

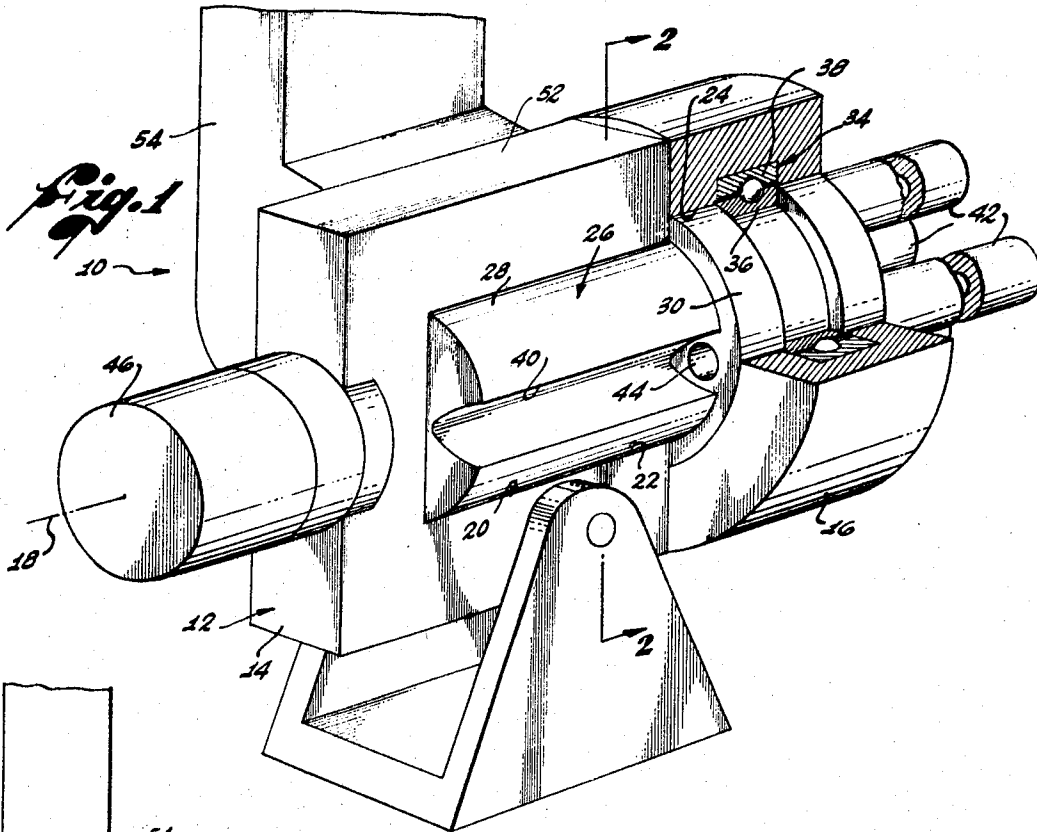
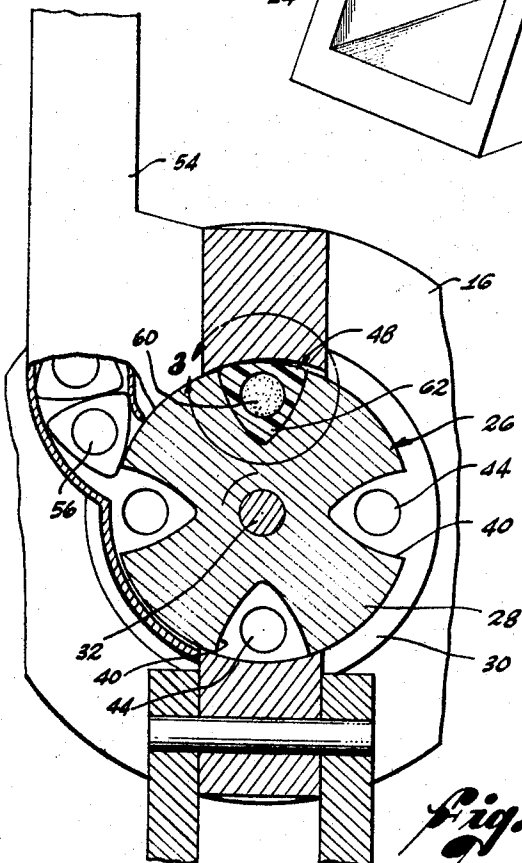
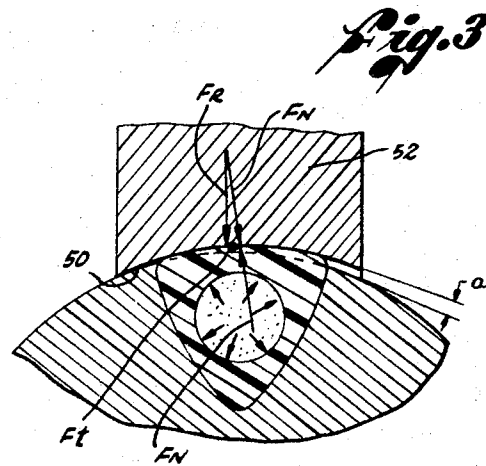
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OPEN CHAMBER BREECH MECHANISM WITH SCARFED FIRING STRAP

