June 9, 1959 S. K. JANSON 2,889,749

SPROCKET TYPE FEEDING FOR A GAS PISTON GUN

Filed July 2, 1956

3 Sheets-Sheet 1

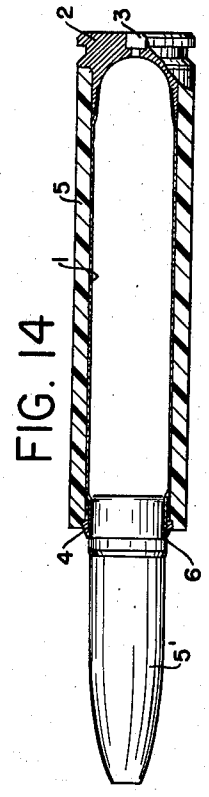

FIG. 14

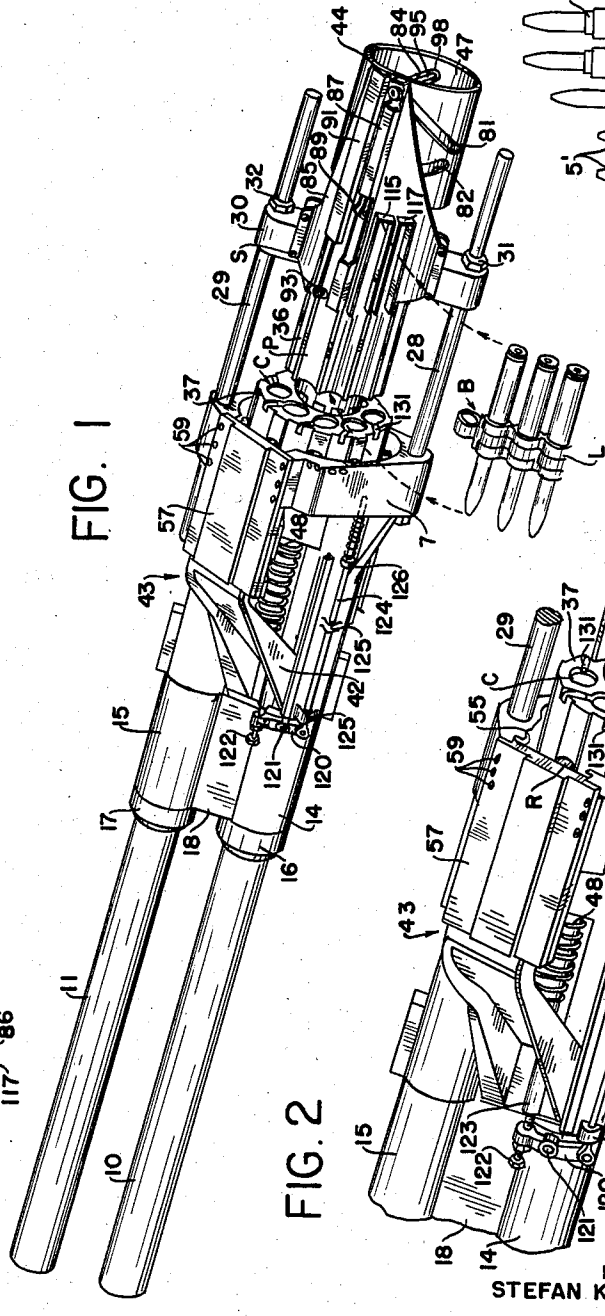

FIG. 1

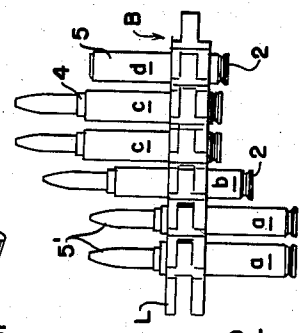

FIG. 12

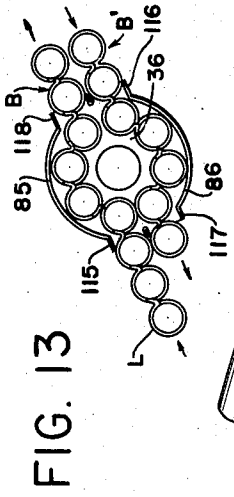

FIG. 13

