

March 8, 1938.

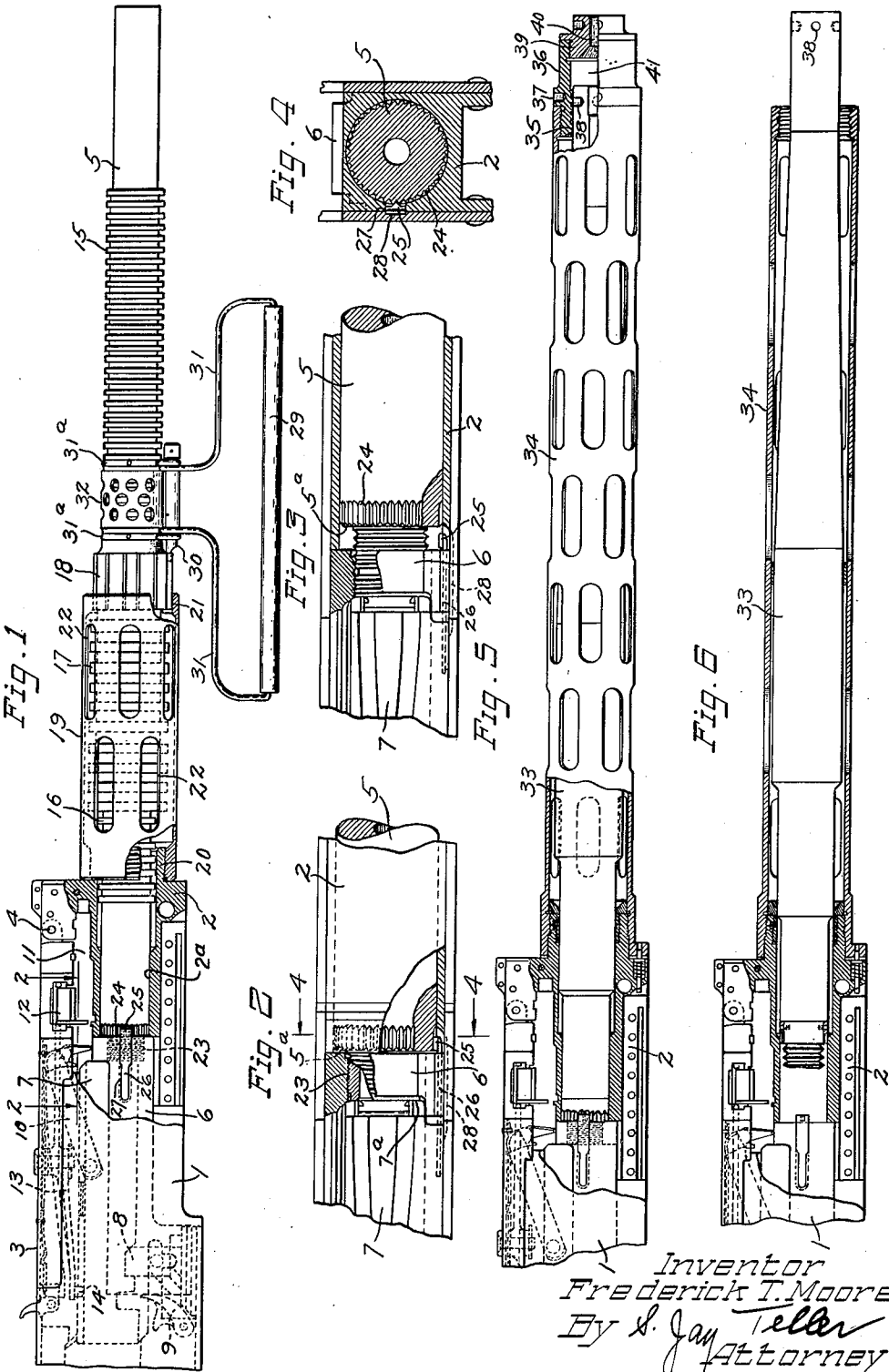
F. T. MOORE

2,110,165

MACHINE GUN

Filed Nov. 18, 1935

2 Sheets-Sheet 1



Inventor
Frederick T. Moore
By S. Jay Teller
Attorney

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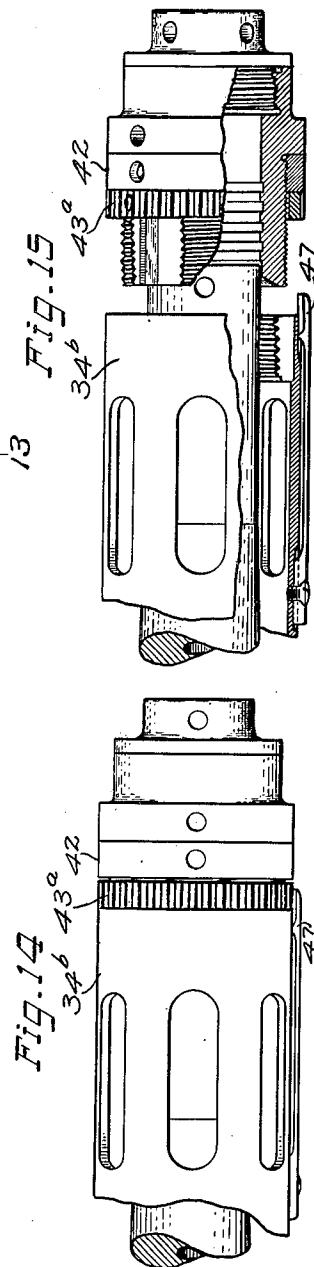
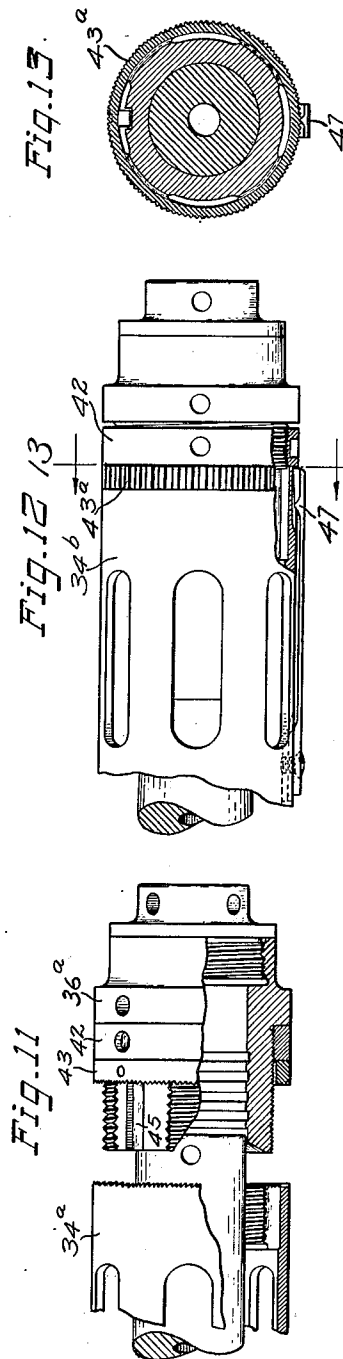
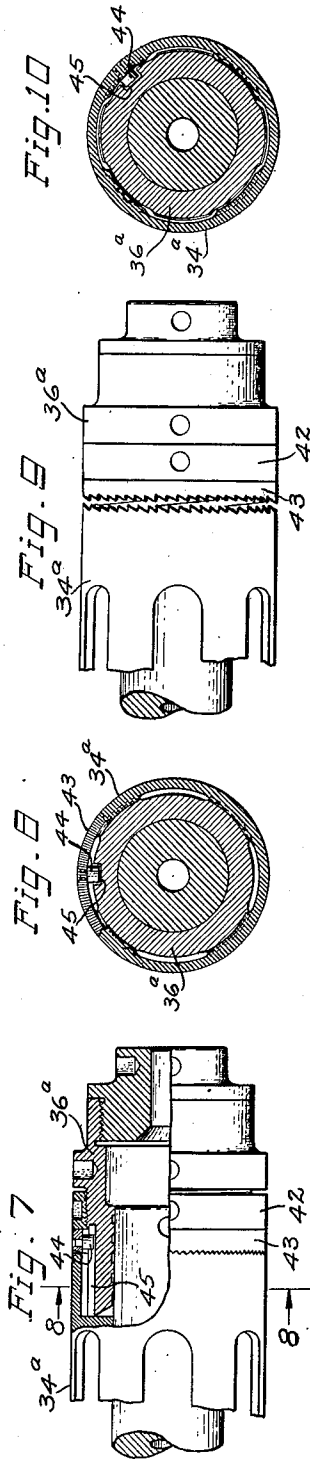
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2 Sheets-Sheet 2



Inventor
Frederick T. Moore
By S. Jay Teller
Attorney

UNITED STATES PATENT OFFICE

2,110,165

MACHINE GUN

Frederick T. Moore, West Hartford, Conn., assignor to Colt's Patent Fire Arms Manufacturing Co., Hartford, Conn., a corporation of Connecticut

Application November 18, 1935, Serial No. 50,387

17 Claims. (Cl. 42—75)

The invention relates to a machine gun, particularly to air-cooled machine gun, having a readily detachable barrel. One of the objects of the invention is to provide a machine gun of the reciprocating barrel type, wherein the barrel may be readily put in place or removed from the front of the gun without disturbing or disassembling any other essential gun part. A machine gun embodying the invention has the advantage that the barrel, upon becoming heated during use, may be easily taken out and replaced by another similar barrel with a minimum loss of time, and, in some embodiments it has the further advantage that the barrel may be conveniently removed to facilitate transportation.

A more specific object of the invention is to provide certain novel details of construction whereby the ready detachability of the barrel is attained.

A further object of the invention is to provide a gun of the type referred to having a barrel jacket or guide and having a barrel guiding bearing on the guide which is readily detachable to permit forward removal of the barrel. There may also be provided in association with the bearing a means forming a gas chamber at the front of the barrel for augmenting the recoil action of the barrel.