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OPEN CHAMBER BREECH MECHANISM WITH SCARFED FIRING STRAP

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ABSTRACT OF THE DISCLOSURE

An open chamber breech mechanism wherein the inner curved wall of the breech frame firing strap recedes at a slight angle from the circumference of the breech cylinder in the direction of cylinder rotation in such a way that when a cased open chamber ammunition round is fired in the breech mechanism, expansion of the cartridge case of the round against the strap wall to seal the breech interfaces against propellant gas leakage produces a driving torque on the cylinder in the direction of its rotation for counteracting the frictional drag torque created by pressurized contact of the case with the wall.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates generally to open chamber breech mechanisms. More particularly the invention relates to such a breech mechanism which is characterized by reduced power requirements for driving the breech cylinder in rotation.

Prior art

Open chamber breech mechanisms are known in the art. Typical breech mechanisms of this type, for example, are disclosed in Patents No. 2,983,223; 3,041,939; 2,831,401; 2,847,784; 3,046,890. Generally speaking, such an open chamber breech mechanism is characterized by a breech frame having a cylinder receiving chamber containing a breech cylinder with one or more firing chambers which open laterally through the circumference of the cylinder. The cylinder is driven in rotation to successively locate each firing chamber in an ammunition infeed position, a firing position, and an ejection position. When in infeed position, the open side of the breech firing chamber registers with an ammunition infeed opening in the breech frame to permit lateral infeed movement of an open chamber ammunition round into the firing chamber. The open side of each firing chamber, when in firing position, is closed by the breech frame, that is by the breech frame firing strap, to condition the breech mechanism for firing the ammunition round contained in the firing chamber. When in ejection position, the open side of each firing chamber registers with an ejection opening in the breech frame to permit lateral ejection of the spent cartridge case of the fired round from the firing chamber. Open chamber breech mechanisms of the character described may be employed in a variety of devices including both weapons or guns and nonweapon, propellant gas powered tools, such as slaughter guns, cable splicers, stud drivers, oil well perforators, and the like. While the improvements contributed by the present invention conceivably may be employed to advantage in some or all of these open chamber devices, such improvements have primary utility in open chamber weapons or guns, particularly high firing rate open chamber guns. Accordingly, the invention will be disclosed in connection with such a gun.

The aforementioned prior art patents disclose open chamber guns embodying two different types of open chamber breech mechanisms. In one type, exemplified by Patent No. 3,041,939, the breech cylinder undergoes continuous rotation during firing, and the gun barrel or

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barrels are secured directly to and rotate with the cylinder. This type of open chamber gun, hereinafter referred to as a rotary barrel open chamber gun, is uniquely adapted for high firing rate operation. In the other type of open chamber breech mechanism, exemplified by the remaining prior art patents referred to earlier, the gun barrel or barrels are fixed to the breech frame, and the breech cylinder is driven in intermittent rotation in such a way that the cylinder is momentarily arrested during firing. This type of gun is hereinafter referred to as a fixed barrel open chamber gun. As will appear from the ensuing description, the improvements contributed by the present invention may be used to advantage in both rotary barrel and fixed barrel open chamber guns. However, such improvements are aimed at correcting certain problems which are most severe in rotary barrel open chamber guns. For this reason, the invention will be disclosed in connection with such a rotary barrel gun.