FIG. 2

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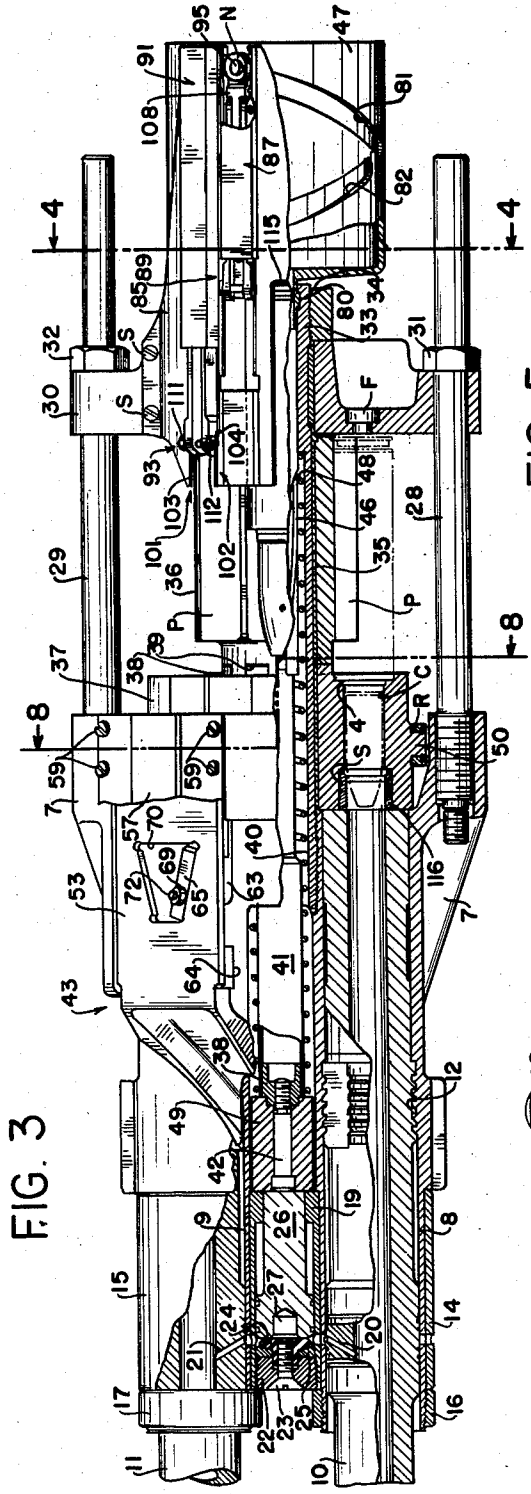

FIG. 3

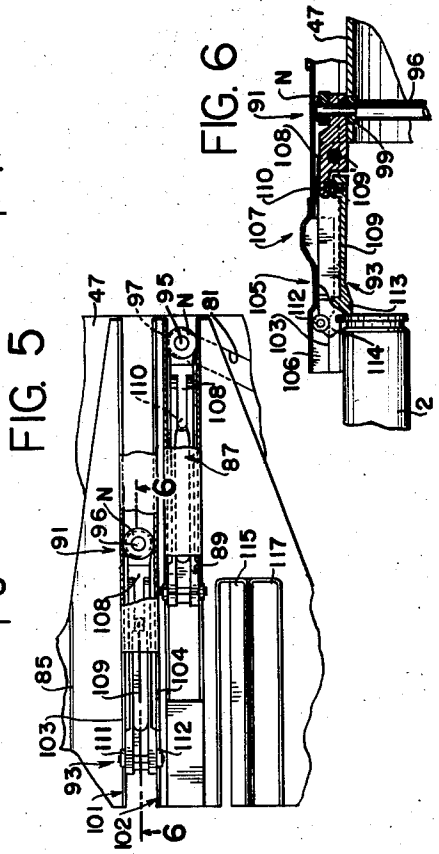

FIG. 5

FIG. 6

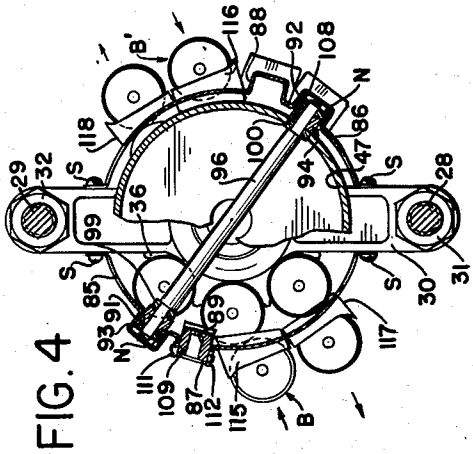

FIG. 4

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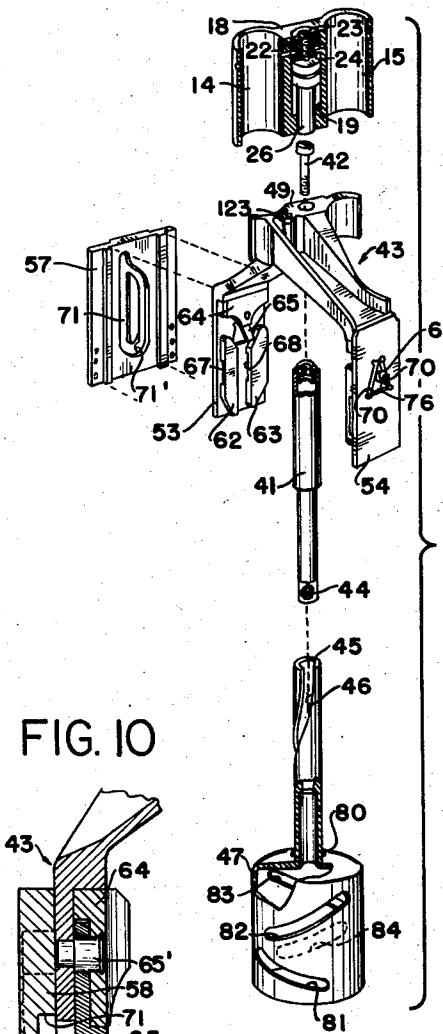