A still further object of the invention is to provide certain novel details of construction which make possible the ready detachability of the barrel bearing from the jacket.

Other objects of the invention will be apparent from the following specification and claims.

This application constitutes a continuation-in-part of my copending application for Machine gun, Serial No. 638,632, filed October 19, 1932.

In the accompanying drawings I have shown two principal embodiments of the invention and also certain alternative details, but it will be understood that the drawings are intended for illustrative purposes only and are not to be construed as defining or limiting the scope of the invention, the claims forming a part of this specification being relied upon for that purpose.

Of the drawings:

Fig. 1 is a fragmentary side view showing the front portion of a machine gun embodying my invention.

Fig. 2 is an enlarged fragmentary plan view showing parts of the barrel, barrel extension and breech bolt, this view being partly in section along the line 2—2 of Fig. 1.

Fig. 3 is a fragmentary view similar to Fig. 2

but showing the barrel partly unscrewed from the barrel extension.

Fig. 4 is a fragmentary transverse sectional view taken along the line 4—4 of Fig. 2.

Fig. 5 is a fragmentary side view somewhat similar to Fig. 1 but showing an alternative embodiment of the invention.

Fig. 6 is a fragmentary view similar to Fig. 5 but omitting the barrel guiding bearing and showing the barrel partly removed. In this view the jacket is shown in section.

Fig. 7 is an enlarged fragmentary view showing an alternative barrel guiding bearing and the parts associated therewith.

Fig. 8 is a transverse sectional view taken along the line 8—8 of Fig. 7.

Fig. 9 is a view similar to Fig. 7 but showing the lock nut and the lock ring in their forward positions.