The problems referred to involve the frictional drag imposed on the breech cylinder during firing and the attendant high power requirements for driving the breech cylinder in rotation. In order to assure a complete understanding of these problems, it is well to consider the basic differences between an open chamber breech mechanism and a conventional closed chamber breech mechanism as applied to automatic weapons or guns. A conventional automatic gun employs an effectively closed firing chamber, that is a firing chamber which is closed about its entire circumference, and a four step firing cycle. This firing cycle involves initial lateral infeed movement of each ammunition round to a position of coaxial alignment with the breech end of the firing chamber, axial insertion or ramming of the round into and firing of the round in the firing chamber, axial extraction of the spent cartridge case of the fired round from the firing chamber, and final lateral ejection of the spent case. Such a conventional breech mechanism and its four step firing cycle possess many inherent disadvantages which are well understood by those versed in the art, and, therefore need not be explained in detail. Suffice it to say that one of the major disadvantages resides in the fact that the axial motions, i.e., the ramming and extracting motions, required of each ammunition round during its respective firing cycle impose a severe limitation on the maximum firing rate.

The open chamber breech mechanism avoids this particular problem. Thus, an open chamber breech mechanism has a simple two step firing cycle involving initial lateral infeed movement of each ammunition round to firing position and final lateral ejection of the spent cartridge case of each fired round from firing position. In other words, in the course of its firing cycle, each ammunition round is introduced laterally into a firing chamber of the breech cylinder through the open side of the firing chamber and is then laterally transported to firing position by rotation of the cylinder. After firing, the spent cartridge case of the fired round is laterally transported from firing position by rotation of the cylinder and is then laterally ejected from the firing chamber through the open side of the chamber. Thus, the open chamber breech mechanism eliminates all axial motions of the ammunition rounds. As a consequence, an automatic open chamber gun is capable of an extremely high firing rate, far exceeding maximum firing rate of the conventional automatic gun.

An open chamber gun, however, is subject to one problem. Thus, the breech frame and breech cylinder define therebetween various leakage interfaces which must be sealed against propellant gas leakage during firing. One of these leakage interfaces exists between the inner wall of the breech frame firing strap and the circumference of the breech cylinder, about the open side of each firing chamber. In the open chamber guns disclosed in the

aforementioned prior art patents, this leakage interface is sealed during firing by the cartridge case of the fired round.

To this end, each firing chamber in the breech cylinder has a generally V shape in transverse cross section and is bounded by two concave sidewalls which converge in the direction of the cylinder axis and join one another along their radially inner edges. The inner wall of the breech frame firing strap is curved to substantially the same radius as and is disposed in close proximity to or in sliding contact with the circumference of the breech cylinder. When a firing chamber is located in firing position, the open side of the chamber is spanned and closed by this curved wall of the firing strap, whereby the chamber has effectively a triangular round shape in transverse cross section.

Actually, the aforementioned prior art patents disclose two different firing chamber configurations. The preferred configuration, illustrated in the majority of the patents, has firing chamber side walls which are curved to the same radius as the circumference of the breech cylinder, such that each firing chamber, when in firing position, has a generally equilateral triangular round shape in cross section.

