angular relation, means for simultaneously shifting all of the barrels into such relations, and means for simultaneously rotating the barrels around an axis approximately parallel to the barrels.

28. In a gun, a plurality of barrels extending in the same general direction and disposed in radial planes intersecting the central axis, means for simultaneously shifting the barrels into parallel relation or into angular relation to each other, and means for rotating said barrels around an axis extending parallel to the barrels.

29. In a gun, a plurality of barrels extending in the same general direction and disposed in radial planes intersecting the central axis, means for simultaneously shifting the barrels into parallel relation or into angular relation to each other, and means for rotating said barrels around an axis common to and extending in the same direction as all of the barrels.

30. In a gun, a plurality of barrels extending in the same general direction and mounted for rotation around an axis extending substantially parallel to the barrels, means for rotating the barrels around said axis, said barrels being mounted for movement into parallel or angular relations to the central axis, and means for adjustably shifting the barrels into or out of said parallel or angular relation.

31. A machine gun comprising a plurality of barrels rotatable around a central axis, the guns discharging in one general direction, manually controlled means for shifting the barrels into or out of a parallel relation to the axis of rotation, mean for automatically feeding a plurality of projectiles into each barrel, as the barrels are being rotated and discharging each of said barrels a plurality of times while they are being rotated, and manually operable means for initially actuating said projectile feeding and discharging means.

32. A machine gun comprising a plurality of barrels mounted upon a common axis of rotation and directed in the same general direction, each barrel being equipped with means for automatically causing the constant feed of projectiles into the barrel and the constant discharge of said projectiles, motor operated means for rotating the plurality of barrels around said common axis, manually controlled means for shifting the barrels into or out of a parallel relation with the common axis while the barrels are being rotated, and manually operable means for initially actuating said projectile feeding and discharging mechanism, said means, when released from manual actuation causing the cessation of the feeding and discharging mechanism.

33. A machine gun comprising a plurality of barrels pivotally mounted for movement into or out of parallel relation and having firing mechanism including a trigger for each barrel, a frame upon which the barrels are mounted, trigger operating means mounted upon said frame, flexibly connected to the triggers of the barrels for operating them simultaneously, the flexible connecting means permitting variations in the relative disposition of the barrels, and manually controlled means for shifting the barrels into or out of angular parallel relation.

34. A machine gun comprising a plurality of barrels mounted for rotation around a central axis and mounted for movement into or out of parallel relation to said central axis, each barrel having firing mechanism including a trigger, a longitudinally movable rotatably mounted member with which the triggers of all the barrels are connected, and non-rotatable means engaging said rotatable member whereby said rotatable member may be shifted longitudinally to simultaneously operate all of the triggers.

35. A machine gun comprising a plurality of barrels mounted for rotation around a central axis, each barrel having a magazine, and firing mechanism including a trigger, the magazine automatically discharging projectiles into the barrel upon an actuation of the trigger and the firing mechanism becoming automatically operable upon a single actuation of the trigger, and means for actuating all of the triggers comprising a rotatably mounted member operatively connected to all of the triggers, and manually operable means for shifting said member including a non-rotatable member having engagement with the rotatable member.

36. A machine gun comprising a plurality of barrels mounted for rotation around a centrally disposed support, the barrels extending in the same direction, and each barrel being pivotally mounted for movement into or out of parallel relation to the common axis for the barrels, motor operated means for rotating the barrels around the central axis, manually controlled means for shifting the barrels into or out of a parallel relation while the barrels are being rotated, means for feeding projectiles continuously into each barrel, means for automatically discharging the barrels while the barrels are being shifted and rotated, and manually controlled means for initially actuating said feeding and firing mechanism.

37. In a gun, a plurality of barrels extending in the same general direction, automatically operated means associated with each barrel for feeding projectiles into said barrel and for discharging the projectiles, and manually operable means for shifting the barrels with relation to each other out of or into parallel relation while the feeding and discharging means are being operated, and for initially actuating the feeding and discharging mechanism.

38. A gun of the character described comprising a plurality of barrels arranged equidistantly around a central axis and mounted for simultaneous movement into parallel or angular relations to the central axis, manually operable means common to all of the barrels for shifting the barrels into parallel or angular relations, gas operated means automatically feeding projectiles into the barrels and firing said projectiles while the barrels are being shifted, said means requiring initial actuation, and manually controlled means common to all of the barrels for initially actuating and controlling the gas operated means.

39. A gun of the character described comprising a plurality of barrels arranged equidistantly around a central axis and mounted for simultaneous movement into parallel or angular relations to the central axis, gas operated means automatically feeding projectiles into the barrels and firing said projectiles while the barrels are being shifted, said means requiring initial actuation, and manually operable and shiftable means common to all of the barrels and operatively engaged therewith to cause the simultaneous shifting of said barrels into or out of angular or parallel relation and operatively connected to the projectile feeding and discharging mechanism to initially actuate and control said gas operated means.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

VINTON ULRIC DAHLGREN PIERCE.

Witnesses:
FREDERIC B. WRIGHT,
M. C. LYDDANE.