FIG. 8

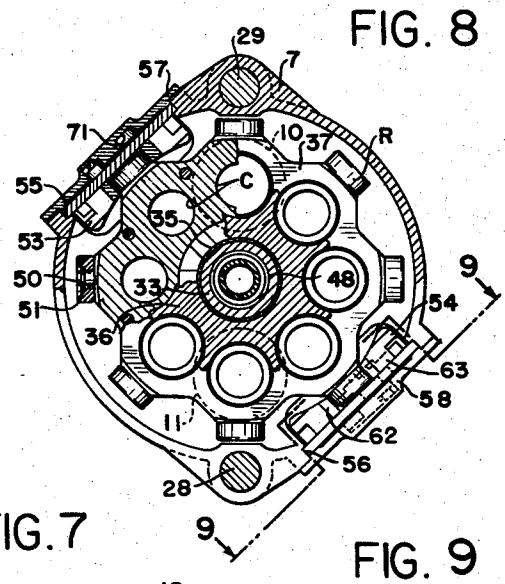


FIG. 7

FIG. 9

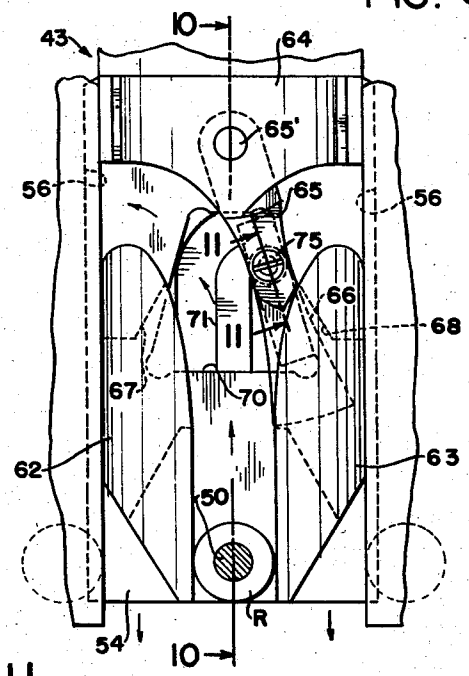


FIG. 10

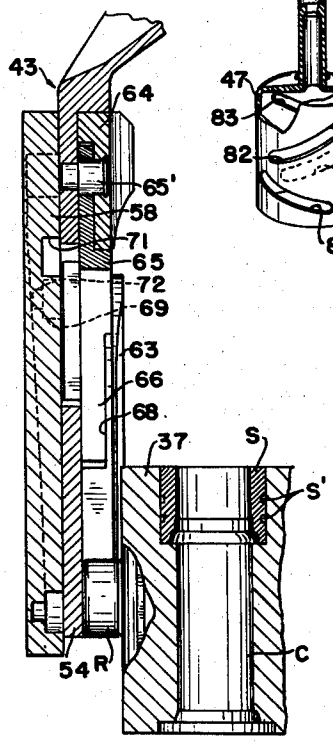
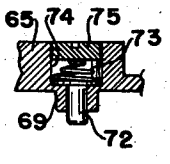


FIG. 11



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United States Patent Office 2,889,749 Patented June 9, 1959

2,889,749

SPROCKET TYPE FEEDING FOR A GAS PISTON GUN

Stefan Kenneth Janson, New Haven, Conn., assignor to Olin Mathieson Chemical Corporation, New Haven, Conn., a corporation of Virginia

Application July 2, 1956, Serial No. 595,522

11 Claims. (Cl. 89—33)

This invention relates to automatic rifles and has for its object the provision of an improved automatic rifle for military purposes which is capable of a very high rate of fire. The automatic rifle of the invention is a gas operated type primarily characterized by having two barrels together with means for feeding two belts of cartridges simultaneously, one for each barrel.

The rifle of the invention is constructed and arranged to utilize what I shall call chambered cartridges which are characterized by having cases of such strength that they can be fired without being inserted into a barrel chamber, such as cartridges having cases formed of glass filaments or fibers and resin binder which are capable of containing the force of the explosion. Such cartridges are preferably provided with a relatively thick cylindrical case having the bullet projecting from a shouldered front face, preferably provided with a sealing means, and a primer of usual construction at the base.

The rifle comprises a receiver to which is attached the two barrels, a feed sprocket which has circumferential pockets for the cartridges and a connected chamber member having chambers in line with the pockets. The gun includes means for feeding two belts of cartridges to the feed sprocket from different directions, means for turning the feed sprocket and connected chamber member in increments to position a cartridge in line with each barrel, and means operated in timed relation with the feed sprocket and chamber member to push a cartridge, while retained on its feed belt and while in a pocket, into firing position with the bullet and a short section of the case in a chamber of the chamber member which is set in line with the barrels.