The open chamber ammunition rounds which are fired in these open chamber guns have the same generally triangular round shape in cross section as, and are sized to complement, the firing chambers. Accordingly, when an ammunition round is located in firing position within a firing chamber, the curved side of the round which is exposed at the open side of the firing chamber is substantially flush with the circumference of the breech cylinder. Each ammunition round has an outer yieldable, non-combustible cartridge case which is typically constructed of one of the plastic materials referred to in the prior art patents. When a round is fired, the high pressure propellant gas generated by burning of the propellant charge within the cartridge case of the round performs a two-fold function. First, the pressurized gas propels the projectile of the round forwardly through the gun bore with which the round is currently aligned. Secondly, the pressurized gas expands the yieldable, noncombustible case of the round outwardly against the walls of the firing chamber and the inner wall of the breech frame firing strap to seal the leakage interfaces between the firing strap and the circumference of the breech cylinder, about the open side of the firing chamber.

It will be recalled that the invention is concerned with correcting a frictional drag problem, and an attendant cylinder driving power requirement, which are most severe in a rotary barrel open chamber gun. Thus, in an open chamber gun of this type, the barrel or barrels of the gun are secured to and rotate with the breech cylinder, and the cylinder undergoes continuous rotation during firing. As a consequence, the cartridge case of each fired round undergoes lateral sliding motion across the curved inner wall of the breech frame firing strap concurrently with expansion of the cartridge case against this wall to seal the breech interfaces. This action produces a substantial frictional drag torque on the breech cylinder and substantially increases the power required to drive the cylinder.

The existing rotary barrel open chamber guns, therefore, are characterized by a relatively high cylinder driving power requirement which detracts from the advantages of such a gun.

While, as noted, this frictional drag problem is most severe in a rotary barrel open chamber gun, it nevertheless exists, to a lesser degree, in a fixed barrel open chamber gun and in other open chamber devices of the kind referred to earlier. Thus, although in a fixed barrel gun the breech cylinder is stationary during firing and is thus not subjected to a propellant gas pressure induced frictional drag force at the instant of firing, nevertheless, the cylinder may be rotated from one firing position to

the next immediately after firing and while the propellant gas pressure within the spent cartridge case of the fired round is still at an elevated level. Depending upon the firing rate of the gun, and hence the rate of intermittent rotation of the breech cylinder, the propellant gas pressure level within the cartridge case of each fired round may be such as to retain the cartridge case of the round in sufficient frictional contact with the breech frame firing strap to impose a substantial frictional drag force on the breech cylinder.

SUMMARY OF THE INVENTION

The present invention provides an improved open chamber breech mechanism which obviates the above discussed frictional drag problem. To this end, the invention provides an open chamber breech mechanism wherein the inner curved wall of the breech frame firing strap is scarfed, i.e., curved or shaped so that this wall recedes at a slight angle from the circumference of the breech cylinder in the direction of cylinder rotation. The scarf angle is such that the propellant gas pressure induced expansion of the cartridge case of each fired round against the firing strap wall to seal the breech interfaces against propellant gas leakage produces a driving torque on the breech cylinder in the direction of its rotation. This driving torque, hereinafter referred to as a compensating torque, effectively reduces the frictional drag torque imposed on the cylinder and, thereby, the power required to drive the cylinder in rotation. According to the preferred practice of the invention, the angle, measured in radians, between the inner wall of the firing strap and the circumference of the cylinder is made substantially equal to the coefficient of friction of the cartridge case against the wall. Under these conditions, the frictional drag torque and the compensating torque on the breech cylinder will substantially balance one another.

As will appear from the ensuing description, scarfing the breech frame firing strap in the manner explained above creates a slight gap between the circumference of the cylinder and the trailing edge of the firing strap wall, relative to the direction of cylinder rotation. According to the present invention, the width of this gap is minimized, to avoid extrusion or rupture of the cartridge case through the gap, by selecting breech frame and cartridge case materials having a relatively low coefficient of friction. A reduced coefficient of friction, of course, reduces the scarf angle of the breech frame firing strap required to produce on the cylinder a compensating torque approximately equal to the frictional drag torque, and hence the width of the gap.

