This invention described herein may be manufactured and used by or for the Government for governmental purposes without the payment to me of any royalty thereon.

This invention relates to an automatic weapon for firing rectangular, square, hexagonal, octagonal or any other shaped ammunition of all calibers and more particularly for handling and feeding at a high rate of speed the ammunition to be fired in the weapon, in such manner as to minimize distance, and restrict movements. This is accomplished by means of a chamber having top and bottom walls, the sides being open for receiving a shuttle type dual feed mechanism.

This application is a continuation-in-part of the application, Serial No. 612,080 filed September 4, 1956, now abandoned.

A primary object of this invention is to provide an automatic weapon having a rapid fire rate and possessing a more compact operating mechanism and possessing light weight.

Another object of the invention is to combine the operational function of ammunition feeding, ejecting and firing in one interval and the chambering, extraction and cocking in another.

A further object is the elimination of ammunition belts, links, heavy feed mechanisms by a side feeding and ejecting mechanism.

A still further object is to eliminate the danger of high order explosion in all areas except when the ammunition is chambered, the feeding mechanism being under separate control and independent of the weapon operation.

Other objects and advantages of the invention will become apparent from the following description taken in connection with the accompanying drawings wherein:

FIG. 1 is a fragmentary side view of the weapon of the invention, the frame chamber being omitted; FIG. 2 is a perspective view of the frame chamber mounted to the barrel; FIG. 3 is a fragmentary top plan view of the weapon with parts left out for clarity; FIG. 4 is a cross section taken along line 4-4 of FIG. 3; FIGS. 5a-5c and FIGS. 5d-5f are end views of two examples of shuttle assembly configuration to accommodate ammunition having a shape other than rectangular; FIG. 6 is a side view of the locking block; FIG. 7 is a top view of the cam operating the blocks shown in FIG. 6; FIG. 8 is a cross section taken along line 8-8 of FIG. 7; FIG. 9 is a cross section of the mating cam portion of the operating mechanism that is operated by and attached to the operating rod; FIG. 10 is an end view of a rectangular type ammunition used in the weapon of the invention; FIG. 11 is a cross section taken along line 11-11 of FIG. 10; FIG. 12 is a side view of the ammunition case shown in FIGS. 10 and 11; FIG. 13 is a cross section taken along line 13-13 of FIG. 12; FIG. 14 is a schematic rear view of the manner of ammunition feeding of the weapon; FIG. 15 is a side view of the weapon and showing the shuttle assembly; FIG. 16 is an enlarged view of the locking blocks and their cooperation with the operating rods; FIG. 17 is an enlarged cross section taken along line 17-17 of FIG. 15; and, FIG. 18 is an end view taken in the plane indicated by line 18-18 of FIG. 17.

Referring now to the drawings, there is shown in FIG. 1, a barrel 1 attached to an open chamber-frame 2. Chamber-frame 2 is provided with an integral top wall 25 and an integral bottom wall 26, an integral end wall 69 in which is housed a firing pin 54 and an integral front wall 29 which receives the breech end of barrel, which may be threadably engaged therein or by other suitable means. As seen in FIG. 2, a transverse rectangular chamber open at both ends 6 is formed in the barrel frame for receiving a chamber-frame 13 (see FIG. 4). The longitudinal length 17 and height of chamber 6 is substantially equal to the longitudinal length and height of a rectangular shape ammunition package indicated by 7 in FIGS. 10-13.

The ammunition is shown in FIGS. 10-13 and includes an ammunition package, which as shown in FIG. 10 is a square case 36 having a thickened front 18 and a rear plate 19 of sufficient strength to withstand the loading operations. A striking primer 35 is provided in the rear plate 19 of case 36. The projectile 37 is externally encased in the package 36 and the case 36 is open at the front.

The manner in which the ammunition is fed to barrel 1 in chamber 6 is diagrammatically shown in FIG. 14. Live ammunition 16 is fed downwardly by forces 10 from vertical stacked positions 8 and 9 and fed transversely and alternately into chamber 6 into position 15 where it is fired and the spent ammunition being ejected by force 10, and, in the particular position shown, assisted by gravity as at 17.