Fig. 10 is a view similar to Fig. 8 but showing the parts in the relative positions which they occupy prior to disassembly.

Fig. 11 is a view similar to Figs. 7 and 9 but showing the bearing sleeve and associated parts removed from the barrel jacket.

Fig. 12 is a view similar to Fig. 7 but showing another alternative embodiment of the invention.

Fig. 13 is a transverse sectional view taken along the line 13—13 of Fig. 12.

Fig. 14 is a view similar to Fig. 12 but showing the lock nut in its forward position.

Fig. 15 is a view similar to Figs. 12 and 14 but showing the bearing sleeve and associated parts removed from the barrel jacket.

While not so limited, the invention is well adapted for use with a machine gun of the type disclosed in the Browning Pat. No. 1,293,021, dated February 4, 1919. Reference may be had to the said patent for details of mechanism not herein fully disclosed.

Referring particularly to Fig. 1 of the drawings, 1 represents the breech casing of the gun and 2 the trunnion block constituting the forward end of the casing. The said trunnion block is formed with an opening for receiving the barrel of the gun, and the walls 2^a of the said opening constitute a bearing at the front of the casing for engaging a corresponding bearing surface of the barrel near the rear end thereof. The breech casing is provided with a cover 3 hinged at 4 to the trunnion block. Projecting from the casing at the front is a barrel 5 which, upon recoil, is movable rearward to a limited extent. Connected with the barrel at the rear end thereof and located within the casing is a bodily movable bar-

rel extension 6. It will be understood that the barrel and extension are both longitudinally reciprocable in unison during normal operation of the gun.

5 Mounted on the barrel extension for longitudinal movement independently thereof is a breech bolt 7. The breech bolt is normally held in fixed relationship with the barrel extension by means of the lock 8. Upon recoil, the barrel extension 10 6 moves rearward, carrying the breech bolt with it. The lock 8 is automatically withdrawn and thereafter the action of the barrel extension on the pivoted accelerator 9 serves to move the breech bolt rearward independently against the 15 resistance of a reaction spring which is not shown. This reaction spring serves to immediately return the breech bolt to its normal relationship with the barrel extension, whereupon it is again locked.

Carried by the breech bolt 7 is a pivoted extractor 10 which serves during rearward movement of the breech bolt to extract a cartridge from a cartridge belt positioned in the transverse feed channel 11. As the bolt moves rearward and again moves forward, the cartridge is transferred downward into alignment with the chamber of the barrel and is pushed into the chamber as the breech bolt reaches its normal forward position. The extractor is automatically returned to its elevated position so as to engage another cartridge in the feed belt.

The feed belt is successively fed forward so that the cartridges thereof may be engaged by the extractor 10, such feeding being effected by the transversely movable feed slide 12. This feed 35 slide is reciprocated by means of a feed lever 13 pivoted to the top cover of the casing and oscillated by means of a stud 14 which fits within a cam groove (not shown) in the top surface of the breech bolt.

As already stated, the gun is preferably air-cooled. In order to provide a relatively large body of metal for the absorption of heat the barrel is made relatively heavy, and in order that the heat may be rapidly dissipated, the barrel may be provided with a plurality of cooling ribs. As shown, 45 there is a series of circumferentially extending ribs 15 on the front portion of the barrel and a series of similar ribs 16 near the rear portion of the barrel. Between the said ribs 15 and 16 the barrel is enlarged, the enlarged portion being provided with a series of circumferentially extending ribs 17 and a series of longitudinally extending ribs 18.

For supporting and guiding the barrel there is provided a barrel guide in the form of a jacket 19 projecting forward from the casing and surrounding the barrel. Preferably the trunnion block 2 is provided with a forward projecting threaded flange 20 and the jacket 19 is provided with internal threads adapted to be screwed onto the threaded flange 20. The guide or jacket 19 is provided adjacent its forward end with a bearing 21 and the barrel is provided with a bearing surface spaced longitudinally forward from the aforesaid rear bearing surface thereof at 2^a and adapted to engage the bearing 21 on the jacket 19. As shown the bearing 21 is formed integrally with the guide or jacket 19, but this is not essential. Preferably the outer faces of the before-mentioned longitudinally extending ribs 18 70 are so positioned and are of such size that their outer surfaces engage the said bearing surface 21. The jacket 19 is provided with a plurality of openings 22, 22 which permit air to freely circulate through the interior of the sleeve and to contact

with the cooling ribs 18. By reason of the construction described the guide 19 and its bearing 21 serve to guide and support the barrel without, however, seriously reducing the cooling effect of the several series of ribs on the barrel. The ribs 5 18 are partly exposed when the barrel is in its normal forward position and even when the barrel moves rearward there is still opportunity for air to circulate through the spaces or grooves between the ribs 18. Inasmuch as the ribs 18 extend longitudinally wear on the bearing surface 21 is reduced to a minimum.

The barrel 5 may be put in place or removed from the front without disturbing any other parts of the gun mechanism. To this end the barrel 15 has an engagement with the barrel extension 6 which permits engagement and disengagement by rotative movement of the barrel. Preferably the extension has a threaded barrel receiving opening and the barrel has threads 23 at its rear portion adapting it to be screwed into the opening in the extension. The bearings 2^a and 21 not only permit the normal reciprocating movements of the barrel, but they also permit the rotative movements that are necessary to connect the barrel 25 with or disconnect it from the barrel extension. The said bearings are also constructed and arranged to permit the barrel to be inserted into or removed from the gun at the front thereof. With respect to the front bearing carried by the guide 30 I do not limit myself, but as shown in Fig. 1 the integral bearing 21 and the corresponding bearing surface on the barrel have a diameter at least equal to that of any portion of the barrel behind the said bearing surfaces. The barrel can, therefore, be inserted or removed through the bearing 21 with the guide and bearing both in place.