At this point, attention is again directed to the fact that while the invention will be disclosed in connection with a rotary barrel open chamber gun, the invention may be utilized to its advantage in a fixed barrel open chamber gun as well as in some or all of the open chamber devices referred to earlier.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. 1 is a perspective view, partly in section, of a rotary barrel open chamber gun according to the invention;

FIG. 2 is a section taken on line 2—2 in FIG. 1; and
FIG. 3 is an enlargement of the area enclosed by the circular arrow 3 in FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, there is illustrated a rotary barrel open chamber gun 10 according to the invention. This gun, with the exception of its firing strap scarfing, is generally conventional and thus need be described only in sufficient detail to enable a full and complete understanding of the present invention. With this in mind, the illustrated gun will be seen to comprise a

breech frame 12 having a rear, generally flat rectangular portion 14 and a front circular flange-like portion 16. This front frame flange has a central axis 18 which coincides with the longitudinal axis of the frame. Formed within the breech frame 12, on the axis 18, is a cylinder receiving chamber 20. The rear end portion 22 of the chamber, within the rear frame portion 14, opens laterally through opposite sides of this frame portion. The front end portion 24 of the chamber is circular in cross section, radially enlarged relative to the rear chamber portion, and opens forwardly through the front end of the frame flange 16.

Contained within the chamber 20 is a breech cylinder 26. This breech cylinder has a rear cylindrical end portion 28 positioned within the rear chamber portion 22 and a front cylindrical, radially enlarged flange portion 30 positioned within the front chamber portion 24. Extending coaxially from the rear end of the breech cylinder is a shaft 32. This shaft is journaled in the rear end of the breech frame 12. Surrounding the front cylinder flange 30 is a ball bearing unit 34 having an inner race 36 secured to the cylinder flange and an outer race 38 secured within the frame flange 16. It is evident at this point, therefore, that the breech cylinder 26 is rotatably supported by its shaft 32 and the bearing unit 34 for rotation in the breech frame 12 on the axis 18.

The rear end portion 28 of the breech cylinder 26 is formed with a number, in this instance four, of uniformly circumferentially spaced, longitudinally extending firing chambers 40. Each firing chamber opens laterally through the circumference of the cylinder and has the generally triangular round shape in cross section, referred to earlier. Threaded or otherwise secured within and extending forwardly from the front cylinder flange 30, in parallel relation to the cylinder axis 18, are a number of barrels 42. These barrels are equal in number to and are coaxially aligned with the firing chambers 40, respectively. Within each barrel is a bore 44 which opens at its rear end to the front end of the adjacent firing chamber. It is now evident, therefore, that the breech cylinder 26 and the barrels 42 are rotatable in unison on the axis 18.

Mounted on the rear end of the breech frame 12 is a motor 46 for driving the breech cylinder 26 and barrels 42 in rotation in the clockwise direction, as the gun is viewed in FIGS. 2 and 3. During this rotation, the cylinder firing chambers 40 rotate in succession through an ammunition infeed position, a firing position, and a cartridge case ejection position. When in ammunition infeed position, the open side of the open side of each firing chamber registers with an ammunition infeed opening in the breech frame to permit lateral infeed movement of a live ammunition round 48 into the chamber. This infeed opening is furnished by the open, left side of the cylinder receiving chamber 20, as this chamber is viewed in FIG. 2. When in firing position, the open side of each firing chamber is spanned and closed by the inner wall 50 of the breech frame firing strap 52. Finally, when in ejection position, the open side of each firing chamber registers with a cartridge case ejection opening in the breech frame to permit lateral ejection of the spent cartridge case of a fired round from the chamber. This ejection opening is furnished by the open right hand side of the cylinder receiving chamber in FIG. 2. The illustrated open chamber gun 10 includes ammunition infeed means 54 for laterally feeding an ammunition round 48 to each firing chamber 40 during rotation of the chamber through its ammunition infeed position. An open chamber gun according to the invention may utilize a variety of ammunition infeed means, including any one of those disclosed in the aforementioned patents. The particular ammunition infeed means illustrated comprise an ammunition magazine containing a spring loaded follower (not shown) for urging the ammunition rounds in the magazine toward the breech cylinder 26. Similarly, an open chamber gun according to the invention may utilize vari-

ous firing means for firing each ammunition round in firing position. In the particular gun illustrated, each ammunition round 48 contains an electrically actuated primer 56 and the gun is equipped with electrical firing means (not shown). This electrical firing means is mounted in the rear end of the breech frame 12, in a position to fire each ammunition round upon arrival of the round and its containing firing chamber 40 at firing position within the breech frame.