In its more complete aspects the automatic rifle of the invention comprises two barrels removably secured to a rigid receiver, a cartridge feed sprocket and chamber member in combination rotatably mounted in the receiver, means for feeding two belts of chambered cartridges to the feed sprocket from diametrically opposite sides. A fixed block in the form of a rigid cross-bar is securely attached to the receiver against which the bases of the cartridges are supported when in firing position. A gas piston is mounted in the receiver and operated by gas from both barrels and means are connected to the piston to turn the feed sprocket and the chamber member to bring the pockets and chambers into alignment with the barrels, and other means are connected to the gas piston for pushing a cartridge for each barrel while on the feed sprocket and in its belt forward to insert the bullet and part of the case into a chamber of the chamber member, said means for pushing the cartridge and turning the feed sprocket and chamber member being operated in synchronism by the gas piston. The cartridges in the pockets are moved into firing position with the sealing means of the cases in contact with the chamber member and the bullets inserted into the chambers thereof and the bases in contact with the fixed clock containing the firing pins. The cartridge for each barrel is fired

as with an electric firing means operating the firing pins to ignite both cartridges at the same instant.

The cartridges are fed into the gun and the bullets are inserted into the chambers, the cases being unsupported except at their bases on the fixed block, and fired, and the empty cases are removed from the firing position while held by a feed belt of suitable construction, advantageously a link type metal feed belt.

These and other novel features of the invention will be better understood after considering the following discussion taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a perspective of an automatic rifle of the invention, the means for mounting the rifle being omitted;

Fig. 2 is a fragmentary view of the rifle shown in Fig. 1, with parts in section;

Fig. 3 is an enlarged side view of the rearward portion of the rifle of Fig. 1 with parts in section;

Fig. 4 is a sectional view at 4—4 of Fig. 3;

Fig. 5 is a fragmentary view of a part of Fig. 3;

Fig. 6 is a sectional view at 6—6 of Fig. 5;

Fig. 7 is an exploded perspective of the gas operating means;

Fig. 8 is a sectional view at 8—8 of Fig. 3;

Fig. 9 is a sectional view at 9—9 of Fig. 8;

Fig. 10 is a sectional view at 10—10 of Fig. 9;

Fig. 11 is a fragmentary enlarged sectional view at 11—11 of Fig. 10;

Fig. 12 is a diagrammatic view illustrating the travel of the belts and cartridges on the feed sprocket;

Fig. 13 is a developed view of Fig. 12 from above with parts omitted illustrating the sequence of cartridge movement in relation to the belt, and

Fig. 14 is a longitudinal view partly in section of a chambered cartridge of the type to be used in the automatic rifle of the invention.

The automatic rifle embodying the invention illustrated in the drawings is advantageously a military weapon, especially effective for aircraft and has the capacity of firing around 4000 rounds per minute. The rifle may be constructed for using ammunition of various calibers, for example, 30 mm. anti-aircraft cartridges.

The rifle of the invention is constructed to fire chambered cartridges which are characterized by having cases of such strength that they can withstand the pressure of the explosion without being confined in a supporting chamber of the rifle. Fig. 14 illustrates a suitable cartridge comprising a metal liner 1, for example of aluminum, a metal base 2 having a pocket 3 for the usual primer, a gas sealing sleeve 4 and a case 5 formed of glass fibers impregnated with a resin binder. The liner 1 may be very thin and its thickness is independent of the seal obturation requirements due to the application of the separate sleeve 4 of suitable thickness attached to the liner. The protruding portion of the sleeve is rolled over a groove in the base of the bullet or projectile 5' to provide the necessary pull-force. The collar 6 of the sleeve butts against the face of the gun chamber and prevents a separation of the sleeve from the case on firing. One form of chambered cartridge case suitable for use in the rifle is described in the application of Richard L. Brown, John L. Wilson and Marcus Ramsey, Serial No. 537,791, filed September 30, 1955.

The automatic rifle illustrated in the drawings comprises a receiver 7 having tubular extensions 8 and 9 into which the barrels 10 and 11 are inserted and removably attached by half-threads 12. On the forward tubular extensions of the receiver, a housing having two tubular collars 14 and 15 is fitted thereover in a close sliding fit and held in position by the ring nuts 16 and 17 which are screwed on to the tubular extensions of the receiver. Intermediate the tubular collars 14 and 15

and in a connecting web 18, a gas cylinder 19 is formed which is connected by ducts 20 and 21 with the bores of the barrels. The cylinder is closed at its forward end by a threaded plug 22 which is bored out to receive a screw 23 which is threaded into and holds in position a neoprene rubber buffer 24 which bears on the ring 25. The gas piston 26 is reciprocally mounted in the cylinder, and has a recess 27 in its head to receive the projecting end of the screw 23 when the piston compresses the buffer.

The tie rods 28 and 29 are threaded into the receiver and these rods are connected to an support a cross-bar 30 which serves as a breech block in which are mounted two electrically operated firing pins F. This cross-bar is held in rigid and precise spaced relation with respect to the receiver by the nuts 31 and 32. A tubular sleeve or tie tube 33 is in threaded connection at its forward end with the receiver and is secured in place by a ring nut 34 threaded onto the opposite end which makes tight engagement with the cross-bar 30. The tie tube member 33 aids in securing the cross-bar 30 to the receiver and has a surrounding bearing sleeve or bushing 35 over which are rotatably mounted a cartridge feed sprocket 36 and a rotary chamber member 37 which are connected together by a slip joint having a plurality of lugs 38 on the chamber member which are inserted into slots 39 on the feed sprocket 36. These two members are accordingly rotatable on the bushing 35 as a unitary member.