A portion of the barrel is adapted for engagement by a wrench or other suitable tool to effect rotation thereof so as to connect it with or disconnect it from the barrel extension. Inasmuch as the barrel is removable from the front of the gun, the said portion adapted to be engaged to effect rotation is so related to the said guide as to be accessible with the guide in place. In the construction shown in Fig. 1, the ribs 18, with the longitudinal grooves between them, constitute the portion of the barrel adapted to be engaged to effect rotation.

In order that the barrel may be firmly held in place, there is provided a means for resisting the rotation thereof, which means is additional to the means, such as the threads, which connect the barrel and the extension. The means for resisting rotation is so constructed that rotation may be permitted when desired while the barrel and extension are in place in the casing. Preferably and as shown, the barrel has a shoulder 5^a adjacent the threads and is provided with an annular or peripheral series of notches 24. There is provided a latch 25 adapted to enter any one of the notches 24 to thus hold the barrel in its adjusted position. Preferably the notches 24 are V-shaped and the latch 25 is spring-pressed and is radially movable so as to automatically move into and out of the notches 24 successively as the barrel is rotated.

The latch 25 is preferably in the form of a tooth at the forward end of a spring member 26. This spring member is seated in a longitudinal slot 27 70 formed in one side of the barrel extension 6. The rear portion of this slot is shaped to fit and hold the rear portion of the spring 26, leaving the forward portion free to flex so that the tooth or latch 25 may enter the notches 24 as described. 75

In order to permit the spring 26 to freely flex when the barrel extension is in place in the casing, the adjacent side wall of the casing may be provided, if necessary, with a recess or notch 28.

5 Preferably the front portion of the latch and the rearward facing shoulder of the barrel adjacent the notches are relatively beveled so that the latch is forced laterally when first engaged by the barrel.

10 As clearly shown in Fig. 2, the construction is such that the barrel can be moved rearward so that its rear face engages the front of the breech bolt at 7^a, the shoulder 5^a on the barrel remaining out of engagement with the barrel extension. In this way it is possible to readily obtain the proper relationship between the barrel and the bolt. It will be obvious that if the adjusted position of the barrel were determined otherwise, as for instance by a seating of the barrel directly upon the barrel extension, any inaccuracies in the parts resulting from errors of manufacture or resulting from wear, would cause an improper relationship between the barrel and the breech bolt, thus leaving an abnormally large space into which the head of the cartridge would be expanded during firing; or the barrel and breech bolt might be too firmly engaged so as to interfere with the free action of the lock for the bolt. From the foregoing description it will be apparent that the barrel may be connected with or detached from the barrel extension by simply screwing it into or out of position. When the barrel is being attached it is turned until the rear portion thereof engages the front of the breech bolt at 7^a. As already stated, the latch 25 successively enters the notches 24 and when the final position of the barrel is reached the tooth 25 remains in one of the notches to hold the barrel against further movement. While the barrel is effectively held by the tooth 25 the resilient mounting of the tooth and the inclined or beveled faces of the notches permit the barrel to be unscrewed and removed at any time without giving any attention to the latch.

45 To facilitate the turning or rotating of the barrel to screw it into or out of place and preferably to also facilitate the handling or carrying of the barrel I provide the attachment which will now be described. The said attachment is used in cooperation with the aforesaid rotation effecting means at 18. The attachment preferably comprises a handle 29 which is adapted to be effectively connected with the barrel and which also comprises a finger or latch 30 adapted to engage the barrel in such a way that the handle may be used for turning the barrel. When it is desired to remove the barrel, as for instance at the conclusion of firing, the attachment may be utilized as a means for turning the barrel to unscrew it, thus enabling the operator to avoid direct contact with the barrel itself which may be very hot. When the barrel has been turned sufficiently to completely disengage it from the barrel extension the attachment may be utilized for carrying the barrel.

70 The details of construction of the device for turning the barrel may be widely varied, but as shown the handle proper is carried by wire elements 31, 31, the inner ends of which are bent at 31^a, 31^a so as to be seated in grooves between the annular ribs 15. Positioned between the wire elements 31^a, 31^a is a sleeve 32 which surrounds the barrel and which carries the before-mentioned longitudinally movable latch 30. This latch, when in the position shown, is engaged

between two of the longitudinal grooves 18 and thus serves to connect the handle with the barrel so that the former may rotate the latter. The latch 30 may be withdrawn in the forward direction so as to permit the handle to turn independently of the barrel. It will be apparent that with the latch 30 engaged with the barrel, as shown, the handle may be utilized as a means for rotating the barrel to screw it into or out of engagement with the barrel extension.

The construction shown in Figs. 5 and 6 is or may be the same as that shown in Figs. 1 to 4 so far as concerns the gun mechanism proper and so far as concerns the means for attaching the barrel to the barrel extension. The barrel 33 however, instead of being provided with a large number of cooling ribs, as shown in Fig. 1, has a smooth unbroken surface, dependence for avoidance of excessive heating being placed upon the relatively large mass of the barrel.

20 Instead of providing a relatively short barrel jacket or guide such as the guide 19 shown in Fig. 1, there is provided a longer jacket or guide 34 which extends nearly to the forward end of the barrel. The barrel has a diameter at its front end portion which is smaller than its maximum diameter, and a bearing 35 is provided which engages this front end portion of the barrel and is detachably connected with the front end of the jacket or guide, as shown in Fig. 5. The barrel 30 guiding bearing 35 is formed as a part of a bearing sleeve 36, the said sleeve having external threads which engage internal threads in the jacket. The sleeve is provided at 37 with holes for a spanner wrench so that the sleeve may be readily attached to or detached from the jacket. At the front of the barrel is a means for effecting barrel rotation, this means being in front of the front end of the jacket or guide 34 and being therefore accessible with the guide in place. As shown the said means comprises radial holes 38. When the sleeve 36 has been removed, as indicated in Fig. 6, the front end portion of the barrel 33 is exposed, and by means of a spanner wrench engaging the holes 38 the said barrel 45 may be turned and thus unscrewed from the barrel extension in the manner already described in connection with Figs. 1 to 4.