As thus far described, the open chamber gun 10 is essentially conventional. During operation of the gun, the breech cylinder 26 and the gun barrels 42 are driven in rotation in unison by the cylinder drive motor 46. The cylinder firing chambers 40 are thereby rotated in succession through their infeed, firing and ejection positions. As each firing chamber rotates through infeed position, it receives a live ammunition round 48 from the ammunition infeed means or magazine 54. The round is then carried to and fired in firing position by the firing means. When thus fired, the propellant charge 60 within the round is ignited to generate a high pressure propellant gas which drives the projectile (not shown) of the round forwardly through the corresponding gun bore 44.

As noted earlier, one of the major problems involved in an open chamber gun involves sealing of the breech interfaces against propellant gas leakage during firing, which sealing function is accomplished by the cartridge case 62 of each fired ammunition round 48. To this end, the cartridge case of each round is constructed of a yieldable noncombustible material, such as one of the plastics referred to in the earlier mentioned patents. When an ammunition round is fired in a firing chamber 40 of the gun, the internal propellant gas pressure generated within the cartridge case expands the latter outwardly against the walls of the firing chamber and breech frame 12 to seal the breech interfaces against propellant gas leakage. A major part of this sealing function involves expansion, against the breech frame firing strap wall 50, of the side of the cartridge case which is exposed at the open side of the firing chamber to seal the leakage interfaces existing between the firing strap and the breech cylinder 26, about the open side of the chamber. To enable this latter sealing function to be accomplished effectively, the inner wall of the firing strap is curved to approximately the same radius as and is disposed in close proximity to or in sliding contact with the cylinder circumference. As noted earlier, the exposed side of each cartridge case is also curved to the same radius. The cartridge case of each fired round is thus permitted to expand into intimate sealing contact with the firing strap wall 50 to effectively seal the open side of the firing chamber against propellant gas leakage.

As noted earlier, however, and as will now be evident, this sealing function creates a substantial frictional drag on the breech cylinder 26 and a corresponding high power requirement for driving the cylinder in rotation. In this regard, it will be observed that in the illustrated rotary barrel open chamber gun, the exposed side of the cartridge case 62 of each fired ammunition round 48 undergoes lateral sliding motion across the inner wall 50 of the breech frame firing strap 52 concurrently with expansion of the cartridge case against the wall by internal propellant gas pressure to seal the breech interfaces. This sliding motion obviously imposes a high frictional drag on the cylinder which must be overcome by supplying correspondingly high driving power to the cylinder. It can be demonstrated, for example, that the driving power W required to overcome such frictional drag and maintain a constant speed of the breech cylinder is

$$W = Kn^2u$$

where:

K is a constant

n is the rate of fire

u is the coefficient of sliding friction of the cartridge case against the firing strap.

It is evident from the foregoing that the frictional drag imposed on the breech cylinder 26 during firing may be reduced somewhat by utilizing cartridge case and breech frame materials having a relatively low coefficient of friction. However, even with the maximum reduction in frictional drag which may be accomplished in this way, the remaining frictional drag, and hence the power required to drive the breech cylinder, are still quite high.

The present invention proposes to effect a further substantial reduction in the frictional drag on the breech cylinder 26, and thereby a substantial reduction in the driving power required to drive the cylinder, by scarfing the inner wall 50 of the breech frame firing strap 52 in the manner shown in the drawings. Thus, according to the invention, the firing strap wall is curved in such a way that this wall recedes at a small angle α from the circumference of the breech cylinder in the direction of its rotation. It will be observed that when the firing strap is thus scarfed, the cartridge case 62 of each fired ammunition round 48 exerts a force F_n against the firing strap wall 50 along a line of action normal to the wall. The cartridge case, and hence the breech cylinder 26, are thus subjected to an equal and opposite reaction force F_n which may be resolved into a component F_r directed radially of the cylinder and a component F_t directed tangentially of the cylinder. This tangential force component has a magnitude which is a function of the scarf angle α and produces a driving or compensating torque on the breech cylinder in opposition to the frictional drag on the cylinder.