Feeding of the ammunition to the firing position 15 (FIG. 14) is accomplished by a shuttle assembly indicated generally by 4 and shown schematically in FIG. 4 and in detail in FIGS. 16 and 17. This assembly consists of two side walls 11 and 12 and an intermediate wall 14. Walls 11, 12 and 14 are carried by frame 13 and the entire assembly slides transversely in chamber 6 from either side, and, as one round is fired at firing position 15, another round of live ammunition 16 is loaded between walls 14 and 12 and the spent round 17 is ejected. The process is repeated when the frame slides to the other side of chamber 6.

Ejection of spent rounds 17 while performed by gravity is also assisted by pivoted latches 29 (better shown in FIG. 17).

Means are provided for sliding the shuttle assembly 4 and are indicated generally by 5 and illustrated in FIGS. 3 and 15 and comprise a pair of operating rods 27 located one above and one below the gun (see FIG. 15). Rods 27 are attached to a sleeve 45 slidable on gun barrel 1. Each rod 27 carries a cam follower 28. Slidably secured one each to the top and bottom of the gun is a cam 62 (see FIG. 3) having a V-shaped cam slot 29 in which the cam follower 28 rides. Cam 62 moves frame 13 in chamber 6 as rods 27 are moved longitudinally back and forth. Guide rollers 30 cause cam 62 to travel in a transverse direction only with respect to the longitudinal axis of the gun.

Shuttle assembly 4 is operated by gases from the gun barrel 1 and comprises a pair of piston rods 63 attached at one of their ends to sleeve 45 and at their other ends to respective pistons 64 slidable in cylinders 44. The pistons 64 are normally biased in a forward position.
3 by return springs 65. Gas is admitted to cylinders 44 by ports 66 which are located near the muzzle of the gun and the cylinders 44 are secured to the gun barrel by mounts 47 which may be straps or the like.

The recording of the ammunition is located in firing position 15, means are provided to lock side walls 11 and 14, against displacement while firing.

The locking means comprise four locking bars 3 (see FIGS. 4 and 16) that are pivotally mounted at one of their ends at 70 one each in a recess 21 in bottom 26 and similarly in top 25 (not shown) there being two recesses, in bottom 26 and two in top 25. Their other ends are pivotally mounted as at 71 to a vertically actuating rod 23. Locking bars 3 are adapted to engage full length grooves 22 in the bottom surface of walls 11 and 14. A similar arrangement is used on the top side of walls 11 and 14 (not shown). Each rod 23 slides in holes 24 in top 25 and bottom 26 and are provided with heads 33 for engagement in cam plates indicated generally by 48, there being two, one being slidable under the bottom wall 26 and one being slidable on top of the top wall 25.

Cam plates 48 are provided with cam surfaces 49 (see FIG. 8 and 9) which receive heads 33 and are for the purpose of moving the rods 23 vertically in grooves 22 for locking or unlocking the frame 13 in firing position.

Means for moving cam assemblies 48 is provided and consists of four operating rods 31 arranged in spaced relation, two being on the top of the frame 13 and two being on the bottom of the frame 13. Each pair of rods 31 are attached to a cam plate 48. Rods 31 extend forwardly of the cam plates 48 to a sleeve 67 which is attached to a pair of piston rods 39 and piston 68 which slides in a gas cylinder 38 one being on the top and one on the bottom of the gun and both cylinders 38 are secured to the gun barrel 1 by a strap clamp 61. A return spring 46 is provided in each cylinder 38 and a gas port 69, one for each cylinder 38 is provided to admit combustion gas from barrel 1 for operation of the rods 31.

Latches 40 are provided for holding each rod 27 when in their rearward position and are tensioned by springs 41 secured to barrel 1 in diametrically opposed position by a strap clamp 43 and to which catches 40 are pivotally mounted. Upon return of the rods 27 to forward position by action of springs 65, catches 40 are pivoted into a groove 42, one each on each rod 27.