50 As already explained, the barrel 33 is relatively heavy, its large mass being relied upon to avoid too rapid heating. A heavy barrel such as shown has the advantage that it heats less rapidly, but it has the disadvantage that it recoils more sluggishly and thus tends to cause the mechanism of the gun to operate more slowly than it otherwise would. In order to obtain the advantages of the heavy barrel and to avoid the ordinary disadvantages thereof, I preferably provide means at the front of the barrel for providing a chamber which will receive the gases of explosion and cause them to react upon the barrel to expedite the recoil thereof. As shown, the sleeve 36 is extended forward and carries at the front a plug which is apertured at 40 in alignment with the bore of the barrel to permit the passage of the bullet. The plug 39 preferably has threaded engagement with the sleeve, as shown. From an inspection of Fig. 5 it will be apparent that there is provided a gas chamber 41 into which the gases of explosion will expand immediately upon the escape of the bullet from the barrel. The expanding gases in the chamber 41 react upon the front surface of the barrel, tending to push the barrel rearward and thus expedite the rate of recoil thereof.

Inasmuch as the sleeve 36 and the plug 39 which form the gas chamber 41 are detachably connected with the jacket 34 they do not interfere with the ready removal of the barrel from the gun in the forward direction. Notwithstanding its large mass, the barrel 33 may become heated to such an extent that it is desirable to remove it and replace it by a cool barrel. This can be readily done by first removing the sleeve 36 with its associated parts and then unscrewing the barrel from the barrel extension by means of a spanner wrench. A substitute cool barrel can be put in place in the manner already described and then the sleeve 36 with its associated parts can be replaced and attached to the jacket.

In order to still further facilitate the removal and replacement of the barrel, it may be preferable to provide special means permitting the quick detachment and attachment of the bearing sleeve. One such construction is shown in Figs. 7 to 11. As shown, the jacket 34^a is provided with interrupted threads, and the bearing sleeve 36^a is similarly provided with interrupted threads. When the bearing sleeve is in place the threads are engaged, as clearly shown in Fig. 8. In order that the sleeve 36^a may be prevented from unintended turning by reason of vibration or otherwise, I provide a lock nut 42 and a lock ring 43. The lock nut 42 is engaged with the threads on the bearing sleeve and the adjacent lock ring 43 is freely movable longitudinally with respect to the sleeve but is held against relative rotation by means of a stud 44 which engages a longitudinal groove 45 in the sleeve. Interengaging means are provided on the jacket 34^a and on the lock ring 43 for preventing relative rotation of the latter and as shown, the interengaging means comprise an annular series of serrations on the front of the jacket and a similar annular series of serrations on the rear of the ring. With the serrations interengaged, as shown in Fig. 7, and with the lock ring 43 pressed rearward by the lock nut 42, as shown in the same figure, it will be evident that the sleeve 36^a is positively held against rotation.

In order to remove the sleeve 36^a, the lock nut 42 is turned by means of a spanner wrench or otherwise to the forward position shown in Fig. 9, and the lock ring 43 is also moved forward so as to disengage the serrations thereof from the serrations on the jacket 34^a. The sleeve can then be given a quarter-turn so as to bring the interrupted threads thereof out of engagement with the interrupted threads of the jacket, as clearly shown in Fig. 10. With the threads thus disengaged, the sleeve and the parts associated therewith can be moved forward and completely disengaged from the jacket, as shown in Fig. 11.

After the barrel has been taken out in the manner already described, and after a substitute cool barrel has been put in place, the sleeve 36^a can be again attached to the jacket by reversing the steps which have been described. After the threaded portion of the sleeve has been inserted in the jacket, the sleeve is turned to bring the interrupted threads again into engagement, as shown in Fig. 8. Then the lock nut 42 is turned sufficiently to force the lock ring 43 rearward and thus engage its serrations with the serrations on the jacket.

The construction shown in Figs. 12 to 15 is very similar to that shown in Figs. 7 to 11. The essential difference is that no interengaging serrations are provided, the engaging surfaces of the jacket 34^b and of the lock ring 43^a being smooth. The said ring is, however, provided with serrations on its outer or peripheral surface, and a

resilient latch 47 is provided on the jacket, which latch is adapted to enter the serrations on the lock ring. The serrations are preferably V-shaped so that when the ring is turned the latch 47 is caused to snap into the successive notches and thus tend to hold the ring in any position of adjustment.

When it is desired to remove the sleeve, the lock nut 42 is turned in the manner already described, being thus moved to its forward position, as shown in Fig. 14. Then the sleeve is given a quarter-turn to disengage the interrupted threads thereof from the interrupted threads of the jacket, it being understood that the lock ring 43^a turns with the sleeve. The sleeve and the associated parts can then be detached as indicated in Fig. 15. The sleeve and associated parts can be again attached by inserting the forward portion of the sleeve in the jacket and giving the sleeve a quarter-turn. The sleeve can be locked by turning the lock nut 42 to move it from the position shown in Fig. 14 to the position shown in Fig. 12.

What I claim is:

1. In a machine gun, the combination of a main casing, a longitudinally reciprocable barrel extension in the casing, a longitudinally reciprocable barrel normally positioned with its rear portion in the casing and having a portion thereof outside of the casing adapted for engagement to effect rotation, the said barrel also having thereon two integral bearing surfaces longitudinally spaced apart, cooperating means on the barrel extension and on the rear portion of the barrel enabling the barrel upon rotative movement thereof to be connected with or disconnected from the extension, a barrel guide secured to the casing at the front thereof, the said guide surrounding the barrel and having its front end so located that the rotation effecting portion of the barrel may be accessible, two barrel guiding bearings one on the casing near the front thereof and the other on the barrel guide near the front thereof which bearings respectively engage the two said bearing surfaces of the barrel to permit normal reciprocating movements, the said bearings being further constructed and arranged to permit rotative barrel movement as aforesaid and also to permit the barrel to be inserted in or removed from the gun at the front of the said barrel guide and with the guide remaining in place, and means normally resisting rotation of the barrel with respect to the barrel extension which means is additional to the connecting means between the extension and barrel and is adapted to permit barrel rotation while the barrel and extension are in place in the casing.