It is evident that increasing the scarf angle increases the compensating torque produced on the breech cylinder 26 by the propellant gas pressure induced thrust of each fired ammunition round against the breech frame firing strap 52. Theoretically, if the scarf angle in radians is made equal to the coefficient of friction of the cartridge case against the firing strap, the compensating torque will balance and thus effectively eliminate the frictional drag on the cylinder. However, it will be observed that scarfing the firing strap in the manner illustrated increases the width of the clearance separation or gap between the cylinder circumference and the trailing edge of the firing strap relative to the direction of the cylinder rotation. If this gap width is excessive, the cartridge case 62 of a fired ammunition round 48 may extrude and/or rupture through the gap under the force of the internal propellant gas pressure generated in the case during firing. Accordingly, the maximum scarf angle of the firing strap, and hence the magnitude of the resulting compensating torque produced in the breech cylinder 26 are limited by the maximum gap width which may be tolerated without rupture of the cartridge cases of the fired rounds.

This problem of maximum gap width is alleviated to some degree by virtue of the fact that the time duration of high propellant gas pressure during firing is relatively short (i.e., less than 1 millisecond), and the peripheral speed of the breech cylinder is typically relatively low (i.e., on the order of 50 feet per second). Considering all of these factors, it has been determined that maximum gap widths on the order of 0.020 inch may be utilized. When manufacturing tolerances and their effects on minimum running gaps are also considered, it has been determined that a maximum scarf angle on the order of 0.025 radians may be utilized for a peripheral speed of 50 feet per second and not exceed the 0.020 maximum gap width, and that with a coefficient of friction of the ammunition cartridge case against the firing strap on the order of 0.04 (corresponding to the friction coefficient of Teflon against polished steel) the compensating torque on the breech cylinder will be on the order of 62% of the frictional drag imposed on the cylinder during firing.

It must be noted that the maximum allowable gap width is the controlling factor and that at lower peripheral speeds and/or shorter periods of propellant gas pressurization, the allowable scarf angle can increase due to the shorter tangential distance traveled by the cartridge

case during pressurization. It has been determined that at a peripheral speed of 31 feet per second, the compensating torque on the breech cylinder will equal the frictional drag and will reduce the frictional driving horsepower requirements to zero.

It is now evident, therefore that the present invention achieves a substantial reduction in the power required to drive the breech cylinder of a rotary barrel open chamber gun of the character illustrated. As noted earlier, however, the scarfed firing strap concept of the invention may be utilized to advantage in fixed barrel open chamber guns and in other open chamber devices.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. An open chamber breech mechanism comprising: a breech frame containing a cylinder receiving chamber extending longitudinally of said frame and opening laterally through the sides of said frame to define ammunition infeed and cartridge case ejection openings to said chamber and a firing strap having a generally cylindrically curved surface bounding and defining a wall of said chamber;

a cylinder coaxially disposed within said chamber and containing a longitudinal firing chamber opening laterally through the circumference of the cylinder; means supporting said cylinder on said frame for rotation in one direction on the axis of said receiving chamber and through an ammunition infeed position wherein the open side of said firing chamber registers with said infeed opening to permit lateral infeed movement of a cased open chamber ammunition round into said firing chamber, a firing position wherein the open side of said firing chamber is spanned and closed by said receiving chamber wall to condition said breech mechanism for firing the round contained in said firing chamber, and an ejection position wherein the open side of said firing chamber registers with said ejection opening to permit lateral ejection of the spent cartridge case of the fired round from said firing chamber;

said cylinder and frame defining therebetween propellant gas leakage interfaces about the open side of said firing chamber when said firing chamber occupies said firing position, and the propellant gas pressure generated during firing of each ammunition round in firing position being effective to expand the cartridge case of the fired round outwardly against the walls of said firing chamber and said receiving chamber wall to seal said interfaces against propellant gas leakage;

said receiving chamber wall being disposed in close proximity to and having substantially the same curvature as the circumference of said cylinder; and

said receiving chamber wall receding at a slight angle from the circumference of said cylinder in said direction of cylinder rotation, whereby expansion of the cartridge case of each fired round against said receiving chamber wall produces a driving torque on said cylinder in said direction.