The rotary chamber member 37 has eight chambers C for the insertion of the bullets and the forward ends of the cases as shown in Fig. 3. It will be noted that the sleeve 4 of the cartridge is in bearing contact with a shoulder of the chamber. The forward portion of the chambers which surrounds the barrel bore has sealing sleeves S with gas rings S', which sleeves are held against the faces of the barrels during firing to prevent a loss of pressure (Fig. 10).

Within the tie tube 33 and the cylindrical bore 40 of the receiver which are in longitudinal axial alignment is mounted a push rod 41 which is attached by a screw 42 to the slide 43. The slide is reciprocably mounted on the receiver and will be described more fully hereinafter. Rod 41 is preferably hollow having a necked rearward end to which is attached a roll 44 rotatable on a transverse axis (Fig. 7). The rod is slidably mounted inside the tubular shaft 45 which has a helical cam path 46 in which the roll 44 travels to rotate the securely connected cam drum 47. The arrangement of these elements is best shown in Fig. 7. A return spring 48 preferably in the form of a multi-strand cable, is mounted inside the tube 33, surrounds the shafts 41 and 45 and bears against the central hub 49 of the slide. In its operative position, prior to firing, this hub is held in contact with the flat face of the cylinder 19 and, as shown in Fig. 3, the rearward end of the gas piston 26 is in abutting contact with this hub of the slide.

The feed sprocket 36 contains eight arcuate pockets P for receiving and holding in position the cartridges during the firing cycle. The chamber member 37 also has eight bullet chambers C which are in line with the pockets. As best shown in Fig. 8, the chamber member has eight index rolls R located in radial alignment with the bullet chambers which are freely rotatable on bearing extensions 50 of the chamber member and are held in position by snap rings 51.

It will be noted with reference to Figs. 7 and 8 that the slide includes two diametrically opposite cam arms 53 and 54 which are slidable in recesses 55 and 56 in the receiver (Figs. 8 and 9). These cam arms 53 and 54 are partially supported in position by cam plates 57 and 58 which are mounted in fixed positions on the sides of the receiver by screws 59.

The principal function of the slide is to turn the rotary chamber member, feed sprocket and drum cam in small increments each time the gun is fired and this is done by cam means later to be described which are associated with rod 41 and the cam arms 53 and 54. It is necessary only to provide one of these cam arms for the operation of the chamber member, but for the purpose of achieving proper balance the slide is made symmetrical and to this end includes the two identical cam arms 53 and 54 each having identical cam means. To simplify this description, only one of these arms and cam members will be described. As best shown in Figs. 7 to 11, the inner faces of the cam arms have attached and spaced apart cam members 62 and 63 and a bar 64 to which is pivotally attached a rocking cam leaf 65. As best shown in Fig. 9 the cam leaf has a narrow extension 66 which slides under recesses 67 and 68 in the cam members 62 and 63. As best shown in Figs. 7, 10 and 11 the cam leaf has a cylindrical projection 69 which extends through a window 70 in the cam arms and makes engagement with the cam race 71 on the inside of the plates 57 and 58. A small guide plunger 72 is mounted in and extends from the projection 69 and is held in its extended position by a spring 73 which is mounted in a recess 74 in the cam leaf and held in position by the screw plug 75 as best shown in Fig. 11. As shown in Fig. 7 the projection 69 and guide plunger 72 project through the window 70 into plate 57 and extend into the cam race 71.

As shown in Figs. 8, 9 and 10 the cam members 62 and 63 of each cam arm straddle one of the rolls R during part of the cycle and as the slide is driven rearward by the gas piston these cam members turn the chamber member one-half position during each stroke and the other one-half position during the return stroke as will be described more fully hereinafter.

It will be seen with reference to Fig. 7 that the push rod 41 is telescopically slidable within the hollow shaft 45 and that the roller 44 travels in the cam path 46 to turn the drum cam 47. As shown in Fig. 3 this drum is held in a freely rotatable position on the tie tube 33 but is prevented from longitudinal motion by the bayonet connection 80. The drum has four oppositely disposed helical cam slots 81, 82, 83 and 84.