2. In a machine gun, the combination of a main casing, a barrel extension longitudinally reciprocable in the casing and having at the front a threaded barrel receiving opening, a longitudinally reciprocable barrel threaded at its rear portion so as to be adapted to be screwed into or unscrewed from the opening in the extension when the said extension is in its normal position in the casing, the said barrel having a peripheral series of notches adjacent the threads, a barrel guide projecting forward from the casing and having near the front thereof a barrel guiding bearing which permits the barrel to be inserted or removed from the front with the guide remaining in place, and a latch on the barrel extension operable with the extension in its normal position in the casing and adapted to enter any one of the several notches in the barrel to hold the barrel

against relative rotation with respect to the barrel extension.

3. In a machine gun, the combination of a main casing, a longitudinally reciprocable barrel extension in the casing having a threaded barrel receiving opening, a longitudinally reciprocable barrel threaded at its rear portion to engage the threaded portion of the barrel extension and having a peripheral series of V-shaped notches adjacent the threads, the said barrel having a portion thereof outside of the casing adapted for engagement to effect rotative movement so as to screw it into or out of the barrel extension and the said barrel also having thereon two integral bearing surfaces longitudinally spaced apart, a barrel guide secured to the casing at the front thereof, the said guide surrounding the barrel and having its front end so located that the rotation effecting thereof the barrel may be accessible, two barrel guiding bearings one on the casing near the front thereof and the other on the barrel guide near the front thereof which bearings respectively engage the two said bearing surfaces of the barrel to permit normal reciprocating movements, the said bearings being further constructed and arranged to permit rotative barrel movement as aforesaid and also to permit the barrel to be inserted in or removed from the gun at the front of the said barrel guide and with the guide remaining in place, and a spring-pressed latch on the barrel extension automatically movable into and out of the several notches successively as the barrel is rotated and free to so move when the barrel extension is in its normal position in the casing.

4. In a machine gun, the combination of a main casing, a barrel extension longitudinally reciprocable in the casing and having a threaded barrel receiving opening, a reciprocable breech bolt in the casing, means for locking the breech bolt in its forward position and in operative relation to the barrel extension, a longitudinally reciprocable barrel threaded at its rear portion so as to be adapted to be screwed into or unscrewed from the opening in the barrel extension when the said extension is in its normal position in the casing, the said barrel having its rear face in engagement with the breech bolt when the latter is in locked position and the extent of threaded engagement of the barrel with the barrel extension being limited and determined solely by the said breech bolt, a barrel guide projecting forward from the casing and having near the front thereof a barrel guiding bearing which permits the barrel to be inserted or removed from the front with the guide remaining in place, and a releasable means on the barrel extension adapted to hold the barrel in adjusted position and to prevent relative rotation with respect to the barrel extension.

5. In a machine gun, the combination of a main casing, a longitudinally reciprocable barrel extension in the casing having a threaded barrel receiving opening, a reciprocable breech bolt in the casing, means for locking the bolt in its forward position and in operative relation to the barrel extension, a longitudinally reciprocable barrel having its rear portion threaded to engage the threaded portion of the barrel extension and having its rear face substantially in engagement with the breech bolt when the latter is in locked position so that the extent of threaded engagement of the barrel with the barrel extension is determined solely by the said breech bolt, the said barrel having a portion thereof outside of

the casing adapted for engagement to effect rotative movement so as to screw it into or out of the barrel extension and the said barrel also having thereon two integral bearing surfaces longitudinally spaced apart, a barrel guide secured to the casing at the front thereof, the said guide surrounding the barrel and having its front end so located that the rotation effecting portion of the barrel may be accessible, two barrel guiding bearings one on the casing near the front thereof and the other on the barrel guide near the front thereof which bearings respectively engage the two said bearing surfaces of the barrel to permit normal reciprocating movements, the said bearings being further constructed and arranged to permit rotative barrel movement as aforesaid and also to permit the barrel to be inserted in or removed from the gun at the front of the said barrel guide and with the said guide remaining in place, and means normally resisting rotation of the barrel with respect to the barrel extension which means is additional to the engaging threaded portions of the extension and barrel and is adapted to permit barrel rotation while the barrel and extension are in place in the casing.

6. In a machine gun, the combination of a main casing, a longitudinally reciprocable barrel extension in the casing having a threaded barrel receiving opening, a longitudinally reciprocable barrel threaded at its rear portion to engage the threaded portion of the barrel extension and having a peripheral series of V-shaped notches adjacent the threads, the said barrel having its rear face substantially in engagement with the breech bolt when the latter is in locked position so that the extent of threaded engagement of the barrel with the barrel extension is determined solely by the said breech bolt and the said barrel having a portion thereof outside of the casing adapted for engagement to effect rotative movement so as to screw it into or out of the barrel extension and the said barrel also having thereon two integral bearing surfaces longitudinally spaced apart, a barrel guide secured to the casing at the front thereof, the said guide surrounding the barrel and having its front end so located that the rotation effecting portion of the barrel may be accessible, two barrel guiding bearings one on the casing near the front thereof and the other on the barrel guide near the front thereof which bearings respectively engage the two said bearing surfaces of the barrel to permit normal reciprocating movements, the said bearings being further constructed and arranged to permit rotative barrel movement as aforesaid and also to permit the barrel to be inserted in or removed from the gun at the front of the said barrel guide and with the guide remaining in place, and a spring-pressed latch on the barrel extension automatically movable into and out of the several notches successively as the barrel is rotated and free to so move when the barrel extension is in its normal position in the casing.