2. An open chamber breech mechanism comprising: a breech frame containing a cylinder receiving chamber extending longitudinally of said frame and opening laterally through the sides of said frame to define ammunition infeed and cartridge case ejection openings to said chamber;

a cylinder coaxially disposed within said chamber and containing a longitudinal firing chamber opening laterally through the circumference of the cylinder; means supporting said cylinder on said frame for rotation on the axis of said receiving chamber and through an ammunition infeed position wherein the open side of said firing chamber registers with said infeed opening to permit lateral infeed movement of a cased open chamber ammunition round into said

firing chamber, a firing position wherein the open side of said firing chamber is spanned and closed by a wall of said receiving chamber to condition said breech mechanism for firing the round contained in said firing chamber, and an ejection position wherein the open side of said firing chamber registers with said ejection opening to permit lateral ejection of the spent cartridge case of the fired round from said firing chamber;

said cylinder and frame defining therebetween propellant gas leakage interfaces about the open side of said firing chamber when said firing chamber occupies said firing position, and the propellant gas pressure generated during firing of each ammunition round in firing position being effective to expand the cartridge case of the fired round outwardly against the walls of said firing chamber and said receiving chamber wall to seal said interfaces against propellant gas leakage;

said receiving chamber wall being disposed in close proximity to and having substantially the same curvature as the circumference of said cylinder; and

said receiving chamber wall receding from the circumference of said cylinder in said direction of cylinder rotation at an angle whose measurement in radians approximates the coefficient of sliding friction of an ammunition cartridge case against said latter wall.

3. An open chamber gun comprising:

a breech frame containing a cylinder receiving chamber having a central axis extending longitudinally of said frame and opening laterally through opposite sides of said frame to define ammunition infeed and cartridge case ejection openings in said frame and a longitudinal firing strap on said frame between said openings,

a breech cylinder coaxially disposed within said chamber and containing a longitudinally firing chamber opening laterally through the circumference of said cylinder,

means supporting said cylinder on said frame for rotation on said axis and through an ammunition infeed position wherein the open side of said firing chamber registers with said infeed opening to permit lateral infeed movement of a cased open chamber ammunition round into said firing chamber, a firing position wherein the open side of said firing chamber is spanned and closed by the inner wall of said firing strap to condition said gun for firing the round con-

tained in said firing chamber, and an ejection position wherein the open side of said firing chamber registers with said ejection opening to permit lateral ejection of the spent cartridge case of the fired round from said firing chamber,

a barrel secured to the front end of and extending forwardly from said breech cylinder in coaxial alignment with said firing chamber and having a bore opening rearwardly to said firing chamber,

said cylinder and frame defining therebetween propellant gas leakage interfaces about the open side of said firing chamber when said firing chamber occupies said firing position and the propellant gas pressure generated during firing of each ammunition round in firing position being effective to expand the cartridge case of the fired round outwardly against the wall of said firing chamber and said firing strap wall to seal said interfaces against propellant gas leakage,

said firing strap wall being disposed in close proximity to and having substantially the same curvature as the circumference of said cylinder and

said firing strap wall receding at a small angle from the circumference of said cylinder in the direction of cylinder rotation, whereby expansion of the cartridge case of each fired round against said latter wall produces a driving torque on said cylinder in the direction of cylinder rotation and in opposition to the frictional drag imposed on said cylinder by sliding contact of the cartridge case of the fired round with said firing strap wall.

4. An open chamber gun according to claim 3 wherein: the angle in radians between said firing strap wall and the circumference of said cylinder approximates the coefficient of sliding friction of an ammunition cartridge case against said latter wall.

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