FIG. 17 is an enlarged view and in more specific detail than FIG. 14. In this view, there is shown two different kinds of drives for advancing the ammunition to the firing position and as by way of example only thereon.

One drive on the left shown is an electric motor 50 having a pulley 55. Belt 52 bears against the ammunition 16 by a slip clutch 51 and moves the ammunition 16 downward against latch 20 which is tripped by an ejected round on that side.

On the right side of the gun, another example is shown and consists of a gas operated piston 57 sliding in a cylinder 53. Tubing 54 from a source (not shown) moves the piston 57 downwardly against return spring 58 to act as the ammunition in the same manner as on the left side.

4 Operation

Chamber frame 2 acts as the firing chamber of the gun as only projectile 37 travels through the barrel and case 36 after firing is ejected from the chamber.

At the start of the firing cycle, one round will be in firing position 15 in chamber frame 2 and the frame 13 will be locked in this position by locking bars 3, and the shuttle mechanism 4 will be held by catches 40 bearing against sleeve 67.

After the first round is fired, gases from barrel 1 enter ports 69 and into the two gas cylinders 38. Pistons 68 are moved rearwardly to compress return springs 46 and also move bars 31 longitudinally and rearwardly to slide the two cam plates 48 whereby cam surfaces 49 move actuating rods 23 vertically and out of holes 24 in the bottom and top walls of frame 13 respectively whereby the locking bars 3 are moved out of grooves 22 in walls 11 and 14 and the frame is in unlocked condition.

Gases from barrel 1 next enter ports 69 near the muzzle end of the barrel, and into gas cylinders 44 to move pistons 64 rearwardly to compress return springs 65 and operate the shuttle system 4 by moving rods 27 rearwardly and longitudinally whereby cam followers 28 travel in grooves 22 in frame 13 to one side for a round of ammunition to be forced by the drive on that side of the gun into position to the left or right for loading in the frame. As the breech end of the barrel is partially opened during this operation, the residual gases will be bled from the barrel. Also as the frame 13 moves either left or right, a spent round 17 is ejected by gravity being assisted by a latch 20. Latch 20 is operated on either side of the gun by the pressure of either side wall 11 or 12 when it reaches the extreme position along the chamber 6.

Upon completion of the loading, ejecting and chambering operation of the mechanism, reduction of the gas pressure in barrel 1 and gas cylinders 38 and 44 cause return springs 46 and 65 to move pistons 68 and 64 to their forward positions in their respective cylinders 38 and 44 and thereby actuate rods 27 to cause cam followers 28 to move frame 13 into another firing position at 15 and to actuate bars 3 into their locking position by cam plates 48.

As long as ammunition is stacked in positions 8 and 9 the gun will continue firing at a fast rate of speed.

The drive system forcing the ammunition into frame 13 is operated from a separate force.

The gun is a highly compact unit for use in constricted space due to the feeding of the ammunition in stacked relation close to the sides of the gun.

The drives shown in FIG. 17 are by way of illustration and any other method of forcing the ammunition may be employed.

Variations and modifications may be effected without departing from the scope of the novel concept of the present invention.

What is claimed is:

1. An automatic weapon for firing ammunition which is fed from both sides of the weapon and is arranged in vertically stacked relation adjacent the breech end of the weapon, said weapon comprising in combination, a rectangular chamber frame having a rectangular transverse opening therein, said chamber frame including top, bottom, front and side walls, a barrel secured to said front wall, said top and bottom walls having a series of vertical holes therein, a shuttle mechanism slideable in said transverse opening for the automatic feeding of ammunition from the aforementioned stacked relation alternately from either side of said weapon into simultaneous loading, firing and ejecting positions therein, said shuttle mechanism including a rectangular frame, a pair of side walls having longitudinal grooves in their top and bottom surfaces and an intermediate wall having longitudinal grooves in its top and bottom surfaces, means for alternately moving said shuttle mechanism from side to side comprising a first piston assembly attached to said bar and responsive to gas pressure therein, cam assembly mounted on the front wall of said chamber frame and connected to said shuttle mechanism and said first piston assembly, locking means for locking said shuttle mechanism in said alternate positions comprising a first cam plate having cam surfaces slidable along the bottom of said bottom wall of said chamber frame, a second cam plate having cam surfaces slidable along the top of said top wall of said chamber frame, a plurality of actuating rods slidable in said vertical holes in said top and bottom walls of said chamber frame the outer ends of said rods being in contact with said cam surfaces, a locking bar.
pivotally mounted to the inner ends of said actuating rods and adapted to engage said grooves in said shuttle mechanism walls when actuated by said cam surfaces and means for sliding said cam plates for actuating said locking means comprising a second piston assembly attached to said barrel and responsive to gas pressure from said barrels and a plurality of rods connecting said second piston assembly and said cam plates.

2. An automatic weapon for firing ammunition which is arranged in vertically stacked relation on each side thereof comprising in combination; a barrel; a chamber frame attached to the breech end of said barrel, said chamber having top, bottom, forward and rearward walls whereby there is formed a transverse opening extending from side to side therein, said top and bottom walls having a series of vertical, aligned bores therethrough and a series of recesses in the inner faces thereof; a shuttle assembly slidably mounted in said transverse opening for movement from side to side into positions for loading said ammunition, presenting said ammunition for firing in said barrel and ejecting the spent ammunition cases, said shuttle assembly comprising a pair of side walls, an intermediate wall and a frame secured to said side walls, there being a longitudinal groove along the top and bottom sides of said last named walls, said grooves in said side and intermediate walls registering alternately with the recesses in said top and bottom walls of said chamber frame when said shuttle assembly is shifted from said loading, said firing and said ejecting positions; a gas actuated mechanism for moving said shuttle assembly into said last named positions comprising, a first pair of cylinders secured on opposite sides of said barrel and near the muzzle end thereof, there being a port between said barrel and each cylinder, a piston slideable in each cylinder, a piston return spring in each cylinder, a pair of rods connected at their forward ends, one each, to a piston and extending rearwardly therefrom, a cam follower mounted on the rearward end of each rod, a pair of cams slidably arranged, one each, on the top and bottom walls respectively of said chamber frame, there being a V-shaped cam slot in each said cam for receiving a said cam follower, said cams constituting top and bottom sides of said frame on said shuttle assembly whereby when said last named rods are reciprocated by the pistons in the cylinders, said shuttle is moved alternately from side to side into stations for ammunition loading, firing and ejection of spent cases, said opening in said chamber frame; and a gas responsive mechanism for locking said shuttle assembly when in firing station comprising, a second pair of cylinders secured one each on each side of said barrel and being located adjacent said chamber frame and positioned at right angles with respect to said first pair of cylinders, there being a port between each cylinder and the barrel, a piston slideable in each cylinder, a piston return spring in each cylinder, a sleeve connected to each piston and slideable on said barrel, a first pair of rearwardly extending rods integrally connected at their forward ends to said sleeve and arranged in parallel relation along the top wall of said chamber frame, a second pair of rearwardly extending rods integrally connected with said sleeve and arranged in parallel relation along the bottom wall of said chamber frame, a first cam plate connected to the rearward ends of said first pair of rods and slideable along the top wall of said chamber frame, a second cam plate connected to the rearward ends of said second pair of rods and slideable along the bottom wall of said chamber frame, there being inclined cam surfaces on said first and second cam plates, and a plurality of vertically disposed actuating rods slideable in said vertical bores in said top and bottom walls of said chamber frame, each said actuating rod having a head portion engaging a said cam surface on said cam plate, a locking bar pivotally connected at one of its ends to a respective actuating rod and pivotally connected at its other end in a respective recess in said top and bottom walls of said chamber frame, whereby when said cam plates are reciprocated said locking bars will pivot into said longitudinal grooves in said walls of said shuttle assembly and lock said assembly when in its firing station.

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