7. In a machine gun, the combination of a main casing, a barrel extension longitudinally reciprocable in the casing and having at the front a threaded barrel receiving opening, a longitudinally reciprocable barrel threaded at its rear portion so as to be adapted to be screwed into or unscrewed from the opening in the barrel extension when the said extension is in its normal position in the casing, the said barrel having a rearward facing annular shoulder at the front of the threads and having a peripheral series of V-shaped notches adjacent the shoulder,

and a spring-pressed latch on the barrel extension automatically movable radially into and out of the several notches successively as the barrel is rotated and free to so move when the barrel extension is in its normal position in the casing, the front portion of the latch and the rearward facing shoulder of the barrel being relatively beveled to cause the latch to be moved outward as the barrel is moved rearward.

8. In a machine gun, the combination of a main casing, a barrel extension longitudinally reciprocable in the casing and having at the front a threaded barrel receiving opening, a longitudinally reciprocable barrel threaded at its rear portion so as to be adapted to be screwed into or unscrewed from the opening in the extension when the said extension is in its normal position in the casing, the said barrel having a rearward facing annular shoulder at the front of the threads and having a peripheral series of V-shaped notches adjacent the shoulder, a barrel guide projecting forward from the casing and having near the front thereof a barrel guiding bearing which permits the barrel to be inserted or removed from the front, and a spring-pressed latch on the barrel extension automatically movable radially into and out of the several notches successively as the barrel is rotated and free to so move when the barrel extension is in its normal position in the casing, the front portion of the latch and the rearward facing shoulder of the barrel being relatively beveled to cause the latch to be moved outward as the barrel is moved rearward.

9. In a machine gun, the combination of a main casing, a barrel extension longitudinally reciprocable in the casing and having a threaded barrel receiving opening, a reciprocable breech bolt in the casing, means for locking the breech bolt in its forward position and in operative relation to the barrel extension, a longitudinally reciprocable barrel threaded at its rear portion so as to be adapted to be screwed into or unscrewed from the opening in the barrel extension when the said extension is in its normal position in the casing, the said barrel having its rear face in engagement with the breech bolt when the latter is in locked position and the extent of threaded engagement of the barrel with the barrel extension being limited and determined solely by the said breech bolt and the said barrel having a rearward facing shoulder at the front of the threads and having a series of peripheral V-shaped notches adjacent the shoulder, and a spring-pressed latch on the barrel extension automatically movable radially into and out of the several notches successively as the barrel is rotated and free to so move when the barrel extension is in its normal position in the casing, the front portion of the latch and the rearward facing shoulder of the barrel being relatively beveled to cause the latch to be moved outward as the barrel is moved rearward.

10. In a machine gun, the combination of a main casing, a barrel extension longitudinally reciprocable in the casing and having a barrel receiving opening at the front, a longitudinally reciprocable barrel adapted at the rear to enter the opening in the extension and having means adapted upon rotation to engage the barrel extension to prevent longitudinal movement relative thereto, the said barrel being provided with a bearing surface spaced forward from the rear end thereof and having a diameter at least equal to that of any portion of the barrel behind the

bearing surface, a barrel guide projecting forward from the casing and having a barrel guiding bearing in engagement with the said bearing surface of the barrel and permitting the barrel to be inserted or removed from the front with the guide remaining in place, and a releasable means on the barrel extension adapted to hold the barrel against relative rotation with respect to the barrel extension.

11. In a machine gun, the combination of a main casing, a longitudinally reciprocable barrel extension in the casing, a longitudinally reciprocable barrel normally positioned with its rear portion in the casing and having a portion thereon outside of the casing adapted for engagement to effect rotation, the said barrel also having thereon two integral bearing surfaces longitudinally spaced apart the forward of which bearing surfaces has a diameter at least as great as that of any part of the barrel at the rear thereof, cooperating means on the barrel extension and on the rear portion of the barrel enabling the barrel upon rotative movement thereof to be connected with or disconnected from the extension, a barrel guide secured to the casing at the front thereof and surrounding the barrel, and two barrel guiding bearings one on the casing near the front thereof and engaging the rear bearing surface of the barrel and the other on the barrel guide near the front thereof and engaging the forward bearing surface of the barrel so as to leave the rotation effecting portion thereof accessible, the said bearings being further constructed and arranged to also permit rotative barrel movement as aforesaid and also to permit the barrel to be inserted in or removed from the gun at the front of the said barrel guide and the bearing thereon and with the guide and the bearing both remaining in place.

12. In a machine gun, the combination of a main casing, a barrel extension longitudinally reciprocable in the casing and having at the front a threaded barrel receiving opening, a longitudinally reciprocable barrel threaded at its rear portion so as to be adapted to be screwed into or unscrewed from the opening in the extension when the said extension is in its normal position in the casing, the said barrel having a peripheral series of notches adjacent the threads and also having a bearing surface spaced forward from the threads and having a diameter at least equal to that of any portion of the barrel behind the bearing surface, a barrel guide projecting forward from the casing and having a barrel guiding bearing in engagement with the said bearing surface of the barrel and permitting the barrel to be inserted or removed from the front with the guide remaining in place, and a latch on the barrel extension operable with the extension in its normal position in the casing and adapted to enter any one of the several notches in the barrel to hold the barrel against relative rotation with respect to the barrel extension.