On two opposite sides of the cross-bar 30 are securely mounted guide frames 85 and 86 which are held in position by the screws S. Each of these frames includes two channeled housings 87 and 88 in which are mounted rear rammers 89 and 90 and two channeled housings 91 and 92 in which are mounted front rammers 93 and 94. There is one pair of identical rear rammers 89 and 90, one mounted on each side of the drum cam, and one pair of identical front rammers 93 and 94, one mounted on each side of the drum cam. The rammers 89 and 90 are mounted on the opposite ends of rod 95 while the rammers 93 and 94 are mounted on the opposite ends of rod 96. As best shown in Figs. 1, 4, 5 and 6 these rods 95 and 96 extend completely through the cam drum and have cam follower rollers 97 and 98, and 99 and 100, respectively, which travel in the cam races 81 and 84, and 82 and 83, respectively. In other words, the rod 95 with its rollers 97 and 98 is operatively connected to the cam races 81 and 84 while the rod 96 with its rollers 99 and 100 is operatively connected to the cam races 82 and 83. When the drum cam is oscillated by the travel of the roll 44 in the cam path 46 the cam races move the rods 95 and 96 backwards and forwards and in that way impart reciprocal motion to the rammers 89 and 90, and 93 and 94. The rear rammers 89 and 90 are the first to make contact with the cartridges and give them their initial push forward, and then the front rammers 93 and 94 engage the cartridges and push them into final position.

The rammers and the housings in which they operate are functionally identical and the detailed description of but housing 91 and rammer 93 will suffice. The housing 91 is pressed out of the frame 85 and the forward part is open having upright sides of the tops of which form tracks 101 and 102 with cam surfaces 103 and 104. A cover

105 is mounted over the tracks, the forward end of which has a hood 106 and the rearward part a hood 107.

The rammers are mounted on the rods 95 and 96 over the rolls 97—100 and are held in position by suitable nuts N. The rammer comprises a part 108 which is secured at one end to the rod 96 and an arm 109 pivotally connected to part 108 by a pin 109'. The arm 109 is normally held in a counterclockwise position as viewed in Fig. 6 by the spring 110. The free or lift end of the arm of the rammer has a pair of rolls 111 and 112 which are held in pressed contact with the cam tracks 101 and 102 by the spring 110, a ramming nose 113 which engages the cartridge base and a hook 114 for engaging the rim of the cartridge.

The guide frames 85 and 86 include cartridge entrance ports within the guide flanges 115 and 116 on diametrically opposite sides, and cartridge exit ports within the guide flanges 117 and 118 on diametrically opposite sides.

It will be noted with reference to Fig. 3 that the forward ends of the cartridge cases enter the chambers a short distance, about one-quarter inch in the case of a 30 mm. caliber cartridge. In order to remove the empty cases an extractor device is included as best shown in Figs. 1 and 2. A lever 120 is pivotally connected by the pin 121 to the gas cylinder housing 14. One end of this lever carries an adjustable screw 122 which is set to be struck by a boss 123 on the end of the slide 43 on its return stroke. The opposite end of the lever is pivotally connected to a push rod 124 mounted in lugs 125 on the side of the receiver. The rod has a stop collar 126 against which the spring 127 presses to hold the rod normally to the left as viewed in Figs. 1 and 2 and out of contact with the face of the chamber member 37. As best shown in Fig. 2, each chamber C has an abutting slidable ejector rod. One end of the rod terminates in a flat head 129 movable with the rod a short distance in a recess 130. The opposite end of the rod has a lateral foot 131 movable in a slot 132. When a cartridge is in the chamber the foot bears against the end, and after firing, when the slide returns forward, the boss 123 strikes the screw 122 carried by the lever 120. The lever 120 rotates and drives the rod 124 rearward striking the head 129 which imparts a sharp blow to the empty case and pushes it out of the chamber.

The rifle of the invention is operated in the following manner:

The chambered cartridges are supported in the metal links L of the feed belts of a well known type, and two of these belts B and B' are fed into the feed sprocket 36 as shown in Figs. 1, 4, 12 and 13. The belts with their contained cartridges enter the ports or open mouths of the guide flanges 115 and 116 and the cartridges initially take positions in the pockets P of the feed wheel as shown in Figs. 3 and 13. Assume that there are two cartridges as shown in Fig. 12 in the chamber member as shown in broken lines in Fig. 3 and that they are then fired simultaneously by igniting the primers with the electrically operated firing pins F. When the bullets clear the gas ports 20 and 21, the gas enters the cylinder 19 and drives the piston 26 rearward causing it to strike the hub 49 of the slide 43 with a sharp hard blow. Thus, the slide together with attached cam means 62, 63, 64 and 65 and the attached push rod 41 travel rearward under kinetic energy compressing the return spring 48.

One of the rolls R on opposite sides of the chamber member are guided between the cam blocks 62 and 63 as shown in Figs. 8, 9 and 10. The rearward movement of the slide gives the relative effect of the roll R traveling in the path of the arrows in Fig. 9. As the roll passes out of the upper curved part of the cam race (on the left as viewed in Fig. 9) between members 62 and 64 the chamber member is turned clockwise as seen in Fig. 8