13. In a machine gun, the combination of a main casing, a longitudinally reciprocable barrel extension in the casing having a threaded barrel receiving opening, a reciprocable breech bolt in the casing, means for locking the bolt in its forward position and in operative relation to the barrel extension, a longitudinally reciprocable barrel having its rear portion threaded to engage the threaded portion of the barrel extension and having its rear face substantially in engagement with the breech bolt when the latter is in locked

position so that the extent of threaded engagement of the barrel with the barrel extension is determined solely by the said breech bolt, the said barrel having a portion thereof outside of the casing adapted for engagement to effect rotative movement so as to screw it into or out of the barrel extension and the said barrel also having thereon two integral bearing surfaces longitudinally spaced apart, the forward of which bearing surfaces has a diameter at least as great as that of any part of the barrel at the rear thereof, a barrel guide secured to the casing at the front thereof and surrounding the barrel, and two barrel guiding bearings one on the casing near the front thereof and engaging the rear bearing surface of the barrel the other on the barrel guide near the front thereof and engaging the forward bearing surface of the barrel so as to leave the rotation effecting portion thereof accessible, the said bearings being further constructed and arranged to also permit rotative barrel movement as aforesaid and also to permit the barrel to be inserted in or removed from the gun at the front of the said barrel guide and the bearing thereon and with the guide and bearing both remaining in place, and means normally resisting rotation of the barrel with respect to the barrel extension which means is additional to the engaging threaded portions of the extension and barrel and is adapted to permit barrel rotation while the barrel and extension are in place in the casing.

14. In a machine gun, the combination of a main casing, a barrel extension longitudinally reciprocable in the casing and having a threaded barrel receiving opening, a reciprocable breech bolt in the casing, means for locking the breech bolt in its forward position and in operative relation to the barrel extension, a longitudinally reciprocable barrel threaded at its rear portion so as to be adapted to be screwed into or unscrewed from the opening in the barrel extension when the said extension is in its normal position in the casing, the said barrel having its rear face in engagement with the breech bolt when the latter is in locked position and the extent of threaded engagement of the barrel with the barrel extension being limited and determined solely by the said breech bolt and the said barrel having a peripheral series of notches adjacent the threads, a barrel guide projecting forward from the casing and having near the front thereof a barrel guiding bearing which permits the barrel to be inserted or removed from the front with the guide remaining in place, and a latch on the barrel extension operable with the extension in its normal position in the casing and adapted to enter any one of the several notches in the barrel to hold the barrel against relative rotation with respect to the barrel extension.

15. In a machine gun, the combination of a main casing, a longitudinally reciprocable barrel extension in the casing, a longitudinally reciprocable barrel normally positioned with its rear portion in the casing and having a portion thereof outside of the casing adapted for engagement to effect rotation, the said barrel also having thereon two integral bearing surfaces longitudinally spaced apart the forward of which bearing surfaces has a diameter smaller than the diameter of portions of the barrel at the rear thereof, cooperating means on the barrel extension and on the rear portion of the barrel enabling the barrel upon rotative movement thereof to be connected with or disconnected from the extension, a barrel guide

secured to the casing at the front thereof, the said guide surrounding the barrel and having its front end so located that the rotation effecting portion of the barrel may be accessible, a barrel guiding bearing on the casing near the front thereof engaging the rear bearing surface of the barrel, and a barrel guiding bearing on the barrel guide at the front thereof and engaging the forward bearing surface of the barrel, the last said bearing being readily detachable to permit the barrel to be inserted in or removed from the gun at the front of the barrel guide and with the guide remaining in place.

16. In a machine gun, the combination of a main casing, a longitudinally reciprocable barrel extension in the casing having a threaded barrel receiving opening, a reciprocable breech bolt in the casing, means for locking the bolt in its forward position and in operative relation to the barrel extension, a longitudinally reciprocable barrel having its rear portion threaded to engage the threaded portion of the barrel extension and having its rear face substantially in engagement with the breech bolt when the latter is in locked position so that the extent of threaded engagement of the barrel with the barrel extension is determined solely by the said breech bolt, the said barrel having a portion thereof outside of the casing adapted for engagement to effect rotative movement so as to screw it into or out of the barrel extension and the said barrel also having thereon two integral bearing surfaces longitudinally spaced apart the forward of which bearing surfaces has a diameter smaller than the diameter of portions of the barrel at the rear thereof, a barrel guide secured to the casing at the front thereof, the said guide surrounding the barrel and having its front end so located that the rotation effecting portion of the barrel may be accessible, a barrel guiding bearing on the casing near the front thereof engaging the rear bearing surface of the barrel, a barrel guiding bearing on the barrel guide at the front thereof and engaging the forward bearing surface of the barrel, the last said bearing being readily detachable to permit the barrel to be inserted in or removed from the gun at the front of the barrel guide and with the guide remaining in place, and means normally resisting rotation of the barrel with respect to the barrel extension which means is additional to the engaging threaded portions of the extension and barrel and is adapted to permit barrel rotation while the barrel and extension are in place in the casing.

17. In a machine gun, the combination of a main casing, a longitudinally reciprocable barrel extension in the casing, a longitudinally reciprocable heavy barrel normally positioned with its rear portion in the casing and having a portion thereof outside of the casing adapted for engagement to effect rotation, the said barrel also having thereon two integral bearing surfaces longitudinally spaced apart the forward of which bearing surfaces has a diameter smaller than the diameter of portions of the barrel at the rear thereof, cooperating means on the barrel extension and on the rear portion of the barrel enabling the barrel upon rotative movement thereof to be connected with or disconnected from the extension, a barrel guide secured to the casing at the front thereof, the said guide surrounding the barrel and having its front end so located that the rotation effecting portion of the barrel may be accessible, a barrel guiding bearing on the casing near the front thereof and engaging the rear

bearing surface of the barrel, a barrel guiding bearing sleeve on the barrel guide at the front thereof and engaging the forward bearing surface of the barrel, the said bearing sleeve being
5 readily detachable to permit the barrel to be inserted in or removed from the gun at the front thereof with the barrel guide remaining in place,

and a plug at the front of the barrel carried by the said bearing sleeve and removable therewith, the said plug having an aperture in alignment with the bore of the barrel and serving in conjunction with the sleeve to form a gas chamber
5 at the front of the barrel.

FREDERICK T. MOORE.