one-half of its firing position. As one roll is moving out of the race on the left of the rocking cam 65 the adjacent roll is entering the cam race on the right side of the rocking cam (Fig. 9). Meanwhile the projection 69 and the spring pressed plunger 72 on the rocking cam are traveling in the closed cam race 71 of plates 57 which are attached in a fixed position on the receiver. On the rearward stroke of the slide projection 69 and plunger 72 travel in the long left side of the race and as shown in the broken lines of Fig. 10, the bottom of this race is sloped so that by the time the slide reaches the end of its stroke, and is ready to return, the plunger 72 is fully compressed back into projection 69. At the point 71' the cam race is cut abruptly to its maximum depth as at the top and the plunger snaps out to the position shown in full lines in Fig. 10. This prevents the member 69 from reversing and traveling back along the same path. It can only take the path upward on the right as viewed in Fig. 7. This cam action causes the member 69 to turn the rocking cam 65 on its pivot 65' from its position on the right as viewed in Fig. 9, to the opposite side of the cam race between members 62 and 63. As the slide returns to its forward position under the pressure of spring 48, the roll R entering the cam race at the upper right (Fig. 9) (this motion gives roll R the relative effect of moving down), the chamber member is turned the other one-half of its firing position. When the slide reaches the end of its return stroke as shown in Fig. 9, the roll R assumes the position shown in full lines at the foot and on the next rearward stroke the rocking cam is thrown to the right as shown and the roll is pushed out of the cam exit on the left, completing a firing cycle.

The rearward travel of the slide transfers its kinetic energy into chamber member rotating kinetic energy. At that time, the chamber member, due to the energy stored in it, acts as a fly wheel. Due to the switched position of the rocking cam and, therefore, the change in the cam race for the roll R, the chamber member pushes the slide forward into firing position, at the same time decelerating its own rotary motion.

This increment of rotation has also turned the connected feed sprocket one position to position two cartridges, one on each belt, in front of the chambers which are coincident with the barrel bores. While the aforementioned action is taking place, the rod 41 is traveling into shaft 45 and the roller 44 is traveling in the cam path 46 imparting an oscillatory movement to the drum cam 47. As the drum cam turns on the rearward stroke of the slide, the rod 95 which is in cam slots 81 and 84, is pushed forward carrying its attached rammers 89 and 90 with it which are the so-called rear rammers. At the same time, the rod 96 which is in cam slots 82 and 83 is pushed rearward carrying with it the connected rammers 93 and 94 which have been called the front rammers. The two rear rammers initially engage a cartridge (in the *a* position, Fig. 12) in each belt on opposite sides of the feed sprocket and push them part way towards their chambers C while still retained on the belts and in the pockets P (to the position *b*, Fig. 12).

The rammers are each constructed in the same manner and operate in about the same way. This operation will be described with reference to Figs. 5, 6, 12 and 13 and rammer 93. It will be noted that when the rammer 89 is sufficiently rearward that the rolls 111 and 112 are under the raised hood 107 of the housing, that the arm 109 is held down by the spring 110. When the rammer contacts a cartridge at this position (*a* Fig. 12) and before the rammer moves forward appreciably the beveled front face of the arm contacts a cartridge rim raising the arm 109 until hook 114 snaps into the groove of the cartridge base. The cartridges are, accordingly, engaged against the base by the nose 113 and by the hook 114. The cartridges are moved forward very rapidly and must be decelerated so that they will stop in the proper place to be engaged by the front rammers (position *b*, Fig. 12).

The hooks hold the cartridges until about the time they are stopped and are released when the rolls 111 and 112 ride up on the tracks 101 and 102, releasing the hooks from the rims of the cartridges.

The pushing operation of the rear rammers is completed by the time the slide reaches the rearward end of its stroke. At the same time the rod 96 and its attached rammers 93 and 94 are moving rearward. The rear rammers are free to return to their rearward position when the slide reaches the end of the rearward travel. When the slide is returned by the spring 48 to its forward position at the time of firing as shown in Fig. 3, the roll 44 of rod 41 turns the shaft 45 and the drum cam 47 in the opposite direction. This turning movement moves the rod 95 and the rear rammers 89 and 90 rearward and at the same time the rod 96 and the rammers 93 and 94 are moved forward by the action of the rolls 99 and 100 in their cam slots 82 and 83. The rammers 93 and 94 engage the cartridge bases (position *b*, Fig. 12) in exactly the same manner as shown and described with reference to Figs. 5 and 6. The only difference between the action of the rear and front rammers is that the front rammers engage the cartridges in a more forward position. The squence of cartridge engagement by the rammers and their movement while passing over the feed sprocket, insertion into the chambers, ejection of the empty cases and removal of the belts with empty cases is illustrated in Figs. 12 and 13.

While the chamber member and feed sprocket are turning the two cartridges are being pushed forward by rammers 93 and 94 to force the bullets into the chambers C as shown in Fig. 3 with the sealing collar 6 in contact with the sleeve S (Fig. 10). Meanwhile the two cartridges are turning into contact with the cross-bar 30 which serves as a breech block. The faces which are engaged by the cartridge bases are slightly inclined so that the cartridges are pushed slightly forward by this rotation to force the sealing sleeves 4 into tight contact with the sleeves S. At the instant when the slide reaches its forward position as shown in Fig. 3, all motion has ceased. At this time the firing pins are actuated electrically and both cartridges are ignited. When the bullets pass beyond the ports 20 and 21, the high pressure gas enters the cylinder 19 and the piston 26 is driven violently rearward in repetition of the firing cycle.

As the slide 43 moves forward, the boss 123 strikes the screw 122 on the lever 120 and the rod 124 strikes the head 129 on the ejector 131. The lateral end 132 strikes the case of the cartridge and pushes it rearward out of its chamber. The case is moved from the position *c* to the position *d* (Fig. 12) but is still retained on the belt. The empty cases and their connected belts B and B' leave the sprocket 36 and pass out of the rifle through the ports 117 and 118.

I claim:

1. An automatic rifle which comprises a receiver to which two barrels are attached, a rotary feed sprocket having a plurality of cartridge pockets mounted on the receiver, said pockets being disposed in circumferential array around the periphery of the sprocket and being operative to receive cartridge cases, means for feeding two belts of cartridges to the feed sprocket simultaneously, each belt being supplied with cartridges which enter the pockets on opposite sides of the feed sprocket, a gas operated piston mounted in the receiver, means for directing gas from the barrels to the gas piston, a rotary chamber member having a plurality of bullet chambers in alignment with each pocket and connected to and rotatable with the feed sprocket, means operatively connecting the gas piston to the feed sprocket, said gas piston and said connecting means being operated each time a cartridge is fired to index the feed sprocket and chamber member to a position in which a bullet chamber of the chamber member is moved into coincidence with each barrel, means connected to and operated by the gas piston to push a cartridge from each belt forward while in its pocket to insert the bullet into the bullet chamber, and means for firing a cartridge in each barrel at the same time.

2. An automatic rifle as in claim 1 wherein the chamber member is formed with recesses contiguous with the bullet chambers in which the forward ends of the cartridge cases are inserted for firing, said recesses having surfaces operative to engage sealing means on the cases, and means connected to and operated by the gas piston for ejecting the empty cartridge cases from the chamber member.

3. An automatic rifle as in claim 1 which comprises two pairs of rammers with means operatively connecting them to the gas piston, each pair of rammers being operative to engage and to push a cartridge forward while in its pocket to insert the bullet and the forward end of the cartridge case into the bullet chamber.

4. An automatic rifle as in claim 3, which comprises a drum cam for operating the rammers, and cam means operated by the gas piston for operating the drum cam.

5. An automatic rifle which comprises two barrels, a rotatable feed sprocket having peripheral cartridge pockets and a chamber member having chambers for the bullet end of cartridges, means for feeding two belts of cartridges to the feed sprocket, means operatively connected to the feed sprocket and chamber member to turn them sufficiently to bring a chamber of the chamber member into alignment with each barrel each time a cartridge is fired, and means for pushing a cartridge while in each pocket into a chamber of the chamber member, means for ejecting spent cartridges from the chamber member, and means for firing a cartridge individual to each barrel simultaneously, said cartridges including spent cartridges being retained on their belts during the operation of the rifle.

6. An automatic rifle which comprises a receiver to which two barrels are connected, a chamber member and connected feed sprocket mounted on the receiver, a gas piston operable in the receiver, a slide reciprocably mounted on the receiver and in operative connection with the gas piston, cam means on the slide, the chamber member having a plurality of bullet chambers in longitudinal alignment with a plurality of exterior open cartridge pockets on the feed sprocket, a plurality of index rolls, one for each bullet chamber, on the chamber member which are operatively connected to the cam means, whereby the travel of the slide turns the chamber member one cartridge position each time the rifle is fired, cartridge rammers operable in the pockets of the feed sprocket to push the cartridges into the bullet chambers while retained on their belts, other cam means in operative connection with the gas piston to operate the rammers, means for firing a cartridge for each barrel simultaneously and while in its pocket, an means operated by the gas piston to eject the cartridge cases from the chambers.

7. An automatic rifle according to claim 6 which comprises a cross-bar rigidly secured to the receiver against which the bases of the cartridges are held during firing, and firing pins in the cross-bar.

8. An automatic rifle which comprises a receiver, two barrels attached to the receiver, a rotatable cartridge feed sprocket in the receiver for feeding two belts of cartridges through the receiver, exterior open pockets on the sprocket in which the cartridges remain during firing, chamber means for receiving the bullets of two cartridges and moving them into coincident alignment with the two barrels for simultaneous firing, gas operated means for indexing the feed sprocket and chamber means in step-by-step fashion from firing position to firing position and rammers for pushing two cartridges at a time from their initial postions in the pockets on the feed sprocket forward to insert the bullets and forward parts of the cartridge cases into the chamber member, a rearward

cross-bar securely held to the receiver against which the bases of the cartridges are held when in firing position, and means for firing both barrels simultaneously.

9. An automatic rifle according to claim 8 which comprises a single gas piston for operating the feed sprocket, and means for supplying gas from each barrel to operate the piston.

10. An automatic rifle according to claim 8 which comprises two pairs of cartridge rammers operated by the gas operated means in synchronism with the turning of the feed sprocket.

11. An automatic rifle according to claim 8 which comprises a slide operated by the gas piston, a push rod connected to the slide having cam means thereon, a shaft having cam means in operative connection with the cam means of the push rod, a drum cam connected to the shaft which is oscillated by the rearward and forward travel of the push rod, and cam means on the

drum cam connected to the rammers, whereby the travel of the slide imparts reciprocable motion to the rammers.

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